**DEPARTMENT OF THE ARMY**
**HEADQUARTERS, UNITED STATES ARMY GARRISON, HAWAII**
**SCHOFIELD BARRACKS, HAWAII 96857-5000**

REPLY TO
ATTENTION OF

Office of the Garrison Commander

Date: 28 May 2004

Release of the Army Transformation Final Environmental Impact Statement (EIS)

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The U.S. Army Hawai'i announces the release of the Final Environmental Impact Statement (EIS) analyzing the impacts of the proposed Army Transformation of the 2nd Brigade, 25th Infantry Division (Light), to a Stryker Brigade Combat Team (SBCT). The Hawai'i transformation proposal includes 28 construction projects and five land acquisitions on the islands of O'ahu and Hawai'i.

Based on public comments the Army received on the Draft EIS, the Army has expanded its analysis in the Final EIS and has changed its determinations of effect as to some environmental resources. Changes are denoted by underlined text and a sidebar in the margin.

The public comments and responses (Volume IV and Volume V) are provided in a CD in the back of Volume III. Hard copies of Volumes IV and V are available upon request.

The Final EIS is available for review on the web at www.sbcteis.com or at the following libraries:

- Hilo Public Library, 300 Waianuenue Avenue, Hilo, Hawai'i 96720-2477;
- Kailua-Kona Public Library, 75-138 Hualalai Road, Kailua-Kona, Hawai'i 96740-1704;
- Thelma Parker Memorial Public and School Library, 96767-1209 Mamalahoa Hwy. Kamuela, Hawai'i 96743-8429;
- Kahuku Public and School Library, 56-490 Kamehameha Hwy., Kahuku, Hawai'i 96731-2200;
- Mililani Public Library, 95-450 Makaimoimo Street, Mililani, Hawai'i 96789-3018;
- Hawaii State Library, 478 South King St., Honolulu, Hawai'i 96813-2901;
- Wahiawa Public Library, 820 California Avenue, Wahiawa, Hawai'i 96786-2034;
- Waianae Public Library, 85-625 Farrington Hwy., Waianae, Hawai'i 96792-2406;
- Waialua Public Library, 67-068 Kealohanui Street, Waialua, Hawai'i 96791; and
- UH Environmental Center, Krauss Annex 19, 2500 Dole Road, Honolulu, Hawai'i 96822-2217.

To request copies of the Executive Summary, CDs or hard copies of the Final EIS, please contact:

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The Army anticipates a decision on the implementation of the proposed action in June 2004. At that time, we will notify the public of the final decision for the proposed action.

12 Apr 2004

DEPARTMENT OF THE ARMY

$25^{TH}$ INFANTRY DIVISION (LIGHT) AND U.S. ARMY, HAWAII

# FINAL ENVIRONMENTAL IMPACT STATEMENT

# TRANSFORMATION OF U.S. ARMY HAWAII

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12 Apr 2004

DEPARTMENT OF THE ARMY

25th INFANTRY DIVISION (LIGHT) AND U.S. ARMY, HAWAII

# FINAL ENVIRONMENTAL IMPACT STATEMENT

# TRANSFORMATION OF U.S. ARMY HAWAII

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DEPARTMENT OF THE ARMY

UNITED STATES ARMY PACIFIC COMMAND

# FINAL ENVIRONMENTAL IMPACT STATEMENT

# TRANSFORMATION OF U.S. ARMY HAWAII

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**12 April 2004**

12 Apr 2004

DEPARTMENT OF THE ARMY

INSTALLATION MANAGEMENT AGENCY PACIFIC REGION OFFICE

# FINAL ENVIRONMENTAL IMPACT STATEMENT

# TRANSFORMATION OF U.S. ARMY HAWAII

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Pacific Region Office

# Final Environmental Impact Statement

# Transformation of the 2nd Brigade, 25th Infantry Division (L) to a Stryker Brigade Combat Team in Hawai‘i

## Volume 1

*Prepared for*
Department of the Army
Office of the Secretary of the Army
Washington, DC

and

US Army Corps of Engineers
Honolulu Engineer District
Fort Shafter, Hawai‘i

*Prepared by*
Tetra Tech, Inc.
Honolulu, Hawai‘i

May 2004

# *Organization of Document*

An ***ACRONYM LIST*** is provided at the beginning of the document.

An ***EXECUTIVE SUMMARY*** briefly describes the proposed action, environmental and socioeconomic impacts, and mitigation measures.

***CHAPTER 1:*** ***PURPOSE, NEED, AND SCOPE*** summarizes the purpose of and need for the proposed action and describes the scope of the environmental impact analysis process.

***CHAPTER 2:*** ***PROPOSED ACTION AND ALTERNATIVES*** describes the proposed action to transform the 2nd Brigade in Hawai'i to a Stryker Brigade Combat Team (SBCT) and examines alternatives for implementing the proposed action.

***CHAPTER 3:*** ***AFFECTED ENVIRONMENT OVERVIEW*** describes the existing environmental conditions for the Region of Influence (ROI) that could be affected by the proposed action. This chapter provides overview information for the islands of O'ahu and Hawai'i with specific information by installation detailed in Chapters 5 through 8.

***CHAPTER 4:*** ***ENVIRONMENTAL CONSEQUENCES OVERVIEW*** identifies potential environmental effects that could occur if the proposed action or alternatives were implemented. This chapter presents the overall project-wide impacts at all of the installations, with specific impacts at each individual installation presented in Chapters 5 through 8.

***CHAPTERS 5 through 8:*** ***AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES*** describes existing conditions and analysis of potential environmental effects that could occur at each project installation if the proposed action or alternatives were implemented.

***Chapter 5:*** Schofield Barracks Military Reservation and Wheeler Army Airfield
***Chapter 6***: Dillingham Military Reservation
***Chapter 7***: Kahuku Training Area and Kawailoa Military Reservation
***Chapter 8***: Pōhakoloa Training Area

***CHAPTER 9:*** ***CUMULATIVE IMPACTS*** addresses what effects the proposed action would have on the environment, when combined with other past, present, and reasonably foreseeable actions.

***CHAPTER 10:*** ***ENVIRONMENTAL JUSTICE AND OTHER REQUIRED NEPA ANALYSES*** provides additional evaluation of the project's impacts with regards to significant unavoidable adverse impacts, the relationship between short-term uses and long-term productivity; and any irreversible or irretrievable commitment of resources.

***CHAPTER 11:*** ***REFERENCES*** provides the bibliographical information for cited sources of information.

***CHAPTER 12:*** ***LIST OF PREPARERS*** identifies persons who prepared this EIS.

***CHAPTER 13:*** ***DISTRIBUTION LIST*** identifies recipients of this EIS.

***CHAPTER 14:*** ***GLOSSARY AND INDEX*** helps facilitate the review of this EIS.

***APPENDICES***

**May 2004**
**Abstract**
**FINAL ENVIRONMENTAL IMPACT STATEMENT**

**Army Transformation to a Stryker Brigade Combat Team in Hawaii**

This environmental impact statement (EIS) addresses the Army's proposed transformation of the 2nd Brigade, 25th Infantry Division (Light) in Hawai'i to a Stryker Brigade Combat Team (SBCT). This document has been developed in accordance with the National Environmental Policy Act and implementing regulations issued by the Council on Environmental Quality (40 CFR 1500 – 1508) and the Army (32 CFR 651). Its purpose is to inform decision-makers and the public of the likely environmental and socioeconomic consequences of the proposed action and alternatives.

The Department of the Army prepared a programmatic environmental impact statement (PEIS) to evaluate the potential environmental and socioeconomic effects associated with transformation of the entire Army nationwide. The Army issued the Final PEIS and Record of Decision for Army Transformation in 2002. The PEIS designated the 2nd Brigade and five other units across the United States as part of the initial phase of transformation. These units would be converted to SBCTs.

Three alternatives are evaluated in this EIS, including the Proposed Action (the Army's Preferred Alternative), a Reduced Land Acquisition Alternative, and the No Action Alternative. The purpose of the Proposed Action is to assist in bringing the Army's Interim Force to operational capability and to provide realistic training in Hawai'i.

The Proposed Action includes training to be conducted at Schofield Barracks Military Reservation, Dillingham Military Reservation, Kahuku Training Area and Kawailoa Training Area on O'ahu and at Pōhakuloa Training Area on the island of Hawai'i. Twenty-eight projects are proposed that would improve on the existing support structure and facilities to provide the necessary field training required for an SBCT. These projects include construction of ranges, airfield upgrades, land acquisition, and new equipment such as new and modernized vehicles (namely the Stryker, an eight-wheeled, 20-ton combat vehicle) and weapons systems (105mm cannon and 120mm mortar). The number of soldiers and vehicles stationed at SBMR also would increase. The Army would acquire land on O'ahu (approximately 1,400 acres) and on the island of Hawai'i (approximately 23,000 acres) for training areas and road construction.

The Reduced Land Acquisition Alternative is identical to the Proposed Action, with two exceptions, moving a proposed new training range from Schofield Barracks to Pōhakuloa Training Area and reducing land acquisition at Schofield Barracks from approximately 1,400 acres to approximately 100 acres.

Under the No Action Alternative, the Army would not undertake the proposed conversion of the 2nd Brigade to an SBCT in Hawai'i. The 2nd Brigade would continue to train and operate as a conventional light infantry force.

There would be both adverse and beneficial impacts from all alternatives. Significant impacts on land use, air quality, noise, geology and soils, biological resources, and cultural resources have been identified. Significant impacts mitigable to less than significant have been identified on visual resources, water resources, human health and safety, and socioeconomics.

| | |
|---|---|
| The Army will issue a Record of Decision 30 days after notification of the availability of the Final EIS is published in the *Federal Register*.<br><br>Individuals and organizations are invited to access information at the Army's Web site established for this EIS at www.sbcteis.com. | If you would like further information regarding this statement, please contact:<br><br>Ms. Cindy Barger<br>US Army Corps of Engineers<br>Honolulu Engineer District, Building 230<br>Ft. Shafter, HI 96858-5440<br>Commercial Telephone: 808-438-4812<br>E-mail: sbct_eis@usace.army.mil |

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## LIST OF ACRONYMS

| Acronym | Full Phrase |
|---|---|
| $25^{th}$ ID(L) | $25^{th}$ Infantry Division (Light) |
| $2^{nd}$ Brigade | $2^{nd}$ Brigade, $25^{th}$ Infantry Division (Light) |
| A&M | artillery and mortar |
| AAFES | Army and Air Force Exchange Service |
| AALFTR | anti-armor live fire & training range |
| AASHTO | American Association of State Highway and Transportation Officials |
| ACHP | Advisory Council on Historic Preservation |
| ACM | asbestos-containing material |
| ACP | Area Contingency Plans |
| ADT | average daily traffic |
| AFCEE | Air Force Center for Environmental Excellence |
| AFS | Army Facility Strategy Program |
| AGL | above ground level |
| AHA | ammunition holding areas |
| AHERA | Asbestos Hazardous Emergency Response Act |
| AICUZ | Air Installation Compatible Use Zone |
| ALISH | Agricultural Lands of Importance to the State of Hawai'i |
| AMT | armor moving targets |
| API | American Petroleum Institute |
| APZ | accident potential zone |
| AR | Army Regulation |
| ARPA | Archaeological Resources Protection Act |
| ARTCC | Air traffic control center |
| ARTEP | Army Training and Evaluation Program |
| ASP | ammunition storage point |
| AST | aboveground storage tank |
| ATGM | anti-tank guided missile |
| ATI | area of traditional importance |
| ATSC | Army Training Support Center |
| ATTACC | Army Training and Testing Area Carrying Capacity |
| AVN | Aviation |
| BA | biological assessment |
| BAAF | Bradshaw Army Airfield |
| BAT | best available technology |
| BAX | battle area complex |
| BDE | Brigade |
| BEA | Bureau of Economic Analysis |
| BEDT | Hawai'i Department of Business, Economic Development, and Tourism |
| bgs | below ground surface |

| Acronym | Full Phrase |
|---|---|
| BLS | Bureau of Labor Statistics |
| BMP | best management practice |
| BO | Biological Opinion |
| BPT | best practicable control technology |
| BSA | biologically significant area |
| BTEX | benzene, toluene, ethylbenzene and xylene |
| BWS | Board of Water Supply |
| CACTF | Combined Arms Collective Training Facility |
| CALFEX | company combined arms live fire exercises |
| CCAAC | Company Combined-Arms Assault Course |
| CCD | Census County Division |
| CEMML | Center for Ecological Management of the Military Lands |
| CEQ | Council on Environmental Quality |
| CERAP | combined center radar approach |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFA | controlled firing area |
| CFR | Code of Federal Regulations |
| CFX | command field exercise |
| CHPPM | Center for Health Promotion and Preventive Medicine |
| CNEL | community noise equivalent level |
| CPR | Combat Pistol Range |
| CPX | command post exercise |
| CSS | combat service support |
| CTP | combat trail maintenance program |
| CTPP | Countrywide Transportation Planning Process |
| CV | Commander's vehicle |
| CWA | Clean Water Act |
| CZARA | Coastal Zone Act Reauthorization Amendments |
| CZM | Coastal Zone Management |
| dB | decibel |
| dBA | A-weighted decibel scale |
| dBC | C-weighted decibel scale |
| DBCP | dibromochloropropane |
| DCA | dichloroacetic acid |
| DEM | digital elevation model |
| DES | demolition effect simulators |
| DLNR | Department of Land and Natural Resources |
| DMR | Dillingham Military Reservation |
| DNT | 2,4- and 2,6-Dinitrotoluene |
| DOD | Department of Defense |

## LIST OF ACRONYMS *(continued)*

| Acronym | Full Phrase |
|---|---|
| DOE | Department of Energy |
| DOFAW | Hawai'i Division of Forestry Fish and Wildlife |
| DOH | Department of Health |
| DOI | Department of the Interior |
| DOL | Directorate of Logistics |
| DOT | Department of Transportation |
| DP | District Planning |
| DPTMSEC | Directorate of Plans, Training, Mobilization, and Security |
| DPW | Directorate of Public Works |
| DRMO | Defense Reutilization and Marketing Office |
| DuSMMoP | Dust and Soils Mitigation and Monitoring Plan |
| EAs | environmental assessments |
| East Range | Schofield Barracks East Range |
| ECAS | Environmental Compliance Assessment System |
| ECO | Environmental Compliance Officer |
| EDR | Environmental Database Report |
| EDRE | emergency deployment readiness exercise |
| EEZ | exclusive economic zone |
| EFH | essential fish habitat |
| EIFS | Economic Impact Forecast System |
| EIS | environmental impact statement |
| ELF | extremely low frequency |
| EMF | electric and magnetic fields |
| EMF-RAPID Program | Electric and Magnetic Fields Research and Public Information Dissemination Program |
| EMP | Ecosystem Management Plan |
| EMS | environmental management system |
| EM Training | emergency medical training |
| EMT | emergency medical technician |
| ENMP | Environmental Noise Management Program |
| EO | Executive Order |
| EOD | Explosive Ordnance Disposal |
| ESA | Endangered Species Act |
| ESMPR | Endangered Species Management Plan Report |
| ESV | engineer support vehicle |
| FAA | Federal Aviation Administration |
| FAR | federal aviation regulation |
| FCX | fire coordination exercise |
| FFA | federal facility agreement |
| FHWA | Federal Highway Administration |
| FICAN | Federal Interagency Committee on Aviation Noise |

| Acronym | Full Phrase |
|---|---|
| FICON | Federal Interagency Committee on Noise |
| FICUN | Federal Interagency Committee on Urban Noise |
| FIFRA | Federal Insecticide, Fungicide and Rodenticide Act |
| FIRMS | FEMA Flood Insurance Rate Maps |
| FMAs | fire management areas |
| FMP | Fishery Management Plan |
| FOF | Force-on-Force |
| FONSI | Finding of No Significant Impact |
| FOPCO | Fuel Oil Polishing Company |
| FOSC | Federal On-Scene Coordinator |
| FPPA | Farmland Protection Policy Act |
| FSA | fuel storage annex |
| FSV | fire support vehicle |
| FTI | fixed tactical internet |
| FTX | field training exercises |
| FUDS | Formerly Used Defense Site |
| FY | fiscal year |
| GANDA | Garcia and Associates |
| GIS | geographic information system |
| GMA | Game Management Area |
| gpm | gallons per minute |
| HABS | Historic American Building Survey |
| HAER | Historic American Engineering Record |
| HAFB | Hickam Air Force Base |
| HAZMART | Hazardous Materials Pharmacy |
| HBS | Hawaiʻi Biological Survey |
| HC | hydrocarbons |
| HCM | Highway Capacity Manual |
| HCP | Historic Component Plan |
| HCZMP | Hawaiʻi Coastal Zone Management Program |
| HDLNR | Hawaiʻi Department of Land and Natural Resources |
| HDOE | HawaiʻI Department of Education |
| HDOH | Hawaiʻi Department of Health |
| HECO | Hawaiian Electric Company |
| HEP | Habitat Evaluation Procedures |
| HIANG | Hawaiʻi Air National Guard |
| HINHP | Hawaiʻi Natural Heritage Program |
| HMCC | Hazardous Materials Control Center |
| HMMWV | high mobility multiple wheeled vehicle |
| HMR | Helemanō Military Reservation |
| HMX | high melting explosive |

## LIST OF ACRONYMS *(continued)*

| Acronym | Full Phrase |
|---|---|
| HPP | Historic Preservation Plan |
| HQDA | Headquarters, Department of the Army |
| HSMS | Hazardous Substance Materials System |
| HWSSP | Hazardous Waste Shop Storage Point |
| Hz | Hertz |
| I Corps | First Corps |
| I3A | Installation Information Infrastructure Architecture |
| IAF | initial approach fix |
| IARII | International Archaeological Research Institute, Inc. |
| IAV | interim armored vehicle |
| IBCT | Interim Brigade Combat Team |
| ICM | improved conventional munitions |
| ICRMP | Integrated Cultural Resources Management Plan |
| ICS | Incident Command System |
| ICUZ | installation compatible use zone |
| ICV | infantry carrier vehicle |
| IDG | installation design guide |
| IDP | Inadvertent Discovery Plan |
| IFR | instrument flight rules |
| Initial BCT | Initial Brigade Combat Team |
| INRMP | Integrated Natural Resources Management Plan |
| IOC | initial operational capability |
| IPMP | Integrated Pest Management Plan |
| IR Plan | Integrated Resource Plan |
| IRP | installation restoration program |
| ISCP | Installation Spill Contingency Plan |
| ISF | Information Systems Facility |
| ISTEA | Intermodal Surface Transportation Efficiency Act |
| ITAM | Integrated Training Area Management |
| ITE | Institute of Transportation Engineers |
| IWFMP | Integrated Wildland Fire Management Plan |
| JBPDS | Joint Biological Point Detections Systems |
| JICPAC | Joint Intelligence Command, Pacific |
| JMC | Army/Air Force Joint Mobility Center |
| KLOA | Kawailoa Training Area |
| KMR | Kawaihae Military Reservation |
| KMWP | Koʻolau Mountains Watershed Partnership |
| KTA | Kahuku Training Area |
| kV | kilovolt |
| LBP | lead-based paint |
| LCA | Land Commission Awards |

## LIST OF ACRONYMS *(continued)*

| Acronym | Full Phrase |
|---|---|
| LCTA | Land Condition Trend Analysis |
| LCX | Logistical Coordination Exercise |
| Ldn | day-night average sound level |
| Leq | equivalent noise levels |
| Leq values | average noise levels |
| LFX | live fire exercise |
| Lmax | maximum A-weighted decibel level |
| LOS | level-of-service |
| LPG | liquid petroleum gas |
| LRAM | Land Rehabilitation and Maintenance |
| LRLTP | Long Range Land Transportation Plan |
| LSVs | logistic support vessels |
| LURS | Land Use Requirements Study |
| LUST | leaking underground storage tank |
| MAC | mount assault course |
| MACOM | Major Command |
| MACZMAG | Marine and Coastal Zone Management Advisory Group |
| MAP | missed approach point |
| MAPEX | map exercise |
| MARS | military-affiliated radio station |
| MBTA | Migratory Bird Treaty Act |
| MC | mortar carrier |
| MDF | multiple deployment facility |
| MEV | medical evacuation vehicle |
| MGD | million gallons per day |
| MGS | mobile gun system |
| MIDI | Military Item Disposal Instruction |
| MILES | Multiple Integrated Laser Engagement System |
| MIM | maneuver impact mile |
| MIP | Mākua Implementation Plan |
| MIT | moving infantry targets |
| mm | millimeter |
| MMPA | Marine Mammal Protection Act |
| MMR | Mākua Military Reservation |
| MOA | Memorandum of Agreement |
| MOAs | military operations areas |
| MOU | Memorandum of Understanding |
| MOUT | military operations in urban terrain |
| MP | military police |
| MPA | Marine Protected Areas |
| MPM | most probable munitions |

## LIST OF ACRONYMS *(continued)*

| Acronym | Full Phrase |
|---|---|
| MPRC | Multi-purpose range complex |
| MR | Military reservation |
| MSA | Magnuson-Stevens Fishery Conservation and Management Act |
| MSD | mortar simulation devices |
| MSDS | material safety data sheet |
| msl | mean sea level |
| MSTF | Mission Support Training Facility |
| MU | management unit |
| MVA | megavolt-ampere |
| NAAQS | National Ambient Air Quality Standards |
| NACO | National Aeronautical Charting Office |
| NAGPRA | Native American Graves Protection and Repatriation Act |
| NALF | Navy Landing Airfield |
| NAVFACENGCOM | Naval Facilities Engineering Command |
| NBC | Nuclear, Biological, and Chemical |
| NCP | National Contingency Plan |
| NEPA | National Environmental Policy Act of 1969 |
| NESHAP | National Emission Standard for Hazardous Air Pollutants |
| NFRAP | no further response action planned |
| NHPA | National Historic Preservation Act |
| NIEHS | National Institute of Environmental Health Sciences |
| NIH | National Institutes of Health |
| NISA | National Invasive Species Act of 1996 |
| NMFS | National Marine Fisheries Service |
| NMHC | nonmethane hydrocarbon |
| $NO_2$ | nitrogen dioxide |
| NOAA Fisheries | National Oceanic and Atmospheric Administration's National Marine Fisheries Service |
| NOE | Nap of the Earth (low elevation flights) |
| NOI | notice of intent |
| NO | nitric oxide |
| NOTAM | Notice to Airmen |
| NPDES | National Pollutant Discharge Elimination System |
| NPL | National Priorities List |
| NRCS | Natural Resources Conservation Service |
| NRHP | National Register of Historic Places |
| NSR | new source review |
| OB/OD | open burn/open detonation |
| OC | organic compounds |
| OEQC | Office of Environmental Quality Control |
| OG | organic gases |

| Acronym | Full Phrase |
|---|---|
| OHA | Office of Hawaiian Affairs |
| OMA | Operation and Maintenance, Army |
| OMPO | Oʻahu Metropolitan Planning Organization |
| ONR | Office of Naval Research |
| OPA | Other Procurement, Army |
| ORMP | Ocean Resources Management Plan |
| OSHA | Occupational Safety and Health Administration |
| MOOTW | Military Operations Other Than War |
| OU2 | Operable Unit 2 |
| OU | Operable Unit |
| OWS | oil/water separator |
| P2 | pollution prevention |
| PA | Programmatic Agreement |
| PACAF | Headquarters Pacific Air Forces |
| PAH | Polycyclic aromatic hydrocarbon |
| PASH | Public Access Shoreline Hawaiʻi vs. County of Hawaiʻi Planning Commission |
| PCB | polychlorinated biphenyl |
| pCi/L | picocuries per liter |
| PCPI | per capita personal income |
| PCSU | Pacific Cooperative Studies Unit |
| PDC | Pacific Disaster Center |
| PEIS | programmatic environmental impact statement |
| $PM_{10}$ | inhalable particulate matter |
| $PM_{2.5}$ | fine particulate matter |
| POI | pollutants of interest |
| POLs | petroleum, oils, and lubricants |
| POV | privately owned vehicle |
| ppb | parts per billion |
| ppm | parts per million |
| ppt | parts per thousand |
| PRG | preliminary remediation goal |
| PSD | prevention of significant deterioration |
| PTA | Pōhakuloa Training Area |
| PTO | permit to operate |
| PVC | poly-vinyl chloride |
| QA/QC | quality assurance/quality control |
| QTR1 | Multipurpose Qualification Training Range, McCarthy Flats |
| QTR2 | Multipurpose Qualification Training Range, South Range Acquisition Area |
| RAWS | Remote automated weather stations |

| Acronym | Full Phrase |
|---|---|
| RCRA | Resource Conservation and Recovery Act |
| RCUH | The Research Corporation of the University of Hawaii |
| RD Plan | Range Development Plan |
| RDX | cyclotrimethylenetrinitramine |
| RF | radio frequency |
| RFMSS | Range Facility Management Support System |
| RHC | reactive hydrocarbon |
| RI | remedial investigation |
| RLA | reduced land acquisition |
| RMSSP | Recyclable Material Shop Storage Point |
| ROC | reactive organic compound |
| ROCA | Range Operation Control Area |
| ROD | Record of Decision |
| ROG | reactive organic gas |
| ROI | region of influence |
| RSTA | reconnaissance, surveillance, and target acquisition |
| RTV | rational threshold value |
| RV | reconnaissance vehicle |
| SAIC | Science Applications International Corporation |
| SAP | satellite accumulation point |
| SARA | Superfund Amendments and Reauthorization Act |
| SAT | stationary armor targets |
| SBCT | Stryker Brigade Combat Team |
| SBER | Schofield Barracks East Range |
| SBMR | Schofield Barracks Military Reservation |
| SCP | spill contingency plan |
| SCS | Soil Conservation Service |
| SEL | sound exposure level |
| SEMP | Soil Erosion Monitoring Program |
| SENEL | single event noise exposure level |
| SHPD | School Health Program Department |
| SHPO | State Historic Preservation Officer |
| SIP | State Implementation Plan |
| SIT | stationary infantry targets |
| SMA | special management area |
| SOC | Species of Concern |
| SOP | standard operating procedure |
| SPCC | spill prevention, control, and countermeasure |
| SR | state route |
| SRAA | South Range Acquisition Area |
| SRP | Sustainable Range Program |

## LIST OF ACRONYMS *(continued)*

| Acronym | Full Phrase |
|---|---|
| SRP, Inc. | Social Research Pacific, Inc. |
| SRTA | short-range training ammunition |
| STX | Situation Training Exercise |
| SVOC | semi volatile organic compound |
| SWPCP | Storm Water Pollution Control Plan |
| TAMC | Tripler Army Medical Center |
| TAP | transfer accumulation point |
| TC Plan | Transformation Campaign Plan |
| TCA | trichloroacetic acid |
| TCE | trichloroethylene |
| TCP | traditional cultural property |
| TDS | total dissolved solids |
| TEWT | tactical exercise without troops |
| THC | total hydrocarbon |
| TLV | threshold level value |
| TMDL | total maximum daily load |
| TNC | The Nature Conservancy |
| TNT | trinitrotoluene |
| TOC | total organic compound |
| TOG | total organic gas |
| TOW missile | tube-launched, optically-tracked, wire-guided missile |
| TRI | training requirement integration |
| TSCA | Toxic Substances Control Act |
| TSDF | Treatment, Storage, or Disposal Facility |
| TSVs | theater support vessels |
| UACTF | Urban Assault Training Facility |
| UAV | unmanned aerial vehicle |
| UCL | upper confidence limit |
| US | United States |
| USACE | US Army Corps of Engineers |
| USAEC | US Army Environmental Center |
| USAG-HI | US Army Garrison, Hawai'i |
| USARAK | US Army Alaska |
| USARHAW | US Army Hawai'i |
| USDA | US Department of Agriculture |
| USEPA | US Environmental Protection Agency |
| USFWS | US Fish and Wildlife Service |
| USGS | United States Geological Survey |
| UST | underground storage tank |
| UXO | unexploded ordnance |
| V/C | volume-to-capacity |

| Acronym | Full Phrase |
|---|---|
| VFR | visual flight rules |
| VFTF | Virtual Fighting Training Facility |
| VKT | vehicle kilometers traveled |
| VMT | vehicle miles traveled |
| VOC | volatile organic compound |
| vpd | vehicles per day |
| vph | vehicles per hour |
| WAAF | Wheeler Army Airfield |
| Web | World Wide Web |
| WPAA | West PTA Acquisitions Area |
| WRRC | Water Resources Research Center |
| WWTP | wastewater treatment plant |

# EXECUTIVE SUMMARY

## ES.1 INTRODUCTION

In October 1999, the Secretary of the Army and the Chief of Staff of the Army articulated a vision for the Army to meet the challenges of the 21st century. The Army must become more strategically responsive and dominant at every point on the spectrum of military operations, ranging from intensive combat to peacekeeping duties and humanitarian missions.

Hawai'i has been selected as the location for an interim force based on the Stryker vehicle, or a Stryker Brigade Combat Team (SBCT)[1]. As the Army transforms, the interim force will use available technology and weapons, select new equipment, such as the Stryker, and adopt a modified training doctrine to train Soldiers to be able to meet the goals of a fast reacting light force. This will allow the Army to deploy more quickly, be more lethal, highly mobile, and survivable than the current force. The interim force will also serve as a "working model" to refine equipment, weapons, and training of the future force.

The future force would come out of the development and refinement of weapons, equipment, communications, and training that will occur during the interim phase over the next 30 years when the entire Army would be transformed. The current force, those forces that have not undergone transformation, would continue to provide the strategic assurance for the Army's responsibility to fight and win decisively against any threat while the Army transforms to the future force.

The ROD for the Programmatic EIS directed the 2nd Brigade, 25th Infantry Division (Light) (25th ID[L]) at Schofield Barracks, Hawai'i to transform to an SBCT. The Commanding General of the 25th ID(L) is charged with deciding how best to achieve that directive and provide for military training, readiness, and facility requirements to meet SBCT transformation needs, while enabling the current forces to continue to carry out their missions and giving due consideration to environmental factors. This decision will be based

[1] SBCT is the new name for Interim Brigade Combat Team (IBCT), which was used during the public scoping process. This is a name change only: SBCT and IBCT are synonymous.

on the results of this EIS, and on consideration of all relevant factors including mission, cost, technical factors, and environmental considerations. This EIS considers a reasonable range of alternatives including several alternatives that involve transforming and/or training on the U.S. mainland. The mainland alternatives were not analyzed in detail because they did not meet the purpose and need of the proposed action. (Complete details on the proposed action are presented in Chapter 2 and Appendix D.)

SBCT is a new concept that uses technology and information to improve the abilities of Army units. This change will give the Army greater flexibility and will improve the variety of missions to which the Army can respond. The SBCT will use the lighter more efficient Stryker vehicle to transport Soldiers more quickly to areas of conflict. Because of its speed and maneuverability, the Stryker can deliver Soldiers more quickly and closer to the areas where they are needed. Using improved weapons with greater accuracy, the Stryker can provide the force with protective cover as Soldiers dismount and move by foot to desired target areas. Once their task has been accomplished, the Soldiers would again board the Stryker for transport back to their headquarters or another area for further operations. In the Stryker, Soldiers are able to obtain time-sensitive, critical information or intelligence from their commanders, and they can remain in constant communication with each other, their commanders, or other field units via refined satellite links and Internet connections that are filtered into the Stryker vehicle. This is a radical departure from the way Soldiers fight today and, as such, requires new ranges, training facilities, high-tech communication facilities, and new training protocol. In addition, this technology gives the SBCT the ability to conduct combat operations faster and over far greater areas of land than can be achieved presently. Taken together, these requirements create a need for new training and maintenance facilities and expansion of maneuver lands to provide more realistic training conditions.

Pursuant to the National Environmental Policy Act of 1969 (NEPA), the Department of the Army prepared a programmatic environmental impact statement (PEIS) to evaluate the potential environmental and socioeconomic effects associated with transformation of the entire Army. The Army issued *The Final Programmatic Environmental Impact Statement for Army Transformation* in February 2002, published the notice of availability on March 8, 2002, and signed the record of decision (ROD) on April 11, 2002, indicating its decision to proceed with transformation. The PEIS designated the 2$^{nd}$ Brigade, 25$^{th}$ Infantry Division (Light) (ID[L]) in Hawai‘i (referred to throughout this document as the 2$^{nd}$ Brigade) and five other units across the US as part of the initial phase of transformation. These units would be converted to an SBCT.

Transformation will result in not just a modernized version of the current Army but will combine the best characteristics of current forces. The transformed Army will possess the lethality and speed of the heavy force, the rapid-deployment mentality and toughness of the light forces, and the unmatched precision and close combat capabilities of the special operations forces. A key measure of transformed forces will be their strategic mobility.

## ES.2 PURPOSE OF THE PROPOSED ACTION

On April 11, 2002, the Army signed a ROD indicating its decision to proceed with transformation and designating Hawai‘i as one of five locations for the initial transformation including enhancing training capabilities to support the nationwide transformed forces. This EIS analyzes alternatives on how to implement transformation in Hawai'i. The purpose of the Proposed Action is to assist in bringing the Army's Interim Force to operational capability and to provide realistic training in Hawai'i. Twenty-eight projects are proposed for the US Army Hawai'i (USARHAW) that would improve on the existing support structure and facilities to provide the necessary field training required for an SBCT. Reconfiguring maneuver areas, establishing combat training facilities more appropriate to the types of threats the Army expects to encounter, and strengthening infrastructure would ensure that SBCT's leaders and Soldiers would be prepared for the full spectrum of military operations (see Section 1.1 for a description of the transformation process and what constitutes an SBCT).

## ES.3 NEED FOR THE PROPOSED ACTION

The need for transformation of the 2nd Brigade is to provide the nation with capabilities that meet current and evolving national defense requirements. As Army doctrine evolves, training and facilities must also change. The SBCT goal is to be able to deploy anywhere in the world and be prepared to carry out the Army's military mission within 96 hours of deployment from Hawai'i. While SBCT units will retain the mobility and flexibility of traditional Army light forces, they will incorporate the lethality and survivability of traditional Army heavy forces. They will be equipped with new vehicles, equipment, and communications technology to achieve their missions. Training must include a greater emphasis on military operations in urban terrain (MOUT) to prepare Soldiers for a variety of situations, such as resolving general urban unrest, infiltrating and clearing buildings, and fighting at close range. Training for these kinds of activities requires constructing new ranges and support facilities on O'ahu and the island of Hawai'i.

The 2nd Brigade in Hawai'i was selected to transform to an SBCT in the PEIS based on the following three factors:

- Location of the 2nd Brigade within the Pacific Rim, a critical area of interest for the United States. Stationing an SBCT in Hawai'i allows the President to rapidly respond to events in an area of increasing importance to national security. The goal of the Hawai'i SBCT would be to deploy a brigade anywhere within the Pacific Rim within 96 hours or to combine with other SBCT brigades or future forces to place a division anywhere in the Pacific Rim within five days, or five divisions within thirty days. There are two other SBCTs on the Pacific coast of the continental United States (Alaska and Washington) to support deployment to the critically important Pacific Rim, while others will be in the eastern United States to support deployment to other geographic regions.
- Composition and mission of the 2nd Brigade and the benefits of transforming to an SBCT. The 2nd Brigade is already a light infantry unit, which executes full spectrum military missions in complex terrain. Hawai'i provides the terrain and conditions most likely to be encountered in the Pacific Rim. The enhancement of this unit to an SBCT would allow this already light unit to be more mobile, lethal, and survivable under a greater variety of conditions.

- Ease of deployment. The SBCT would be within close proximity of multiple airbases and seaports of suitable size.

If the 2nd Brigade does not transform in Hawai'i the Army might not be able to respond rapidly enough in all areas of the world for operations requiring military action. The strategic significance of land forces continues to lie in their ability not only to fight and win the Nation's wars but also to provide options that shape the global environment to benefit the United States and its allies.

## ES.4 PUBLIC INVOLVEMENT

By providing a means for open communication between the Army and the public, the procedural aspects of NEPA promote better decision_making. Those having a potential interest in the Proposed Action, including minority, low-income, disadvantaged, Native Hawaiian groups, and others, were notified and invited to participate in the scoping and environmental impact analysis process.

The Council on Environmental Quality (CEQ) regulations, Army regulations , and 32 Code of Federal Regulations (CFR) 651 guide public participation opportunities. These include issuing in the *Federal Register* a notice of intent (NOI) to prepare an EIS[2], initiating a public scoping process and a 45-day public review period for the Draft EIS (DEIS), and publishing the Final EIS (FEIS), accompanied by a 30-day mandatory waiting period before a final decision is made and a ROD is issued. Following publication of the NOI, public notices were published in the major newspapers on the island of Hawai'i and on O'ahu announcing the time and location of seven public scoping meetings to solicit input and to obtain comments on the range of the EIS. In addition, the scoping meetings were announced in the April 8, 2002, issue of *The Environmental Notice,* published by the State of Hawai'i, Department of Health, Office of Environmental Quality Control (OEQC). The 45 day scoping period began on April 8, 2002. Based on public comment, the scoping period was extended by 30 days and ended on June 15, 2002. During the scoping period, the public, organizations, and agencies were encouraged to provide comments.

Seven scoping meetings were held between April 16 and 30, 2002. For residents and groups interested in the Proposed Action at Pōhakuloa Training Area (PTA) on the island of Hawai'i, public scoping meetings were held in Hilo and Waikoloa. For residents and groups interested in the Proposed Action at Schofield Barracks Military Reservation (SBMR) training areas and other training facilities on O'ahu, public scoping meetings were held in Wahiawā, Honolulu, Hale'iwa, Kahuku, and Wai'anae. The Army published early notices of the meeting times and locations. A total of 283 people attended the seven meetings. By letter dated May 28, 2002, the Garrison Commander sent each person who attended a scoping meeting a letter thanking them for their participation in the scoping process, and enclosing a 16-page information paper describing the proposed transformation and mission related projects. Also enclosed with the letter was a copy of the briefing presented at the scoping

[2]The notice of intent for this EIS was published in the *Federal Register,* March 4, 2002 (76 FR 9717), and is found in Appendix B.

meetings, for the attendees' reference. These documents were also posted on the SBCT website and placed at various public and university libraries on Oahu and the Big Island.

In addition to oral comments received at the public scoping meetings, the Army also received written comments in the form of e-mails, faxes, letters, and form letters, comments via telephone, and comments at separate information meetings requested by groups and organizations. A summary of the comments received during the scoping process is included in Appendix B, organized by location, meeting date, and subject.

The Commanding General, 25th ID(L) & US Army Hawai'i approved the DEIS for public review and it was distributed to elected officials, regulatory agencies, and members of the public on October 3, 2003. The availability of this document was announced in the *Federal Register*[3], and a 45-day public comment period followed to provide the public with the opportunity to comment on the findings of the EIS.

Notification of publication of the DEIS and the opening of the public comment period was announced with both legal and display advertisements in the *Hawaii Tribune-Herald*, *West Hawaii Today*, *The Honolulu Advertiser*, *Honolulu Star-Bulletin*, *Midweek*, and OEQC's *The Environmental Notice*. Six public meetings to receive comments on the DEIS were held in Honolulu, Wahiawa, Waianae, Kahuku, Waikoloa, and Hilo. On October 31, 2003, the Army made a decision to extend the public comment period on the DEIS until January 3, 2004.

During the scoping meetings, the administrators of the public facilities would not allow the meetings to extend beyond 10:00 PM. This time restriction required that members of the public keep their oral comments short. After many public comments about the length of the meetings, and in an attempt to allow for full participation of all people present, the Army decided to hold the DEIS public meetings at private facilities that were open as long as the Army needed. The majority of the DEIS public meetings did not conclude until after 12:00 AM.

Through public meetings, the opportunity to provide written comments, and the extension of the public comment period, we believe we allowed meaningful opportunity for public participation in the process. A summary of the public meetings and the types of comments received is provided in Appendix B of this FEIS.

Comments received during the public comment period included those from federal, state, and local agencies, non-governmental organizations, businesses, and individuals. Over 600 unique commenters participated in the public review of the DEIS, and their comments and the Army's responses are provided in Appendix P of this FEIS.

[3] The NOA for the Draft EIS was published in the Federal Register by EPA on September 29, 2003.

## ES.5 SCOPE OF ANALYSIS

This EIS has been developed in accordance with NEPA and the Army's implementing regulations issued by the CEQ and the Army.[4] The purpose of the EIS is to inform Army decision_makers and the public of the likely environmental consequences of the Proposed Action and reasonable alternatives on how to transform the 2nd Brigade in Hawai'i. It focuses on site-specific issues of transforming the 2nd Brigade to an SBCT and the impacts on O'ahu and the island of Hawai'i.

This EIS analyzes the conversion of the 2nd Brigade to an SBCT and enhancement of training capabilities to meet the training requirements of the transformed force. The conversion of the 2nd Brigade to SBCT status would primarily involve changes in force structure (the number of personnel assigned to the unit), equipment and vehicles, and doctrine under which the unit would train for carrying out its assigned missions, as well as improvements to existing ranges and construction of new training facilities. Under transformation, the SBCT would have more personnel than the present 2nd Brigade. A principal change would involve putting the Stryker interim armored vehicle (IAV) into action, which would provide the SBCT with greater firepower and increased tactical mobility. Infrastructure projects would be needed to support this effort, including new vehicle washes and motor pools in which to park these vehicles. Construction of training facilities at various installations and land acquisitions would also be analyzed. See Table ES-1 for an overview of the proposed action. Table ES-2 provides a summary of SBCT training activities by installation.

If a substantial change to any specific project described in this EIS is made, as it moves forward, that may have a bearing on the Proposed Action or its impacts, additional appropriate NEPA documentation will be prepared, as required by NEPA.

SBCT training requirements are not dependent on the use of Makua Military Reservation (MMR). While the MMR is an integral part of USARHAW training capabilities and historically used by other services, SBCT units could perform dismounted Combined Arms Live-Fire Exercise (CALFEX) training at other ranges. SBCT may use MMR if the range were available and only after completion of the Makua EIS and ROD. The Makua EIS will analyze the potential environmental impacts associated with dismounted CALFEXs for both current force and SBCT; therefore, this SBCT EIS does not analyze training impacts of SBCT at MMR.

[4]Council on Environmental Quality: Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act, 40 CFR Parts 1500-1508 and Army implementing regulations contained in 32 CFR Part 651.

**Table ES-1**
**Proposed Action (Preferred Alternative), Reduced Land Acquisition, and No Action Alternatives Overview**

| | Proposed Action (Preferred Alternative) | | | | Reduced Land Acquisition Alternative | No Action Alternative |
|---|---|---|---|---|---|---|
| | SBMR and Wheeler Army Airfield | DMR | KTA/KLOA | PTA | | |
| **Training** | | | | | | |
| Live-fire exercises | Live-fire exercises would continue. | None. | Live-fire SRTA[1] training introduced at the MOUT sites at KTA. | Live-fire exercises would continue on existing lands, no live-fire on WPAA. | Same as Proposed Action. | Live-fire exercises at SBMR and PTA as part of current training would continue at current levels. |
| Vehicles used | Increase of 346 emission-producing vehicles to 1,005 vehicles (including 291 Strykers), which would be based at SBMR[2]. Maneuvers at SRAA and SBER may involve from one to 96 vehicles (includes 1 to 96 Strykers). | One to 74 vehicles (includes 1 to 27 Strykers). | One to 200 vehicles (includes one to 96 Strykers). | Twenty-seven to 400 vehicles (includes 32 to 192 Strykers). | Same as Proposed Action. | 659 emission-producing vehicles. |
| Off-road maneuver training (Stryker maneuvers) | On existing 1,917-acre off-road maneuver area on SBER and 1,300 new acres on SRAA. | On 364 acres currently used for off road maneuvers. | On 3,384 new acres at KTA. None on KLOA. | On 1,800 acres currently used for off-road maneuvers at PTA and 23,000 new acres at WPAA. | Same as Proposed Action except no off-road maneuvers on SRAA. | No Strykers would be used. Continued use of wheeled vehicles at SBMR, DMR, KTA, and PTA. |
| Weapons used | Current force weapons plus 105mm cannon on Stryker mobile gun system and the 120mm mortar and an increase of from 12 105mm to 18 155mm howitzers. | No change in weapons fired. | No change in weapons fired. | Current force weapons plus 105mm cannon on Stryker mobile gun system and the 120mm mortar and an increase of from 12 105mm to 18 155mm howitzers. | Same as Proposed Action. | Existing weapons would continue to be used. |
| Aircraft and UAVs | Normal current force operations of the aviation brigade would continue, plus USAF C-130 and C-17 operations in support of SBCT deployment. UAV flights. | No new aircraft activity. UAV flights . | No new aircraft activity. UAV flights. | No new aircraft activity except UAV flights. UAV and USAF C-130 and C-17s to move units to PTA. However, aircraft activity use will be redistributed. There will be an increase of helicopter use over WPAA and a corresponding decrease over PTA. | Same as Proposed Action. | Continued flight support for current force training. |
| Troop transport | Trucks are used to move troops from SBMR cantonment to ranges; Strykers in a group of approximately 30 vehicles move troops on Battle Area Complex up to company level. | Troops transported from SBMR to DMR by Strykers or trucks, generally up to company level, plus support trucks. | Troops transported from SBMR to KTA/KLOA by Strykers or trucks; battalion to limited brigade level plus support trucks. | Troops would continue to be transported via aircraft or marine vessel from SBMR to PTA. LSV trips would increase to 66 from 60. Troops would be transported from Kawaihae Harbor to PTA by Strykers or trucks, up to brigade level, in groups of 30 vehicles. | Same as Proposed Action. | No change in troop transport except for marine transport. Current transport includes an average of 60 individual LSV and four barge round trips per year. |
| Weapons/Ordnance Transport | No change from current force. | None. | None. | No change from current force. | Same as Proposed Action. | No change from current force. |
| **Construction/Demolition** | | | | | | |
| Range complexes | Four new ranges built: QTR1, QTR2, Urban Assault Course, and Battle Area Complex. | No new ranges. | One mock city built, called the Combined Arms Collective Training Facility (two buildings demolished, S150, S151). | Two new ranges built: battle area complex (12 targets and 1 tower demolished) and the anti-armor range (1 tower demolished). | QTR2 would be built at PTA, not at South Range Acquisition Area. | Existing ranges may be upgraded or new ranges added as future conditions warrant.[3] Separate NEPA documents will be prepared, as necessary. |
| Airfield upgrade | Upgrade parking apron at Wheeler Army Airfield for C-130 operations. | None. | None. | Upgrade, extend, and reorient runway 5 degrees to support C-17 aircraft. | Same as Proposed Action. | No airfield upgrades. |
| Tactical vehicle wash | One tactical vehicle wash would be constructed. | None. | One tactical vehicle wash would be constructed. | One tactical vehicle wash would be constructed. | Same as Proposed Action. | None. |
| Installation information infrastructure architecture (I3A) | None. | None. | None. | I3A would be constructed. | Same as Proposed Action. | Projects may be constructed on a case-by-case basis. [3] |
| Training classrooms | Virtual Fighting Training Facility. | None. | None. | None | Same as Proposed Action. | Projects may be constructed on a case-by-case basis. [3] |
| Range control facilities | Range Control Facility built (eight buildings would be demolished: 1124, 1125, 1150, 1181, 2108, 2056, 2276, 1192). | No new facilities. | No new facilities. | Range maintenance facility built (three buildings demolished: T17, T19, T20). | Same as Proposed Action. | Projects may be constructed on a case-by-case basis[3] |
| Support facilities | Motor pool maintenance shops and multiple deployment facility built. | None. | None. | Expand ammunition storage facility with three new ammunition storage facilities. | Same as Proposed Action. | Projects may be constructed on a case-by-case basis[3] |
| Antennas (fixed tactical internet) | Nine antennas built: seven at SBMR and two at SBER. | Three antennas built: two within DMR and one on Dillingham Ridge. | Two antennas built within KTA. | Ten antennas built within and surrounding PTA and one antenna at Kawaihae Harbor. | Same as Proposed Action. | No new antennas to be constructed. [3] |
| Road improvements | Construct a 15-foot- (5 meter-) wide one-lane gravel road with three-foot shoulders from SBMR to Helemanō (6 miles[9.6 kilometers]). | Construct a 15-foot- (4.6 meter)-wide (one-lane) gravel road, with three-foot shoulders from SBMR to DMR (124 miles[20 kilometers]). Telecommunication lines to be installed alongside the upgraded road. | None | Construct a 24-foot- (7–meter-) wide two-lane gravel road with a 40-foot (12-meter) right of way from Kawaihae Harbor to PTA (27 miles [43 kilometers]). | Same as Proposed Action. | None. |
| Land acquisition | Approximately 1,402 acres (567 hectares) (South Range Land Acquisition). | None. | None. | Approximately 23,000 acres (9,308 hectares) (WPAA). | Approximately 100 acres (40.5 hectares) at SBMR and approximately 23,000 acres (9,308 hectares) at WPAA. | Land acquisitions may be conducted on a case-by-case basis.[3] |

**Table ES-1**
**Proposed Action (Preferred Alternative), Reduced Land Acquisition, and No Action Alternatives Overview**

| | Proposed Action (Preferred Alternative) | | | | Reduced Land Acquisition Alternative | No Action Alternative |
|---|---|---|---|---|---|---|
| | **SBMR and Wheeler Army Airfield** | **DMR** | **KTA/KLOA** | **PTA** | | |
| **Training** | | | | | | |
| Easements | Acquire a perpetual easement of 13 acres (5.3 hectares) for new road to HMR. | Acquire a perpetual easement of 36 acres (14.6 hectares)(11 acres [4.5 hectares] for new road). | None. | Acquire a perpetual easement of 132 acres (53.4 hectares) for new road from Kawaihae Harbor to PTA. | Same as Proposed Action. | Land acquisitions may be conducted on a case-by-case basis.[3] |
| Personnel | Increase of 810 Soldiers, with 502 spouses and 1,053 children[2]. | No increase. | No increase. | No increase. | Same as Proposed Action. | 3,438 Soldiers (existing) and 3,008 predicted for future. |

[1]Short Range Training Ammunition
[2]Soldiers and vehicles would be assigned to SBMR and would use training areas as noted.
[3]Appropriate NEPA documentation will be prepared as necessary.
Source: US Army 2002a

**Table ES-2**
**Summary of Training Activities by Installation**

| | Proposed Action | | | | | | | | | | | | No Action | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Maneuver Acreage | | Training on Land (Includes night training) | | | | | | Aviation Training | | | | Maneuver Acreage | | Training on Land (Includes night training) | | | | | | Aviation Training | | | |
| | | | | Live-fire | | Maneuver | | | | | | | | | | Live-fire | | Maneuver | | | | | | |
| **Training Area** | **Mounted** | **Dismounted** | **Highest Level Training** | **Weapons Qualification** | **Live-fire** | **Mounted** | **Dismounted** | **Maneuver-impact Miles** | **Airborne (Parachute Drops)** | **<u>Helicopters</u>** | **UAV Operations (Daylight)** | **C17/C130 Aircraft Operation** | **Mounted** | **Dismounted** | **Highest level Training** | **Weapons Qualification** | **Live-fire** | **Mounted** | **Dismounted** | **Maneuver-impact Miles** | **Airborne (Parachute Drops)** | **<u>Helicopters</u>** | **UAV Operations (Daylight)** | **C17/C130 Aircraft Operation** |
| SBMR | | | | | | | | | | | | | | | | | | | | | | | | |
| Main Post | 0 | 1,235 | Bde | ☒ | ☒ | | ☒ | 0 | | ☒ | ☒ | | 0 | 1,235 | Bde | ☒ | ☒ | ☒ | ☒ | 0 | | ☒ | ☒ | |
| SBER | 2,223 | 2,223 | Co | | | ☒ | ☒ | 19,125 | ☒ | ☒ | ☒ | | 2,223 | 2,223 | Co | | | ☒ | ☒ | 16,740 | ☒ | ☒ | ☒ | |
| WAAF | 0 | 494[3] | n/a | | | | | 0 | | ☒ | ☒ | ☒ | 0 | 494[3] | n/a | | | | | 0 | | ☒ | ☒ | ☒ |
| SRAA | 1,300 | 1,300 | Plt | ☒ | | ☒ | ☒ | 25,855 | | | | | 0 | 0 | Plt | | | | | | | | | |
| DMR | 354 | 354 | Co | | | ☒ | ☒ | 4,335 | | ☒ | ☒ | | 354 | 354 | Co | | | ☒ | ☒ | 1,710 | | ☒ | ☒ | |
| KTA | 4,569 | 4,569 | Bde | | ☒[1] | ☒ | ☒ | 13,772 | ☒ | ☒ | ☒ | | 4,569 | 4,569 | Bde | | ☒[1] | ☒ | ☒ | 7,211 | | ☒ | ☒ | |
| KLOA[2] | 0 | 5,310 | Co | | | | ☒ | 0 | ☒ | ☒ | ☒ | | 0 | 5,310 | Co | | | ☒ | ☒ | 0 | | ☒ | ☒ | |
| PTA | | | | | | | | | | | | | | | | | | | | | | | | |
| PTA Main | 18,000 | 56,661 | Bde | ☒ | ☒ | ☒ | ☒ | 25,855 | ☒ | ☒ | ☒ | ☒ | 18,000 | 71,880 | Bde | ☒ | ☒ | ☒ | ☒ | 13,659 | ☒ | ☒ | ☒ | |
| WPAA | 23,000 | 23,000 | Bde | | | ☒ | ☒ | 61,894 | ☒ | ☒ | ☒ | | 0 | 0 | | | | ☒[5] | ☒[5] | | ☒ | | | |

Notes:
[1]SRTA only
[2]Mounted maneuver training would take place along Drum Road in transit to KTA.
[3]Although dismounted maneuver acreage is available, this training is not currently conducted at WAAF.
[4] <u>Current mounted and dismounted maneuver training at WPAA is done on a training event basis by individual lease agreement.</u>

Co = Company Bde = Brigade
Plt = Platoon n/a = Not applicable
Bn = Battalion ☒ = Activity occurs or will occur.

Note: RLA Alternative has the same training activities as the Proposed Action, with the exception of no live-fire weapons qualification <u>or off-road maneuvers</u> at the SRAA.

## ES.6 ALTERNATIVES ANALYZED

The alternatives analyzed must reasonably meet the purpose of and need for the action. Alternatives must also be practical and feasible; that is, they must be capable of being implemented by the Army or another agency, be technically feasible, and not require commitment of resources that cannot practically be obtained. In framing alternatives, the USARHAW has taken into consideration information and suggestions submitted by individuals, organizations, and public agencies. Also, each alternative, with the exception of the No Action Alternative, must meet the training needs required for an SBCT, as outlined in Table ES-3.

In selecting specific construction projects to meet the training shortfall for SBCT and to minimize costs and impacts to the environment and communities, planners attempted to first use existing USARHAW lands and ranges, where possible, to upgrade existing ranges and facilities, to build new ranges on existing training areas, and, if necessary, to acquire new training lands. Once project alternatives were developed, they were further evaluated and selected based on the following factors: the extent to which they provided mission support, the extent to which they minimized environmental impacts and contributed to environmental stewardship, their economic feasibility, and the extent to which they increased training productivity.

### ES.6.1 No Action Alternative

CEQ regulations state that an EIS must evaluate a No Action Alternative to serve as a benchmark against which the potential effects of actions can be evaluated. The No Action Alternative represents what would occur if the Army were not to carry out the Proposed Action.

Under the No Action Alternative, the Army would not undertake the proposed conversion of the 2nd Brigade to an SBCT in Hawai'i. The 2nd Brigade would continue to train and operate as a conventional light infantry force.

#### *Current Force Vehicle and Weapon Systems*

Vehicles and weapons used under the No Action Alternative would be similar to those in use now.

#### *Construction*

Construction projects under No Action assume that projects proposed for maneuver training facilities and USARHAW's inventory of facilities for an SBCT would not proceed. However, other projects in support of current force training could be constructed on a case-by-case basis, as dictated to meet the continuing needs of the Army's conventional forces. These projects would be evaluated under separate NEPA documentation.

#### *Land Acquisition/Easements*

None of the land acquisitions that are part of the Proposed Action would be undertaken. Land could be acquired in support of current force training on a case-by-case basis, as might be dictated to meet the continuing needs of historically conventional forces. For example,

**Table ES-3**
**Comparison of Alternatives Considered To Requirements**

| | | Alternative | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| **Function** | **Requirements for SBCT** | **No Action (Current Force Training)** | **Proposed Action (Preferred Alternative): Transform with New Facilities on O'ahu and Hawai'i** | **Reduced Land Acquisition (Construct QTR2 at PTA)** | **Transform with Existing Facilities (No New Construction or Land Acquisition)** | **Transform with Maneuver Training on a Continental US Installation (Includes Maneuver Live-Fire Training)** | **Transform Using Other Existing Military Facilities in Hawai'i (e.g., Marine or Navy Bases)** | **Transform by Moving All Training to PTA** |
| **Qualification training (fixed firing ranges)** | | | | | | | | |
| Sniper and machine gun training | 355 days/year (RDP pp 7-25). | 230 days/year does not meet requirements (RDP pp 7-25). | 355 days/year does meet requirements (construct QTR1and QTR2 at SBMR). | 355 days/year does meet requirements (construct QTR1 at SBMR. | 230 days/year does not meet requirements (existing capacity per RDP pp 7-25). | Meets requirements 355 days/year (construct QTR 1 at SBMR). | Does not meet requirements. | Meets requirements. Would require replication of all SBMR ranges (including QTRs) at PTA. |
| M4/M16 qualification | 281 days/year (RDP pp 7-10). | 230 days/year does not meet requirements (RDP pp 7-10). | 281 days/year does meet requirements (construct QTR1 and QTR2 at SBMR). | 281 days/year does meet requirements (construct QTR1 at SBMR and QTR2 at PTA). | 230 days/year does not meet requirements (RDP pp 7-25). | 281 days/year does meet requirements (construct QTRs 1 and 2 at Schofield Barracks). | Does not meet requirements 0 days/year available; Marine Corps Base Hawai'i has one multipurpose small arms range, used by their forces (http://www.mcbh.usmc.mil/g3/g3rr kb.htm). | Meets requirements. Would require replication of all SBMR ranges (including QTRs) at PTA. |
| Virtual training | Virtual training is an essential element of Army Transformation. | Does not meet requirements VFTF[1] and FTI[2] not available; cannot conduct virtual training. | Meets requirements. Construct a VFTF and FTI. | Meets requirements. Construct a VFTF and FTI. | Does not meet requirements. VFTF and FTI not available; cannot conduct virtual training. | Meets requirements. Construct a VFTF and FTI. | Does not meet requirements Not available; no other service has comparable facility. | Meets requirements. Construct a VFTF and FTI at PTA. |
| **Collective Training** | | | | | | | | |
| Urban combat training | 230 days/year use of Combined Arms MOUT Training Facility (RDP pp 9-7). | Does not meet requirements. Existing MOUT assault course, grenade house, and 17-building MOUT does not meet standard (RDP pp. 7-65). | 230 days/year does meet requirements. Split facility at KTA (live-fire CACTF) and SBMR (urban assault course). | 230 days/year does meet requirements. Split facility at KTA (live-fire CACTF) and SBMR (urban assault course). | Does not meet requirements. Existing MOUT assault course, grenade house and 17-building MOUT do not meet standard (RDP pp 7-65). | 230 days/year does meet requirements Split facility at KTA (live-fire CACTF) and Schofield Barracks (Urban Assault Course). | Does not meet requirements. Not available; no other service has comparable facilities. | 230 days/year does meet requirements Would require construction of live-fire CACTF and UACTF facility at PTA. |
| Anti-tank Missile (Javelin and TOW) training | Anti-armor live-fire and tracking range (RDP pp 7-39). | Does not meet SBCT requirements. None. | Meets requirements. Anti-armor live-fire and tracking range constructed at PTA. | Meets requirements. Anti-armor live-fire and tracking range constructed at PTA. | Does not meet requirements. None. | Does not meet requirements. No capacity to train additional SBCT units. | Does not meet requirements. Not available; no other service has comparable facilities. | Meets requirements. Anti-armor live-fire and tracking range constructed at PTA. |
| Collective live-fire training | 241 days/year use of Battle Area Complex, Multipurpose Range Complex, Multipurpose Training Range (RDP pp 7-69). | Does not meet requirements. All collective live-fire ranges are nonstandard. | Meets requirements. Construct BAXs at SBMR and PTA. | Meets requirements. Construct BAXs at SBMR and PTA. | Does not meet requirements. All collective live-fire ranges are nonstandard. | Does not meet requirements. No capacity to train additional SBCT units. | Does not meet requirements. Not available; no other service has comparable facilities. | Meets requirements. Construct BAXs at PTA only. |

[1]Virtual Fighting Training Facility
[2]Fixed Tactical Internet

under No Action, some or all of the South Range Acquisition Area (SRAA) could be acquired for current force maneuver land requirements. While the acreage and precise locations are not now known, these projects would be evaluated in separate NEPA documents.

### *Description of Training*

Under No Action, current force training is expected to continue and could include future changes in training. These changes could result in requirements for new weapons or new strategies as potential conflicts may dictate.

### *Institutional Programs*

USARHAW has implemented the following institutional programs at all training areas: Integrated Training Area Management (ITAM), an integrated natural resource management plan, an Integrated Cultural Resources Management Plan (ICRMP), a range development plan, institutional controls, the Integrated Wildfire Management Plan (IWFMP), and a real property management plan. Chapter 2 describes these programs in more detail. The Army would continue to fund these programs under the No Action Alternative, as funding is available, with the complexity and scope of the program proportional to the proposed land use.

## ES.6.2 Proposed Action (Preferred Alternative)

Under the Proposed Action, the 2nd Brigade would be converted to an SBCT and, as such, would operate as part of the Army's Interim Force. Implementing the Proposed Action would require taking several distinct but coordinated actions and activities directly associated with transforming the 2nd Brigade. These various actions that make up the Proposed Action would include fielding Stryker Systems, SBCT-specific weapons, building new facilities, acquiring new land and additional easements, and conducting SBCT-specific training. Chapter 1, Section 1.2, describes the overall transformation process in greater detail. This EIS analyzes only the conversion of the 2nd Brigade to an SBCT and not its ultimate conversion to the future force; a separate NEPA analysis will be done for that next phase as appropriate.

Implementing the Proposed Action would require taking several actions and activities directly associated with transforming the 2nd Brigade and enhancing training capabilities. Table ES-1 compares the proposed projects for each alternative, and figures ES-1, ES-2, ES-3, and ES-4 show project locations for the Proposed Action and Reduced Land Acquisition.

After the publication of the DEIS, the Army announced plans for an enhancement package for SBCTs. The enhancements include an aviation task force, an increase from twelve to eighteen 155mm howitzers in the direct support artillery battalion, and improvements to command, control, communications, computer, and intelligence (C4I) assets. The announcements indicated that the aviation task force would include Comanche helicopters when the aircraft were ready for fielding. In February 2004, the Army determined that no further testing or fielding of Comanches would occur and canceled the Comanche program. The SBCT aviation task force will come from existing 25th ID(L) aviation brigade assets and will result in minor changes to training, primarily some increased aviation training over the

**Figure ES-1**
Northern O'ahu Project Overview Map

**Figure ES-2**
Proposed Action at Schofield Barracks Military Reservation and Wheeler Army Airfield

**Figure ES-3**
Project Locations at Kahuku Training Area

**Figure ES-4**
Pōhakuloa Project Overview

west PTA Acquisition Area (WPAA) in support of units training in that area. The FEIS has analyzed the impacts of the increased aviation training over WPAA, and those impacts are minimal. The DEIS contained an analysis of the impacts of twelve 155mm howitzers, a change from the eighteen 105mm howitzers currently in the direct support artillery battalion for the 2nd Brigade. The addition of another six 155mm howitzers was analyzed in the FEIS and resulted in minimal changes to noise impacts and no change in the overall determination of effect. The C4I improvements are not expected to have any impacts on the environment.

Overall, the Army has determined that the enhancements are within the original scope of the Proposed Action, as described in the DEIS, are minor, and do not require a supplemental DEIS.

### *SBCT Systems Fielding*

This element of the Proposed Action involves fielding new and modernized vehicles, weapons systems, and equipment for interim forces and, ultimately, the future force, although there will be some upgrades, changes and additions.

Foremost among the new systems is the Stryker, an eight-wheeled, 22.9-foot- (7-meter-) long, 8.9-foot- (3-meter-) wide, 20-ton (18-metric-ton) combat vehicle that can be transported on the C-130 aircraft. The Stryker vehicle has a 350 HP Caterpillar Model 3126 diesel engine. The vehicle can travel at a maximum speed of 60 miles per hour and can travel 330 miles on one full tank of fuel. Although there are ten variations of the Stryker, the primary design variants are the infantry carrier vehicle (ICV) and the mobile gun system (MGS). The ICV can carry nine Soldiers and their equipment and requires a driver and a vehicle commander. The MGS would be mounted on the Stryker and would be modified to incorporate a 105mm turreted cannon and autoloader system with a crew of three. The actual vehicle used by SBCT may vary from the current Stryker vehicles as the system is developed, but overall will have the same characteristics as the current Stryker. (There are eight other configurations of the Stryker that could be used as part of the SBCT; information on the ICV, MGS, and the eight other Stryker variants is provided in Appendix C.)

The SBCT would be equipped with a tactical unmanned aerial vehicle (UAV) similar to the RQ-7A "Shadow 200" to provide day or night reconnaissance, surveillance, and target-acquisition capability. The UAV would allow tactical commanders a view into heavily protected battle space that could not be penetrated by other intelligence assets or that presents a high risk to piloted aircraft. The aircraft weighs approximately 325 pounds, has a wingspan of 13 feet (4 meters), and measures 11 feet (3 meters) from nose to tail.

The number of barge trips per year from Pearl Harbor on O'ahu to Kawaihae Harbor on the Island of Hawai'i would not change, however the logistic support vessel (LSV) trips would increase from 60 to 66 per year. A new high-speed vessel called a theatre support vessel (TSV) might be used in the future, but it is in the early planning stages. Before a determination is made, NEPA documentation will be completed as well as any Endangered Species Act or National Historic Preservation Act consultation that would be required.

The weapons proposed for the SBCT would be the same as those currently used by current force units in the 25th Infantry Division or the Hawai'i Army National Guard, with the exception of the MGS on the Stryker, the 120mm mortar, and an increase from 12 to 18 155mm howitzers.

### *Construction*

Proposed construction includes building, modernizing, and remodeling buildings, training facilities (e.g., live-fire training facilities), and infrastructure and demolishing buildings and facilities. It also involves ground softening at the PTA Battle Area Complex (BAX) and Anti Armor Live-fire and Tracking Range (AALFTR) by using a D-10 bulldozer that would drive back and forth over areas on the ranges to crush lava, large rocks, and hard soil to provide a softer substrate for Soldiers to train. Both of these ranges are constructed over existing ranges, so ground-softening activities would occur as needed on already heavily disturbed areas. The precise location and extent of ground softening would depend on final orientation of firing points and targets but is expected to be a fraction of the 2,825-acre (1,143-hectare) area of the two ranges. Construction activities will also include construction of Dillingham Trail, Helemano Trail, and PTA Trail on land to be acquired, as described below. Locations of construction projects are provided in Table ES-1.

### *Land Acquisition/Easements*

This part of the Proposed Action involves real property acquisition, which means negotiating temporary or permanent control of property for Army use, mainly through purchase, lease, or permit. Under the Proposed Action, two areas would be acquired and three easements would be obtained. The two acquisition areas would be the South Range Acquisition Area (SRAA) (approximately 1,402 acres [5,666 hectares]) at SBMR and the WPAA (approximately 23,000 acres [9,308 hectares]). The three easements for military vehicle trails would include the trails between SBMR and Dillingham Military Reservation (DMR) (known as Dillingham Trail, 36 acres [14.6 hectares]), between SBMR and Helemanō Military Reservation (HMR) (known as Helemanō Trail, 13 acres [5.3 hectares]), and between Kawaihae Harbor and PTA (known as PTA Trail, 132 acres [53.4 hectares]). While the Army would not own the underlying land, the easement is a property right to the land. See Appendix D for maps and more details on the land acquisition projects. These would be joint use trails. If the proposed trail alignment changes, the Army will negotiate with the property owners on a new alignment and will conduct appropriate analysis and documentation in accordance with NEPA, ESA and NHPA.

### *SBCT Training*

The following subsections describe the SBCT training that would occur under the Proposed Action, with emphasis on the differences between SBCT training and the current force training. Most of the nonlive-fire and other training that does not involve maneuvers by SBCT forces would be similar to that currently being conducted by the 25th ID(L). As with current force training, exercises would continue to be at the squad through company level, with some opportunities for battalion and above training. Urban operations training is more highly emphasized in SBCT requirements than in current requirements. The SBCT would use new urban warfare facilities extensively and would use existing helicopter landing and pickup zones. Nonlive-fire training also is conducted in classrooms, on rappel towers and obstacle courses, and in a variety of specialized facilities. Table ES-2 summarizes training by installation.

Although the most notable physical difference between current forces and SBCT forces is the introduction of the Stryker vehicle, operations and capabilities would also radically change. The Stryker is primarily a troop transport vehicle that would traverse terrain and obstacles to ensure protected delivery of infantry squads to their dismount points. Because of the limitations of the Stryker, most mounted movement takes place on roads or unrestricted terrain. The Stryker can maneuver across a slope that is less than 30 percent, up a slope that is less than 60 percent, and over trees less than five inches (13 centimeters) in diameter. However, the Stryker would not be allowed in areas subject to other restrictions, such as those containing rare species, cultural features, or other significant resources. The number of Strykers involved in training exercises would depend on the capacity of the training area involved. All 1,005 vehicles (including Strykers, trucks, highly mobile multiple wheeled vehicles [HMMWV], and other support vehicles) would be based at SBMR and would deploy for training when required. Mounted maneuver training would involve from one to 96 Strykers at SRAA and SBMR, one to 27 at DMR, one to 96 at KTA, and 32 to 192 at PTA. There would be no mounted maneuvers in Kawailoa Training Area (KLOA), except along Drum Road.

### *Dismounted Maneuver Training*

As described above, Strykers would rapidly transport troops to a predetermined action area. Once at that location the troops would conduct dismounted maneuvers to train for enemy engagement. At times, training could include only dismounted maneuvers without the Stryker. During dismounted maneuvers Soldiers would walk in dispersed groups overland toward a given objective. During simulated engagement, Soldiers would seek cover or concealment, and one section may provide a base of weapons fire, while another maneuvers toward the objective.

During extended maneuver training, Soldiers may sleep in the field. To allow for quick deployment, they would not set up tents. Training may involve live-fire and nonlive-fire exercises. Nonlive-fire exercises use blank ammunition, laser weapons, and simulated artillery and mortar fire with pyrotechnics. During nonlive-fire training there would be no smoking and no aerial pyrotechnics. Helicopters may be used and would use established landing zones.

### *Reconnaissance Training*

Reconnaissance training would be carried out in a similar manner as current force reconnaissance training, except that UAVs would provide air reconnaissance that, in combination with ground reconnaissance, would provide situational awareness and knowledge throughout a larger area. The Stryker may be used in some situations as a support vehicle for reconnaissance training.

It is anticipated that the UAV's total flying hours would amount to 2,400 hours of flight per year (4 UAVs at 600 hours per year), or 600 takeoffs and landings per year. The UAVs would not need to take off from or land at ordinary airfields but could be launched from any location using their own hydraulic launchers. An arrested recovery system using nets and/or cables would also be used, minimizing the area required for launch and recovery.

### Live-Fire Training

The transformed brigade would use new and existing live-fire ranges and firing points. SBCT units would perform individual weapon and combined arms live-fire training. Use of pyrotechnics, obscurants, short-range training ammunition (SRTA), and simulators is anticipated to be similar to current use. Unless or until amended, all SBCT training would be planned and conducted in accordance with established USARHAW range and training land regulations and standard operating procedures (SOPs). The SBCT would use the same weapons and explosives as the current force, with the addition of the 105mm mobile gun system on the Stryker and the 120mm mortar, and a change from 12 105mm howitzers to 18 155mm howitzers. No live-fire training would be conducted at Wheeler Army Airfield (WAAF), KLOA, DMR, or on the WPAA.

### Deployment Training

Deployment training would principally involve moving troops and equipment from SBMR to the other training areas in Hawai'i or to the continental US. As with current force training, transportation would use a combination of vehicles, vessels, and C-17 and C-130 aircraft, depending on the type and location of training. Deployment training would be similar to the current force, except SBCT units would be deployed at least twice a year to PTA from Hickam Air Force Base (HAFB) or WAAF using C-17 or C-130 aircraft. Equipment would be deployed to PTA by 66 individual LSV and four barge round trips per year. There are no adequate facilities to support deployment activities from multiple airfields in Hawai'i. The proposed Multiple Deployment Facility would provide the facilities necessary for SBCT to prepare equipment and vehicles for deployment from either WAAF or HAFB.

### Aviation Training

The number and types of aircraft used for aviation training are expected to be the same as under current force training, with the exception of UAVs. However, the SBCT will not rely on helicopters in the same way light infantry units do. SBCT aviation units will not be used to transport troops but will be used more for supply, convoy support, and close air support. There will not be as many air assault operations during SBCT training.

The aircraft that are used in support of current forces in Hawai'i are the armed reconnaissance OH58D Kiowa Warriors, utility lift UH60 Blackhawks, and the medium lift CH47 Chinook. The individual use and frequency of the UAVs has yet to be determined, as these would be dictated by each individual training scenario.

### Combined Live-Fire/Maneuver Training

SBCT forces would conduct dismounted training, including CALFEX events. The only increase in CALFEXs would be from the introduction of the reconnaissance, surveillance, and target acquisition (RSTA) squadron, which could conduct up to three company CALFEXs per year. The SBCT dismounted CALFEXs would be similar to the CALFEXs conducted by the current force, using the same types of weapons and similar tactics. SBCT dismounted live fire CALFEX training would occur at the SBMR BAX, PTA BAX, and possibly MMR. However, priority will be given for mounted training at PTA BAX, offering limited opportunity for dismounted training.

SBCT training requirements are not dependent on the use of MMR. While the MMR is an integral part of USARHAW training capabilities and historically used by other services, SBCT units could perform dismounted CALFEX training at other ranges. SBCT may use MMR if the range were available only after completion of the Makua EIS and ROD. The Makua EIS will analyze the potential environmental impacts associated with dismounted CALFEXs for both current forces and SBCT; therefore, this SBCT EIS does not analyze training impacts of SBCT at MMR.

*Force-on-Force Training*

There would be no change in force-on-force training activities under the Proposed Action except for the nonlive-fire training at WPAA. However there would be additional organizations, such as the RSTA Squadron and CSS Company that would support the force-on-force units. Force-on-force training would still occur at SBMR, KTA, and existing PTA installations.

*Service Support Operations and Training*

There would be no change in service support operations and training under the Proposed Action. Training would be carried out in a manner similar to current training.

*Institutional Programs*

Total Army transformation also affects installation management. Installation programs that directly affect the environment include range management, environmental management, and real property management. The following programs will be implemented as part of the transformation process: Sustainable Range Program, Impact Area Management, Environmental Management System, Environmental Management Programs, and Alternative Procedures for Cultural Resources Management.

### ES.6.3 Reduced Land Acquisition Alternative

This alternative is identical to the Proposed Action, with two exceptions, moving Qualification Training Range 2 (QTR2) to PTA and reducing land acquisition at the SRAA (Figure ES-5). This alternative would involve downsizing the proposed SRAA by approximately 93 percent, from approximately 1,402 acres (5,666 hectares) to approximately 100 acres (40.5 hectares), which would be necessary within the SRAA for construction of the proposed SBCT Motor Pool because the motor pool must be located close to SBMR where the Soldiers are based and there is no space is available for building this facility at SBMR or WAAF. This would require that an expanded version of QTR2 be constructed at PTA rather than at the home station, SBMR. This is contrary to current training of the 25th Infantry Division, which is based on troops completing qualification training at SBMR before deploying to PTA. The larger exercises conducted at PTA are more effective if each Soldier is fully qualified at SBMR before deploying to PTA. However, the length of deployment at PTA could be extended to allow training at QTR2 before other training is conducted at PTA. Soldiers not able to qualify during deployment would have to return to PTA to complete their qualifications. The best available site for the proposed QTR2 at PTA is on the site of the current Range 8. A controlled firing area over the QTR2 at PTA would not be necessary because the range would be overlain with the existing R-3103 restricted area. This location falls within the overall boundaries of the anti-armor and live-fire tracking range

**Figure ES-5**
South Range Acquisition Area at Schofield Barracks Main Post

(AALFTR) also proposed for this site, meaning that both ranges could not be used for live-fire at the same time. An expanded version of QTR2, to include sniper and machine gun training, as well as pistol and M16, would be constructed at PTA, overlying the proposed AALFTR, so no new area would need to be used or ordnance impact area created. Although the purpose and need for USARHAW transformation would still be fulfilled, it would not be as efficient, and in some circumstances not every Soldier would become qualified on individual weapons before arrival at PTA. This would detract from the effectiveness of the large-unit training conducted there and would require additional training.

## ES.7 Alternatives Considered But Not Studied in Detail

Several factors contributed to the development of alternatives available to USARHAW. First, any alternative must meet the purpose of and need for the action by assisting to bring the Army's interim force to operational capability and by providing realistic field training in Hawai'i while providing the nation with capabilities that meet current and evolving national defense requirements. Alternatives must be practical and feasible; that is, they must be capable of being implemented by the Army or another agency, be technically feasible, and not require commitment of resources that cannot practically be obtained. In addition, in framing alternatives, USARHAW has taken into consideration information and suggestions submitted by individuals, organizations, and public agencies. Finally each alternative, with the exception of the No Action Alternative, must meet the training needs required for an SBCT. Table ES-3 compares each alternative to the training requirements for an SBCT.

### ES.7.1 Transformation of a Different Brigade at Another Location

The Army has identified the first units to be converted to interim force status as the "bridge" to the future force. HQDA directed the action proposed for implementation by the 2nd Brigade, the effects of which have been evaluated by the Army's headquarters. Section 4.2.2 of the final *Programmatic Environmental Impact Statement for Army Transformation* states, "The Army's operating forces are stationed at those installations that can provide adequate facilities (maneuver areas and training facilities) and infrastructure support. For the foreseeable future, the Army would expect to conduct its transformation of existing operating forces 'in-place.' Relocation of units would not be expected." The long-term view is that the entire Army would transform. In the short_term, as indicated by the ROD for the programmatic EIS, converting units to the future force would be sequenced as directed by HQDA. The initial sequencing includes the conversion of the 2nd Brigade.

The Pacific Rim is a critical area of interest for the United States. Stationing an SBCT in Hawai'i allows the President to rapidly respond to events in an area of increasing importance to national security. This alternative does not meet that purpose and need and is not included in Table ES-3.

### ES.7.2 Transformation with Existing Facilities

Under this alternative the Army would attempt to transform but would rely on existing facilities. USARHAW would propose and undertake military construction projects one project at a time to maintain training resources in an acceptable useful condition for continued current force training as SBCT moves towards the future force. Projects not associated with transformation could continue to be funded and programmed (e.g., family housing improvements or in-kind replacement of deteriorated facilities). Those associated with transformation would have to be funded on a piecemeal basis and separate NEPA documentation would have to be prepared as each project is identified. Training would continue using existing maneuver and training facilities, under constraints similar to those now managed by unit commanders and would use new facilities as they are constructed.

The principal differences between the current force and the SBCT would be an increase in the number of personnel, introduction of the Stryker, increase in live-fire training, and modification of the training requirements to guide the unit's readiness training. Current facilities would not accommodate the needs of an SBCT, such as sufficient maneuver training land for the Stryker and automated digitally capable ranges and training facilities.

The Army seeks to have the 2nd Brigade reach its initial operational capability (IOC), that is, to be capable of executing assigned combat missions, in 2007. This would occur after Strykers, MGSs, and UAVs have been fielded and the Soldiers in the 2nd Brigade have demonstrated their ability to execute their assigned tasks, individually and collectively. IOC cannot be attained without the appropriate types of modernized training facilities with adequate capacity to train individual Soldiers and units available. As shown on Table ES-3, the existing facilities do not have the ability to provide specific training, such as virtual training with a fixed tactical internet (FTI) and antitank missile training. Furthermore shortcomings in capacity and capability of live-fire and simulation training facilities would make it impossible to train the Soldiers of the SBCT to the Army standard. Reduced training time would mean that fewer Soldiers were qualified on their individual weapons systems and that elements of the brigade would not be trained in their collective tasks. This alternative would not meet the purpose and need of the project.

### ES.7.3 Transformation in Hawai'i with Maneuver Live-Fire and Nonlive-Fire Training on the Continental US Instead of Hawai'i

Under this alternative, the Army would transform by conducting collective live-fire and maneuver training on a continental US installation. All proposed cantonment facilities required to support an SBCT would be built, but no new collective maneuver ranges (nonlive-fire and live-fire) would be constructed. The Army would not acquire the 23,000-acre (9,308 hectare) WPAA adjacent to PTA. In addition, the following projects would not be built in Hawai'i under this alternative because they are tied to the relocated maneuver training:

- Battle area complexes at SBMR and PTA;
- Combined Arms Collective Training Facility (CACTF) with SRTA live-fire training at KTA;
- Urban Assault Course Training Facility (UACTF) at SBMR; and
- Anti-Armor Live-Fire and Tracking Range at PTA.

QTR1 and QTR2 would still be constructed, and the SRAA would still be needed to provide space for QTR2 and the SBCT motor pool. Both QTRs would be needed to provide day-to-day training of Soldiers on their individual weapons. The Virtual Fighting Training Facility (VFTF) to be built at SBMR is a key element of the training requirements for an SBCT because its suite of simulators and specialized training equipment are an integral part of the transformation process.

The Army considered ranges west of the Mississippi River, to minimize travel time, and those with large enough land areas. Continental US Army installations considered as potential sites for 2nd Brigade live-fire and maneuver training include Fort Richardson and Fort Wainwright and the Donnelly Training Area in Alaska (considered as one installation for this analysis and collectively called US Army, Alaska [USARAK]), Fort Lewis and Yakima Training Center in Washington State (considered a single installation and referred to as Fort Lewis), the National Training Center at Fort Irwin in California, Fort Carson and Piñon Canyon Training Area in Colorado (considered as one installation and referred to as Fort Carson), Fort Hood in Texas, Fort Riley in Kansas, and Fort Polk in Louisiana. These are the major Army installations in the western US devoted to training US Army Forces Command units. Table ES-4 provides an overview of the installations.

In Table ES-4, "total area" is the land area in acres occupied by each military reservation. Ranges, environmental constraints, cantonment areas, and other factors, such as regulatory requirements and access, reduce actual lands available for training at each installation. "Current mission" describes the major functions of each installation. As indicated in the last column of the table, USARAK, Fort Lewis, and Fort Polk are undergoing transformation to receive SBCTs; one will be stationed in USARAK, two at Fort Lewis and one at Fort Polk. The specialized ranges, as well as the MSTF, VFTF, FTI, and installation information infrastructure architecture (I3A) projects required for SBCT training are already programmed to be built at these installations. The other installations may eventually receive similar facilities as transformation to the future force occurs over the next 30 years, but at present forts Irwin, Riley, Hood, and Carson are not capable of providing the specialized training an SBCT requires, and there are no plans to construct the required facilities at those installations.

Table ES-4 shows that, of the six installations considered, only USARAK, Fort Lewis, and Fort Polk will have the facilities required to train a Stryker brigade; therefore, the others are excluded from further consideration.

If the 2nd Brigade is to train at either of these installations, all the people, equipment, and vehicles associated with each element of the brigade would have to be transported to Alaska or Washington. This would be required to ensure that the Soldiers could train with their own equipment in accordance with Army doctrine. In addition, equipment belonging to the Stryker brigades in Alaska and Washington cannot be assumed to be available for use by Hawai'i personnel. While it is possible to move equipment by barge from O'ahu to the island of Hawai'i, Alaska and Washington are too far away for this type of transport to be practical, and the equipment and personnel would need to be airlifted. Military Traffic Management Command's Traffic Engineering Agency estimated in December 2000 at least 79 C-5 aircraft and 110 C-17 aircraft would be required to move one Stryker brigade (USARHAW 2001a) effectively removing over 80 percent of the Air Force's transport capabilities during training of one SBCT. The Air Force will receive the last of its 120 C-17 aircraft in November 2004 and has 109 C-5 aircraft, with no more coming. Only 6 C-17s are proposed to be stationed in Hawai'i and will replace 4 C-130s currently stationed in Hawai'i.

**Table ES-4**
**Continental US Army Installations Considered**

| Installation, State | Total Area (acres) | Current Mission | SBCT Required Facilities Available? |
|---|---|---|---|
| Fort Richardson<br>Fort Wainwright<br>Donnelly Training Area, Alaska | 71,441 (28, 923 hectares)<br>656,241 (265.684 hectares)<br>640,488 (259,290 hectares) | Home to 172nd Infantry Brigade; programmed for one SBCT. | Will be constructed.[1] |
| Fort Lewis<br>Yakima Training Center, Washington | 86,174 (34,888 hectares)<br>316,786 (128,253 hectares) | Home to I Corps, 1st Brigade of the 25th ID(L), and the 3rd Brigade of the 2nd Infantry Division. Programmed for two SBCTs. | Will be constructed.[1] |
| National Training Center, Fort Irwin, California | 636,251 (257,591 hectares) | National Training Center—desert training of heavy Army forces. | No |
| Fort Carson<br>Piñon Canyon Maneuver Site, Colorado | 137,404 (55,629 hectares)<br>235,896 (95,504 hectares) | Home to 7th Infantry Division (mechanized). | No |
| Fort Hood, Texas | 214,352 (86,782 hectares) | Home to III Corps, 1st Cavalry Division, 4th Infantry Division (mechanized). | No |
| Fort Riley, Kansas | 100,656 (40,751 hectares) | Home to the 24th Infantry Division (mechanized). | No |
| Fort Polk, Louisiana | 198,143 (80,220 hectares) | Home of the Joint Readiness Training Center and 2nd Armored Cavalry Regiment. | Will be constructed.[1] |

[1]Facilities of the type used to train an SBCT will ultimately be built at all major Army training installations as part of transformation to the future force, except the AALFTR (which is specifically designated for Hawai'i).

Source: Acreage from Table C-8, US Army 2002c

Even though the entire brigade may not need to be transported at one time, moving even one rifle battalion would tie up a substantial portion of the Air Force's airlift capability for an extended period of time. Air Force airlift support would be unavailable for other uses, including actual wartime deployments of the force. Aside from the substantial costs of such operations, it is impractical to expect the Air Force to commit so large a percentage of its resources to support a training exercise.

USARHAW staff estimates that each deployment, including preparation and debrief, would take five days total. Flight times are estimated at six hours each way. Assuming that maneuver training is to be conducted four times per year, approximately 40 training days of the available 270 would be lost during deployments to Alaska or Washington.

An analysis of USARAK and Fort Lewis training facilities and capacity was conducted as an appendix to the USARHAW Range Development Plan. It showed that Fort Lewis and USARAK would lack adequate collective live-fire training facilities to support an additional SBCT. Neither USARAK nor Fort Lewis is proposing to build an anti-armor live-fire and tracking range to provide the capacity for training that has been programmed for Hawai'i. The Army proposes to conduct anti-armor live-fire training at these facilities on ranges constructed for other uses. This requires careful scheduling to avoid conflicts, and adding an additional SBCT would reduce the throughput capacity to unacceptable levels. Because Fort Polk will already be training an SBCT unit, as well as conducting joint readiness training, the addition of a second SBCT would compromise Fort Polk's capacity to train their Soldiers, a situation that is considered unacceptable.

Owing to climate limitations, training can be conducted only 205 days per year at Fort Wainwright and 224 days per year at Fort Richardson, weather permitting, whereas training in Hawai'i can be conducted 270 days per year. This limitation of training for the SBCT to be stationed in USARAK is considered an acceptable compromise when taken as a part of the Army's overall stationing strategy. However, if the SBCT proposed for stationing in Hawai'i were limited to training only when weather allowed in Alaska, the SBCT's ability to train its units could be diminished, as USARAK's forces would have priority.

In addition, if wartime situations required deploying Hawai'i's SBCT while training on the continental US, the SBCT forces would need to return to Hawai'i for full deployment, making it impossible to meet the 96-hour deployment goal.

In summary, the alternative of conducting collective live-fire training of the 2nd Brigade of the 25th Infantry Division on continental US installations is not feasible or practical and will not meet the purpose and need of the project for the following reasons:

- The Hawai'i-based SBCT could not meet its training requirements using facilities at Forts Irwin, Hood, Riley, and Carson because they lack the specialized facilities required to train an SBCT, and at present there are no plans to construct them;
- The Hawai'i-based SBCT could not meet its training requirements at Fort Lewis and USARAK, which are also to receive SBCTs, because they would not have adequate collective live-fire training capacity to support the requirements of an additional SBCT;
- Transporting a Hawai'i-based SBCT to the continental US for training would consume an unacceptably large portion of the Air Force's strategic airlift capability needed to meet its other missions and would result in a loss of at least 28 training days while in transit; and
- If an SBCT were training at either USARAK or Fort Lewis and military actions required its deployment to an action area, the brigade would have to return to Hawai'i to assemble for full deployment. This would prevent the SBCT from meeting its goal to deploy worldwide within 96 hours.

### ES.7.4 Transformation Using Other Existing Military Facilities and Existing USARHAW Facilities in Hawai'i

Under this alternative the Army would attempt to transform relying on existing facilities at USARHAW and other military facilities in Hawai'i not under USARHAW's control. Other branches of the Armed Forces in Hawai'i train at existing Army facilities because they do not have adequate live-fire ranges themselves. In addition, there are no additional maneuver lands available at other bases in Hawai'i.

The Army seeks to have the 2nd Brigade obtain IOC in 2007. This would occur after the unit receives its required Strykers and MGSs and the training necessary to execute its mission. Adequate facilities are required to effectively train to Army-established IOC standards. IOC cannot be attained without the appropriate types of modernized training facilities with adequate capacity to train individual Soldiers and units available. Limited facilities would result in reduced training time, which would mean that fewer Soldiers would be qualified on their individual weapons systems and that elements of the brigade would not be trained in their collective tasks. Shortcomings in capacity and capability of live-fire and simulation training facilities for individual and crew-served weapons, including the lack of a shoothouse, mock villages, and other modernized training facilities, would make it impossible to train the Soldiers of the SBCT to the Army standard.

### ES.7.5 Transforming by Moving All Training to PTA

Under this alternative the Army would attempt to transform by moving all SBCT training to PTA. USARHAW would propose and construct all military construction projects and would also construct new barracks, unit headquarters, classrooms, simulation training facilities, family housing, qualification training ranges, and community-support facilities on the island of Hawai'i. All training requirements for SBCT could be met, with the exception of the maneuver training, as approximately 15,219 acres (6,159 hectares) of maneuver lands on O'ahu would not be available or acquired for use. However, a substantial amount of land would need to be acquired to accommodate all the new support facilities required for this alternative, essentially everything that now exists on SBMR and WAAF. Aside from the enormous cost, PTA lacks sufficient water, electric power, sewage treatment capability, and road access to support the required population. In addition, construction of all these support facilities would eliminate additional maneuver lands, further increasing the shortfall for maneuver lands.

The Army seeks to have the 2nd Brigade obtain IOC in 2007. This would occur after the unit receives its required Strykers and MGSs and the training necessary to execute its mission. IOC cannot be attained without the proper types of facilities being readily available and having adequate capacity for training the requisite number of units. Although enough land may be available for acquisition for maneuver training and the required construction of an entire new military installation, SBCT Soldiers would not be able to conduct air deployment training operations between SBMR and PTA. Table ES-3 has a comparison of all alternatives to the training requirements for an SBCT. In the absence of adequate maneuver training, Soldiers would not be adequately trained for deployment.

This alternative is not feasible even though the training requirements for an SBCT would be met because the infrastructure at PTA could not handle the housing and other needs of stationing the SBCT at PTA. This would require substantial travel between housing at O'ahu and training at PTA resulting in lost training days. Therefore, this alternative was not evaluated in detail in the EIS.

### ES.7.6 Alternative Land Purchases Considered

In response to public comments about alternative land acquisitions the following previously considered information has been added to the Final EIS.

### *Pu'u Pā*

Pu'u Pā is approximately 14,000 acres (5,666 hectares) farther to the west, northwest of WPAA, next to the town of Waimea. This parcel is close to, but not contiguous with, PTA. USARHAW has habitually used the WPAA more often because it was adjacent to PTA, but the current and proposed tank trail goes through both. The Pu'u Pā parcel was eliminated from detailed analysis because of the following factors:

- The terrain is rougher and less likely to support vehicle maneuver than the WPAA and the parcel is too small, which would require additional purchases elsewhere;
- The area is not contiguous with PTA, requiring the use of public roads to transit from PTA and Pu'u Pā;
- It could have a greater environmental impact in some portions because there is excessive grass that has not been grazed in several years;
- The area is between the community of Waimea and the ocean and would have greater impacts on the scenic viewshed because of visible maneuver activities and dust;
- There are numerous known archaeological sites that would result in additional legal requirements; and
- The parcel is closer to built-up areas (the town of Waimea), increasing concerns about noise and dust.

### *Lualualei*

Naval Magazine Lualualei lies in a large coastal valley near the southwestern shoreline of O'ahu approximately 10 miles southwest of Wahiawa and occupies 8,105 acres of the valley. The nearest urban area is the town of Maili, which lies approximately a mile west. The towns of Waianae and Nanakuli are also nearby. The parcel was eliminated from further analysis because of the following factors:

- The site has extensive environmental and encroachment concerns, including 192 cultural sites, over 25 endangered species in close proximity, wetlands, and a possible hazardous material spill site;
- The site cannot accommodate vehicle maneuvers, so additional lands would need to be purchased and public roads would have to be used to access the site; and
- The cost would be very high considering the limitations on construction and potential cleanup costs.

## ES.8 ENVIRONMENTAL ANALYSIS

The environmental analysis evaluates the potential environmental consequences associated with the Proposed Action, Reduced Land Acquisition Alternative, and No Action. Only those environmental and socioeconomic conditions relevant to the Proposed Action are presented, including land use and recreation, visual resources, airspace, air quality, noise, traffic, water resources, geology, soils, and seismicity, biological resources, cultural resources, human health and safety hazards, socioeconomics and environmental justice, and public services and utilities.

The evaluation of potential impacts on any given resource was based on the project potential to conflict with existing laws and regulations, and effects on specific resource components as described in Chapter 4. A specific set of criteria was used for each resource to make a significance determination. Based on this analysis each impact was identified as significant, or having a significant impact on the resource, or less than significant, having an impact but to a less than significant level. For each significant impact specific mitigation measures were identified that, when implemented, would reduce the impacts to less than significant: these are identified as significant impacts mitigable to less than significant.

### ES.8.1 Affected Environment Overview

Chapter 3, Affected Environment Overview, provides the general baseline physical, biological, social, and economic conditions that occur within the region of influence (ROI) of the Proposed Action. As applicable, each section gives a background on how the resource is related to the Proposed Action, a general overview of relevant legislative requirements governing the resource, followed by any standard operating procedures the Army maintains to protect the resource. The remainder of the section discusses the general conditions of the resource within the ROI.

### ES.8.2 Environmental and Socioeconomic Consequences

Chapter 4, Environmental and Socioeconomic Consequences Overview, describes the impact methodology and factors considered for impact analysis, which are used to determine the level of significance of potential environmental impacts. It also presents a summary of the overall potential environmental impacts of the Proposed Action, the Reduced Land Acquisition Alternative, and No Action when projects at all of the military installations are considered together. Table ES-5 summarizes the impact levels to environmental and socioeconomic resources at each installation for the alternatives.

The summary of impact levels to environmental and socioeconomic resources is based on the analysis of the Proposed Action, Reduced Land Acquisition, and No Action done for each installation (SBMR, DMR, KTA, and PTA) in Chapters 5 through 8. In these chapters, installation-specific environmental conditions for each of the project areas are discussed and the potential environmental impacts of the Proposed Action, Reduced Land Acquisition, and No Action are identified. For each impact, a determination has been made as to whether it would be significant or less than significant. Mitigation measures are identified for any impacts determined to be significant. Beneficial impacts are identified where applicable. There may be both adverse and beneficial impacts within a single resource category; for instance, a project could interfere with a pre-existing land use such as agriculture (an adverse impact) while expanding public access to recreational resources (a beneficial impact).

Tables ES-6 and ES-7 provide lists of environmental impacts by specific SBCT project and resource category. This gives the public and reviewers a more detailed evaluation of impacts deriving from specific SBCT-related actions.

**Table ES-5**
**Summary of Impact Levels from the Proposed Action, Reduced Land Acquisition, and No Action**

| Impact Issue | SBMR | | | DMR | | | KTA/KLOA | | | PTA | | | Project-Wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA |
| Land use/ Recreation | ⦸ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊗/○ | ⊗/○ | ○/○ | ⊙+ | ⊙+ | ○ | ⊗+ | ⊗+ | ○ |
| Visual resources | ⦸ | ⦸ | ⊙ | ⦸ | ⦸ | ⊙ | ⊙/○ | ⊙/○ | ⊙/○ | ⦸ | ⦸ | ⊙ | ⦸ | ⦸ | ⊙ |
| Air space | ○ | ○ | ○ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Air quality | ⦸ | ⦸ | ⊙ | ⦸ | ⦸ | ⊙ | ⦸/○ | ⦸/○ | ⊙/○ | ⊗ | ⊗ | ⊙ | ⊗ | ⊗ | ⊙ |
| Noise | ⊗* | ⊗* | ⊗ | ⊙ | ⊙ | ⊙ | ⊙/○ | ⊙/○ | ⊙/○ | ⦸ | ⦸ | ⊙ | ⊗ | ⊗ | ⊗ |
| Traffic | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/⊙ | ⊙/⊙ | ○/○ | ⊙+ | ⊙+ | ○ | ⊙+ | ⊙+ | ⊙ |
| Water resources | ⦸ | ⦸ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸/⊙ | ⦸/⊙ | ⦸/○ | ⊙ | ⊙ | ⊙ | ⦸ | ⦸ | ⦸ |
| Geology and soils | ⊗ | ⦸ | ⦸ | ⊗ | ⊗ | ⦸ | ⊗/⦸ | ⊗/⦸ | ⦸/⊙ | ⊗ | ⊗ | ⦸ | ⊗ | ⊗ | ⦸ |
| Biological resources | ⊗ | ⊗ | ⊗ | ⦸ | ⦸ | ⦸ | ⊗/⦸ | ⊗/⦸ | ⊗/⦸ | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ |
| Cultural resources | ⊗ | ⊗ | ⊙ | ⊗ | ⊗ | ⊙ | ⊗/⊙ | ⊗/⊙ | ⊙/⊙ | ⊗ | ⊗ | ○ | ⊗ | ⊗ | ⊙ |
| Human health & safety hazards | ⦸ | ⦸ | ⊙ | ⦸ | ⦸ | ⊙ | ⦸/⦸ | ⦸/⦸ | ⊙/⊙ | ⦸ | ⦸ | ⊙ | ⦸ | ⦸ | ⊙ |
| Socioeconomics | ⦸+ | ⦸+ | ○ | ⊙+ | ⊙+ | ○ | ⊙+/○ | ⊙+/○ | ○/○ | ⦸+ | ⦸+ | ○ | ⦸+ | ⦸+ | ○ |
| Utilities | ⊙ | ⊙ | ○ | ⊙+ | ⊙+ | ○ | ⊙+/○ | ⊙+/○ | ○/○ | ⊙+ | ⊙+ | ○ | ⊙+ | ⊙+ | ○ |

This table summarizes project-wide impacts. For installation-specific impacts see Chapters 5 through 8.
In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.
* The PA and RLA for SBMR would have a minor increase in noise impacts over the NA. The determination of significance is based on existing NA levels.

LEGEND:

PA = Proposed Action
RLA = Reduced Land Acquisition
NA = No Action
⊗ = Significant impact
⦸ = Significant but mitigable to less than significant impact
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact
N/A = Not applicable

**Table ES-6**
**SBCT Project Impacts under Proposed Action**

| 1391 Project #/ Graphics Code | SBCT Project Title | Location | Land Use/Recreation | Visual Resources | Airspace | Air Quality | Noise | Traffic | Water Resources | Geology and Soils | Biological Resources | Cultural Resources | Human Health & Safety Standards | Socioeconomics /EJ | Utilities |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SBMR/WAAF** | | | | | | | | | | | | | |
| 58143/S1 | Urban Assault Course and Training Facilities | Main Post | ⊙ | ⊘ | ○ | ⊙ | ⊙ | $\underline{\odot}$ | ⊙ | ⊙ | ⊙ | ⊘ | ⊘ | $\underline{\odot +}$ | ⊙+ |
| 57404/S2 | Virtual Fighting Training Facility | Main Post | ⊙ | ⊘ | ○ | ⊙ | ⊙ | $\underline{\odot}$ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | $\underline{\odot +}$ | ⊙+ |
| 56923/S3 | Range Control Facility | Main Post | ⊙ | ⊘ | ○ | ⊙ | ⊙ | $\underline{\odot}$ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | $\underline{\odot +}$ | ⊙+ |
| 58144/S4 | Battle Area Complex | Main Post | ⊙ | ⊘ | ○ | ⊙ | ⊙ | $\underline{\odot}$ | ⊙ | ⊙ | ⊘ | ⊗ | ⊘ | $\underline{\odot +}$ | ⊙+ |
| 57421/ 58925/S5 | Motor Pool Maintenance Shops | Main Post | ⊙ | ⊘ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊙+ | ⊙+ |
| 57416/S6 | Tactical Vehicle Wash Facility | East Range | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊙ | ⊙+ | ⊙ |
| N/A/S7 | Fixed Tactical Internet | Main Post | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ○ | ○+ |
| 55270/S8 | South Range Land Acquisition | SRAA | ⊙ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 57461/S9 | Qualification Training Range, QTR1 | Main Post | ⊙ | ⊘ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊗ | ⊘ | $\underline{\odot +}$ | ⊙+ |
| 57462/S10 | Qualification Training Range, QTR2 | SRAA | ⊘ | ⊘ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊗ | ⊘ | $\underline{\odot +}$ | ⊙+ |
| 57422/S11 | Multiple Deployment Facility | WAAF | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊙+ | ⊙ |
| 57405/S12 | Upgrade Airfield for C-130 Aircraft | WAAF | ⊙ | ⊙ | ○ | ⊙ | ⊙ | $\underline{\odot}$ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙+ | ⊙ |
| N/A/ N/A | SBCT Training | SBMR | ⊙ | ⊙ | ○ | ⊘ | ⊘ | ⊙ | ⊘ | ⊗ | $\underline{\otimes}$ | ⊗ | ⊘ | $\underline{\oslash}$ | ⊙ |
| 57406/K3 | Road Construction, Schofield to Helemanō | Helemanō | ⊙ | ⊘ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊙ | ⊙ | ⊙ | ⊙+ | ⊙ |

**Table ES-6**
**SBCT Project Impacts under Proposed Action** *(continued)*

| 1391 Project #/ Graphics Code | SBCT Project Title | Location | Land Use/Recreation | Visual Resources | Airspace | Air Quality | Noise | Traffic | Water Resources | Geology and Soils | Biological Resources | Cultural Resources | Human Health & Safety Standards | Socioeconomics/ EJ | Utilities |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57802/K4 | Land Easement, Schofield to Helemanō | Helemanō | ⊙ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | | **Dillingham** | | | | | | | | | | | | | |
| 58161/D1 | Land Easement/Construct Road, SB/DMR | Dillingham | ⊙ | ⊘ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊙ | ⊙+ | ⊙+ |
| N/A/S7 | Fixed Tactical Internet | Dillingham | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ○+ | ○+ |
| N/A/N/A | SBCT Training | Dillingham | ⊙ | ⊙ | ○ | ⊘ | ⊙ | ⊙ | ⊙+ | ⊗ | ⊘ | ⊗ | ⊘ | ⊙ | ⊙ |
| | | **KTA/KLOA** | | | | | | | | | | | | | |
| 57415/K1 | Tactical Vehicle Wash Facility | Kahuku | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊙ | ⊙+ | ⊙ |
| 57305/K2 | Combined Arms Collective Training Facility | Kahuku | ⊗ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊗ | ⊙ | ⊙+ | ⊙+ |
| N/A/S7 | Fixed Tactical Internet | KTA | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ○+ | ○+ |
| N/A/ N/A | SBCT Training | KTA/KLOA | ⊙ | ⊙ | ○ | ⊘ | ⊙ | ⊙ | ⊘ | ⊗ | ⊗ | ⊗ | ⊘ | ⊙ | ⊙ |
| | | **PTA** | | | | | | | | | | | | | |
| 57197/P1 | Battle Area Complex | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊘ | ⊗ | ⊘ | ⊙+ | ⊙+ |
| 57183/P2 | Antiarmor Live-fire and Tracking Range | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊘ | ⊗ | ⊘ | ⊙+ | ⊙+ |
| 58273/P3 | Construct Military Vehicle Trail, PTA-Kawaihae | Pōhakuloa | ⊙ | ⊘ | ○ | ⊙ | ⊙ | ⊙+ | ⊙ | ⊘ | ⊘ | ⊗ | ⊙ | ⊙+ | ⊙ |
| 58273/P4 | Land Easement for Military Vehicle Trail, PTA-Kawaihae | Pōhakuloa | ⊙ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 57417/P5 | Ammunition Storage | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊘ | ⊙+ | ⊙+ |
| 57414/P6 | Tactical Vehicle Wash Facility | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙+ | ⊙ |

**Table ES-6**
**SBCT Project Impacts under Proposed Action** *(continued)*

| 1391 Project #/ Graphics Code | SBCT Project Title | Location | Land Use/Recreation | Visual Resources | Airspace | Air Quality | Noise | Traffic | Water Resources | Geology and Soils | Biological Resources | Cultural Resources | Human Health & Safety Standards | Socioeconomics/ EJ | Utilities |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57411/P7 | West PTA Maneuver Training Area Land Acquisition | Pōhakuloa | ⊙+ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 56994/P8 | Range Maintenance Facility | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⊙+ | ⊙ |
| 57408/P9 | Runway Upgrade/Extension, Bradshaw AAF | Pōhakuloa | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⊙ | ⊙+ | ⊙ |
| N/A/P10 | Fixed Tactical Internet | Pōhakuloa | ⊙ | ⦸ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙+ | ○+ |
| N/A/P11 | Installation Information Infrastructure Architecture | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙+ | ○+ |
| N/A/ N/A | SBCT Training | Pōhakuloa | ⊙ | ⊙ | ⊙ | ⊗ | ⦸ | ⊙ | ⊙ | ⊗ | ⊗ | ⊗ | ⦸ | ⊙ | ⊙ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | | | |
|---|---|---|---|---|---|
| ⊗ | = | Significant impact | ○ | = | No impact |
| ⦸ | = | Significant but mitigable to less than significant impact | + | = | Beneficial impact |
| ⊙ | = | Less than significant | N/A | = | Not applicable |

**Table ES-7**
**SBCT Project Impacts under RLA Alternative**

| 1391 Project # | SBCT Project Title | Location | Land Use/Recreation | Visual Resources | Airspace | Air Quality | Noise | Traffic | Water Resources | Geology and Soils | Biological Resources | Cultural Resources | Human Health & Safety Standards | Socioeconomics /EJ | Utilities |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SBMR/WAAF** | | | | | | | | | | | | | |
| 58143 | Urban Assault Course and Training Facilities | Main Post | ⊙ | ⊘ | ○ | ⊙ | ⊙ | ⊙̲ | ⊙ | ⊙ | ⊙ | ⊘ | ⊘ | ⊙̲+ | ⊙+ |
| 57404 | Virtual Fighting Training Facility | Main Post | ⊙ | ⊘ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙̲+ | ⊙+ |
| 56923 | Range Control Facility | Main Post | ⊙ | ⊘ | ○ | ⊙ | ⊙ | ⊙̲ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊙̲+ | ⊙+ |
| 58144 | Battle Area Complex | Main Post | ⊙ | ⊘ | ○ | ⊙ | ⊙ | ⊙̲ | ⊙ | ⊙ | ⊘ | ⊗ | ⊘ | ⊙̲+ | ⊙+ |
| 57421/ 58925 | Motor Pool Maintenance Shops | Main Post | ⊙ | ⊘ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊙+ | ⊙+ |
| 57416 | Tactical Vehicle Wash Facility | East Range | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊙ | ⊙+ | ⊙ |
| N/A | Fixed Tactical Internet | Main Post | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ○ | ○+ |
| 55270 | South Range Land Acquisition | SRAA | ⊙ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 57461 | Qualification Training Range, QTR1 | Main Post | ⊙ | ⊘ | ○ | ⊙̲ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊗ | ⊘ | ⊙̲+ | ⊙+ |
| 57422 | Multiple Deployment Facility | WAAF | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊙+ | ⊙ |
| 57405 | Upgrade Airfield for C-130 Aircraft | WAAF | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙̲ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙+ | ⊙ |
| N/A | SBCT Training | SBMR | ⊙ | ⊙ | ○ | ⊘ | ⊘ | ⊙ | ⊘ | ⊗ | ⊗̲ | ⊗ | ⊘ | ⊘̲ | ⊙ |
| 57406 | Road Construction, Schofield to Helemanō | Helemanō | ⊙ | ⊘ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊙ | ⊙ | ⊙ | ⊙+ | ⊙ |

**Table ES-7**
**SBCT Project Impacts under RLA Alternative** *(continued)*

| 1391 Project # | SBCT Project Title | Location | Land Use/Recreation | Visual Resources | Airspace | Air Quality | Noise | Traffic | Water Resources | Geology and Soils | Biological Resources | Cultural Resources | Human Health & Safety Standards | Socioeconomics/ EJ | Utilities |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57802 | Land Easement, Schofield to Helemanō | Helemanō | ⊙ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | | **Dillingham** | | | | | | | | | | | | | |
| 58161 | Land Easement/Construct Road, SB/DMR | Dillingham | ⊙ | ⊘ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊙ | ⊙+ | ⊙+ |
| N/A | Fixed Tactical Internet | Dillingham | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ○+ | ○+ |
| N/A | SBCT Training | Dillingham | ⊙ | ⊙ | ○ | ⊘ | ⊙ | ⊙ | ⊙+ | ⊗ | ⊘ | ⊗ | ⊘ | ⊙ | ⊙ |
| | | **KTA/KLOA** | | | | | | | | | | | | | |
| 57415 | Tactical Vehicle Wash Facility | Kahuku | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊙ | ⊙+ | ⊙ |
| 57305 | Combined Arms Collective Training Facility | Kahuku | ⊗ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊗ | ⊙ | ⊙+ | ⊙+ |
| N/A | Fixed Tactical Internet | KTA | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ○+ | ○+ |
| N/A | SBCT Training | KTA/KLOA | ⊙ | ⊙ | ○ | ⊘ | ⊙ | ⊙ | ⊘ | ⊗ | ⊗ | ⊗ | ⊘ | ⊙ | ⊙ |
| | | **PTA** | | | | | | | | | | | | | |
| 57197 | Battle Area Complex | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊘ | ⊗ | ⊘ | ⊙+ | ⊙+ |
| 57183 | Antiarmor Live-fire and Tracking Range | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊘ | ⊗ | ⊘ | ⊙+ | ⊙+ |
| 58273 | Construct Military Vehicle Trail, PTA-Kawaihae | Pōhakuloa | ⊙ | ⊘ | ○ | ⊙ | ⊙ | ⊙+ | ⊙ | ⊘ | ⊘ | ⊗ | ⊙ | ⊙+ | ⊙ |
| 58273 | Land Easement for Military Vehicle Trail, PTA-Kawaihae | Pōhakuloa | ⊙ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

**Table ES-7**
**SBCT Project Impacts under RLA Alternative** *(continued)*

| 1391 Project # | SBCT Project Title | Location | Land Use/Recreation | Visual Resources | Airspace | Air Quality | Noise | Traffic | Water Resources | Geology and Soils | Biological Resources | Cultural Resources | Human Health & Safety Standards | Socioeconomics/ EJ | Utilities |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57417 | Ammunition Storage | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⦸ | ⊙+ | ⊙+ |
| 57414 | Tactical Vehicle Wash Facility | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙+ | ⊙ |
| 57411 | West PTA Maneuver Training Area Land Acquisition | Pōhakuloa | ⊙+ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 56994 | Range Maintenance Facility | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⊙+ | ⊙ |
| 57408 | Runway Upgrade/Extension, Bradshaw AAF | Pōhakuloa | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⊙ | ⊙+ | ⊙ |
| N/A | Fixed Tactical Internet | Pōhakuloa | ⊙ | ⦸ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙+ | ○+ |
| N/A | Installation Information Infrastructure Architecture | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙+ | ○+ |
| N/A | SBCT Training | Pōhakuloa | ⊙ | ⊙ | ⊙ | ⊗ | ⦸ | ⊙ | ⊙ | ⊗ | ⊗ | ⊗ | ⦸ | ⊙ | ⊙ |
| 57462 | Qualification Training Range, QTR2 | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⦸ | ⊗ | ⦸ | ⊙+ | ⊙+ |

Legend is provided above under Table ES-6.

### ES.8.3 Summary of Impacts

#### *Land Use/Recreation*

Table ES-8 provides an overview of Land Use/Recreation impacts on each installation from the Proposed Action, RLA Alternative, and No Action.

**Table ES-8**
**Land Use/Recreation Impacts by Installation and Impact Category**

| Impact Issues | SBMR | | | DMR | | | KTA/KLOA | | | PTA | | | Project-wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA |
| **Land Use/Recreation** | | | | | | | | | | | | | | | |
| Conversion of agricultural land to training land | ⦸ | ⊙ | ○ | ⊙ | ⊙ | ○ | N/A | N/A | N/A | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Impacts on natural resources management and recreational land use | ⊙ | ○ | ○ | ○ | ○ | ○ | ⊗/○ | ⊗/○ | ○/○ | ○+ | ○+ | ○ | ⊗+ | ⊗+ | ○ |
| Construction of FTI in a Conservation District | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | N/A | N/A | N/A | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Impacts on land use during construction activities | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| SBCT training on lands used for current training | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures apply only to adverse impacts.

LEGEND:

| | |
|---|---|
| ⊗ = Significant | N/A = Not applicable |
| ⦸ = Significant but mitigable to less than significant | PA = Proposed Action |
| ⊙ = Less than significant | RLA = Reduced Land Acquisition |
| ○ = No impact | NA = No Action |
| + = Beneficial impact | |

*Proposed Action.* Significant impacts on land use would result from operation of the CACTF at KTA (see Section 7.2), which would result in a surface danger zone preventing unauthorized access within KTA. Significant but mitigable impacts would occur at SBMR as a result of the use of the SRAA for QTR2, which would affect land use within a portion of the Honouliuli Preserve (see Section 5.2). Beneficial impacts would be realized at the WPAA from the expansion of public access for hunting during periods when no military training is taking place (see Section 8.2).

*Reduced Land Acquisition.* Project impacts would be the same, except there would be no impact on recreational uses on lands within SRAA, as the QTR2 would not be built at SRAA (see Section 5.2).

*No Action.* Under No Action, transformation would not occur, so no major changes to training areas would take place in Hawai'i. The Army would continue to operate and maintain its range, training areas, and support facilities in order to meet its current force training mission requirement. However, the level of training would change occasionally in response to this requirement and, as a result, the land uses of these areas may change. If future changes could affect the environment, NEPA documentation would be prepared.

### *Visual Resources*

Table ES-9 provides an overview of Visual Resources impacts on each installation from the Proposed Action, RLA Alternative, and No Action.

**Table ES-9**
**Visual Impacts by Installation and Impact Category**

| Impact Issues | SBMR | | | DMR | | | KTA/KLOA | | | PTA | | | Project-wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA |
| **Visual Resources** | | | | | | | | | | | | | | | |
| Impairment of view during the construction phase | ⦸ | ⦸ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ○ | ⦸ | ⦸ | ○ |
| Modification of existing view | ⦸ | ⦸ | ○ | ⦸ | ⦸ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⦸ | ⦸ | ○ | ⦸ | ⦸ | ⊙ |
| Alteration of the landscape character | ⦸ | ⦸ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ○ | ⦸ | ⦸ | ○ |
| Consistency with visual resource policies | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Impairment of view from visible fugitive dust | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Alter nighttime light and glare | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |

This table summarizes project-wide impacts. For installation-specific impacts see Chapters 5 – 8.
Legend is provided above under Table ES-8.

*Proposed Action.* Significant but mitigable impacts would occur at SBMR (see Section 5.3) from impairment of views during project construction activities and from alteration of landscape character because of facility construction, and at SBMR, DMR, and PTA (see Sections 5.3, 6.3, and 8.3) from modification of existing views relating to road construction. Project-wide significant but mitigable impacts would occur relating to impairment of views, modification of existing views, and alteration of landscape character (see Section 4.3).

*Reduced Land Acquisition.* The impacts to visual resources at SRAA would be reduced somewhat but would still be impacted by construction (see Section 5.3). Overall, the project impacts would be the same as the Proposed Action.

*No Action.* The baseline of current conditions and training exercises at all of the facilities would continue under No Action. The Army would continue to operate and maintain its range and training area facilities in order to meet its training mission requirement. Invariably, the level of training would change occasionally in response to this requirement, and, consequently, the visual impact as a result of these changes might be altered as well. The level of use of the installation's training assets is not anticipated to alter the physical character of the landscape itself, and no impacts are expected to the six visual resources impact issues.

### *Airspace*

Table ES-10 provides an overview of Airspace impacts on each installation from the Proposed Action, RLA Alternative, and No Action.

**Table ES-10**
**Airspace Impacts by Installation and Impact Category**

| Impact Issues | SBMR | | | DMR | | | KTA/KLOA | | | PTA | | | Project-wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA |
| **Airspace** | | | | | | | | | | | | | | | |
| Reduction in navigable airspace | ○ | ○ | ○ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ○ | ○ | ○ | ○ | ○ | ○ |
| New or modified special use airspace | ○ | ○ | ○ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Change to a military training route | ○ | ○ | ○ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Change in en route airways or IFR procedure | ○ | ○ | ○ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Restrict access to airport/airfield | ○ | ○ | ○ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Obstruct air navigation | ○ | ○ | ○ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Aviation safety | ○ | ○ | ○ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ○ | ○ | ○ | ○ | ○ | ○ |

Legend is provided above under Table ES-8.

*Proposed Action.* There would be no significant or significant but mitigable impacts on airspace as a result of the Proposed Action.

*Reduced Land Acquisition.* Project impacts would be the same as the Proposed Action.

*No Action.* The current baseline of existing conditions would continue under No Action. There would be no direct impacts on airspace at any of the locations because none of the factors considered in determining impacts apply.

### *Air Quality*

Table ES-11 provides an overview of Air Quality impacts on each installation from the Proposed Action, RLA Alternative, and No Action.

*Proposed Action.* Significant impacts from wind erosion of areas disturbed by military vehicle use would occur at PTA (see Section 8.5). Mitigation measures will substantially reduce the severity of the impact but not to less than significant levels. Significant but mitigable impacts from wind erosion of areas disturbed by military vehicle use would occur at KTA (see section 7.5). Project-wide $PM_{10}$ emissions from wind erosion would average 1,769 tons (1,629 metric tons) per year before mitigation. Significant but mitigable impacts from fugitive dust raised by military vehicle use would occur at SBMR, DMR, KTA, and PTA (see

**Table ES-11**
**Air Quality Impacts by Installation and Impact Category**

| Impact Issues | SBMR | | | DMR | | | KTA/KLOA | | | PTA | | | Project-wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA |
| **Air Quality** | | | | | | | | | | | | | | | |
| Emissions from construction activities | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Emissions from ordnance use | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Engine emissions from military vehicle use | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Fugitive dust from military vehicle use | ⊘ | ⊘ | ⊙ | ⊘ | ⊘ | ⊙ | ⊘/○ | ⊘/○ | ⊙/○ | ⊘ | ⊘ | ⊙ | ⊘ | ⊘ | ⊙ |
| Wind erosion from areas disturbed by military vehicle use | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘/○ | ⊘/○ | ⊙/○ | ⊗ | ⊗ | ⊙ | ⊗ | ⊗ | ⊙ |
| Emissions from increased aircraft operations | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Emissions from wildfires | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Other emissions from personnel increases | ⊙ | ⊙ | ⊙ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ○ | ○ | ○ | ⊙ | ⊙ | ⊙ |

Legend is provided above under Table ES-8.

Sections 5.5, 6.5, 7.5, and 8.5). Annual fugitive dust $PM_{10}$ emissions from off road military vehicle use would total 1,736 tons (1,575 metric tons) per year, or a net increase of 780 tons per year at SBMR, 211 tons per year at DMR, 315 tons per year at KTA, and 429 tons per year at PTA, before mitigation.

*Reduced Land Acquisition*. Project impacts would be nearly the same as under the Proposed Action. Fugitive dust emissions at SBMR would be slightly higher than under the Proposed Action, but would be the same as for the Proposed Action at other installations.

*No Action.* Projected impacts to air quality are expected to be less than significant from emissions from ordnance use, emissions from engines from military vehicle use, fugitive dust, wind erosion, or other emissions from personnel increases.

### *Noise*

Table ES-12 provides an overview of Noise impacts on each installation from the Proposed Action, RLA Alternative, and No Action.

*Proposed Action*. There would be significant noise impacts from ordnance use at SBMR (see Sections 5.6). At SBMR, increased training and munitions use under the Proposed Action would result in expansion of Zone II and Zone III noise contours. The Zone III noise contour would not change much from existing conditions, but would expand eastward by about 650 to 820 feet (200 to 250 meters) in the southwestern portion of the cantonment area. The Zone II noise contour would expand eastward by about 985 to 1300 feet (300 to 400 meters). Some additional on-post housing would been compassed by the expanded Zone III and Zone II noise contours. Two on-post schools (Solomon Elementary School and Hale

**Table ES-12**
**Noise Impacts by Installation and Impact Category**

| Impact Issues | SBMR | | | DMR | | | KTA/KLOA | | | PTA | | | Project-wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA |
| **Noise** | | | | | | | | | | | | | | | |
| Noise from construction activities | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Noise from ordnance use | ⊗* | ⊗* | ⊗ | ⊙ | ⊙ | ⊙ | ⊙/○ | ⊙/○ | ⊙/○ | ⊘ | ⊘ | ⊙ | ⊗ | ⊗ | ⊗ |
| Noise from military vehicle use | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Noise from aircraft operations | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Noise from added personal vehicle traffic | ⊙ | ⊙ | ○ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ○ | ○ | ○ | ⊙ | ⊙ | ○ |

Legend is provided above under Table ES-8.
* The PA and RLA for SBMR would have a minor increase in noise impacts over the NA. The determination of significance is based on existing NA levels.

Kula Elementary School) would remain exposed to Zone II noise conditions. There would be a significant but mitigable noise impacts at PTA where large caliber weapons firing and explosives use would result in Zone II noise contours that extend slightly beyond the installation boundaries (see Section 8.6). The use of blanks and other training munitions on the WPAA would produce unweighted peak dB levels in the Zone II range at the Waiki'i Ranch and Kilohana Girl Scout Camp near the installation boundary. Ordnance firing and detonations at PTA might also lead to Zone II noise conditions at the Mauna Kea State Park rental cabins. Project-wide impacts from ordnance firing would be significant.

*Reduced Land Acquisition*. Although there would be a slight decrease in noise at the SRAA (see Section 5.6) there would be no appreciable change to project impacts over those described for the Proposed Action.

*No Action.* There would be a significant but unavoidable impact as a result of continued exposure to noise from ordnance use at SBMR (see Section 5.6), and less than significant impacts as a result from military vehicle use and aircraft operations, and no impact as a result of construction equipment and added personal vehicle traffic under No Action. Project-wide impacts under No Action would be significant.

### Traffic

Table ES-13 provides an overview of Traffic impacts on each installation from the Proposed Action, RLA Alternative, and No Action.

*Proposed Action.* There would be no significant adverse impacts on traffic from the Proposed Action. Military vehicles will travel on public roads until the trails are constructed. The short term impact to traffic from this activity is less than significant. Minor beneficial impacts on traffic would be realized at PTA from the use of military trails for military traffic currently using public roadways.

**Table ES-13**
**Traffic Impacts by Installation and Impact Category**

| Impact Issues | SBMR | | | DMR | | | KTA/KLOA | | | PTA | | | Project-wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA |
| **Traffic** | | | | | | | | | | | | | | | |
| Intersection operations | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/⊙ | ⊙/⊙ | ○/○ | ⊙+ | ⊙+ | ○ | ⊙+ | ⊙+ | ○ |
| Roadway segment operations | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/⊙ | ⊙/⊙ | ○/○ | ⊙+ | ⊙+ | ○ | ⊙+ | ⊙+ | ⊙ |
| Construction traffic | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Parking | ⊙ | ⊙ | ○ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ○ | ○ | ○ | ⊙ | ⊙ | ○ |

Legend is provided above under Table ES-8.

*Reduced Land Acquisition*. Project impacts would be the same as the Proposed Action.

*No Action.* There would be less than significant impacts on traffic as a result of continued operations under No Action.

### Water Resources

Table ES-14 provides an overview of Water Resources impacts on each installation from the Proposed Action, RLA Alternative, and No Action.

**Table ES-14**
**Water Resources Impacts by Installation and Impact Category**

| Impact Issues | SBMR | | | DMR | | | KTA/KLOA | | | PTA | | | Project-wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA |
| **Water Resources** | | | | | | | | | | | | | | | |
| Impacts on surface water quality | ⊘ | ⊘ | ⊙ | ⊙ | ⊙ | ○ | ⊘/⊙ | ⊘/⊙ | ⊘/○ | ⊙ | ⊙ | ⊙ | ⊘ | ⊘ | ⊘ |
| Impacts on groundwater quality | ⊙ | ⊙ | ⊙ | ○ | ○ | ○ | ⊙/○ | ⊙/○ | ⊙/○ | ○ | ○ | ○ | ⊙ | ⊙ | ⊙ |
| Increased flood potential | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙/○ | ⊙/○ | ⊙/○ | ○ | ○ | ○ | ⊙ | ⊙ | ⊙ |
| Groundwater supply | ⊙ | ⊙ | ⊙ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ○ | ○ | ○ | ⊙ | ⊙ | ⊙ |

Legend is provided above under Table ES-8.

*Proposed Action.* There would be significant but mitigable long-term impacts on surface water quality from suspended sediment loading resulting from erosion related to maneuver training activities at SBMR, SBER, and KTA (see Sections 5.8 and 7.8), and from sediment loading following wildfires at SBMR and PTA (see Sections 5.8 and 8.8). Project-wide significant but mitigable long-term impacts would occur relating to surface water quality (see Section 4.8).

*Reduced Land Acquisition*. Project impacts would be the same as the Proposed Action.

*No Action.* There would be a significant but mitigable impact to water resources as a result of potential soil erosion at KTA. Under the No Action Alternative, the current less than significant impact levels for all of the identified water quality issues are expected to continue at the same level. Based on available data, the degradation of stream water quality by contaminant residues on training ranges at SBMR is not expected to be a significant impact. Although only the eastern portion of DMR is included in the FEMA flood zone study map for the area, and the flood zone in the rest of DMR has not been determined, it appears likely, based on the portion that was studied, that flooding could occur on the remaining portion of DMR but would not be significant.

### *Geology, Soils, and Seismicity*

Table ES-15 provides an overview of Geological impacts on each installation from the Proposed Action, RLA Alternative, and No Action.

**Table ES-15**
**Geological Resources Impacts by Installation and Impact Category**

| Impact Issues | SBMR | | | DMR | | | KTA/KLOA | | | PTA | | | Project-wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA |
| **Geological Resources** | | | | | | | | | | | | | | | |
| Soil loss from training activities | ⊗ | ⊘ | ⊘ | ⊗ | ⊗ | ○ | ⊗/○ | ⊗/○ | ⊘/○ | ⊗ | ⊗ | ○ | ⊗ | ⊗ | ⊘ |
| Soil erosion and loss from wildland fires | ⊘ | ⊘ | ⊘ | ⊘ | ⊘ | ⊙ | ⊘/⊘ | ⊘/⊘ | ⊘/⊘ | ⊘ | ⊘ | ⊘ | ⊘ | ⊘ | ⊘ |
| Soil compaction | ⊘ | ⊙ | ⊙ | ○ | ○ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊘ | ⊘ | ⊙ | ⊘ | ⊘ | ⊙ |
| Exposure to soil contaminants | ⊙ | ⊙ | ⊙ | ○ | ○ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Slope failure | ⊘ | ⊘ | ○ | ⊘ | ⊘ | ○ | ⊙.⊙ | ⊙/⊙ | ⊙/⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊘ | ⊙ |
| Volcanic and seismic hazards | ○ | ○ | ○ | ⊙ | ⊙ | ⊙ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |

Legend is provided above under Table ES-8.

*Proposed Action*. Significant impacts would occur at SBMR, KTA, DMR, and PTA (see Sections 5.9, 6.9, 7.9, and 8.9) relating to soil loss from training activities. Mitigation measures will substantially reduce the severity of impact but not to less than significant levels. Significant but mitigable impacts would occur at SBMR, DMR, KTA, and PTA (see Sections 5.9, 6.9, 7.9, and 8.9) relating to soil erosion and loss from wildland fires. Significant but mitigable impacts would occur at SBMR and PTA (see Sections 5.9 and 8.9) from soil compaction, and at SBMR and DMR from slope failure (see Sections 5.9 and 6.9). Project-wide impacts would be significant from soil loss, and significant but mitigable from wildland fire-related soil loss, soil compaction, soil contamination, and slope failure (see Section 4.9).

*Reduced Land Acquisition*. The geologic impacts under the RLA Alternative would be nearly the same as those described for the Proposed Action, except that impacts would be substantially reduced in the SRAA. This would result in reduced impacts related to soil erosion and soil compaction in this area but would result in increased impacts in areas where training would be concentrated. There would be a less than significant impact on soil compaction at SBMR as a result of this change, because no maneuver training would take place at the SRAA, but all other impacts would remain the same. Mitigation would be the same as that under the Proposed Action, except that it is likely to be less successful because, with reduced land available for training, the impacts of training would be concentrated on a smaller amount of land. One of the available mitigation measures is to take damaged land out of service until it recovers; but this measure would be less feasible if training were concentrated in a smaller land area.

*No Action.* There would be no significant impact under No Action with the exception of soil compaction. Soils in training areas would be subject to existing levels of compaction. Most of these effects have already occurred, although continued maneuver training would reduce the ability of soils to recover from these effects. Mitigation would be the same as that described under the Proposed Action.

### *Biological Resources*

Table ES-16 provides an overview of Biological Resources impacts on each installation from the Proposed Action, RLA Alternative, and No Action.

**Table ES-16**
**Biological Resources Impacts by Installation and Impact Category**

| Impact Issues | SBMR | | | DMR | | | KTA/KLOA | | | PTA | | | Project-wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA |
| **Biological Resources** | | | | | | | | | | | | | | | |
| Impacts from fire on sensitive species and sensitive habitat. | ⊗ | ⊗ | ⊗ | ⊘ | ⊘ | ⊘ | ⊗/⊘ | ⊗/⊘ | ⊗/⊘ | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ |
| Impacts from construction and training activities on sensitive species and sensitive habitat. | ⊘ | ⊘ | ⊘ | ⊘ | ⊘ | ⊘ | ⊘/○ | ⊘/○ | ⊘/○ | ⊗ | ⊗ | ⊘ | ⊗ | ⊗ | ⊘ |
| Impacts from the spread of nonnative species on sensitive species and sensitive habitat. | ⊘ | ⊘ | ⊘ | ⊘ | ⊘ | ⊘ | ⊘/○ | ⊘/○ | ⊘/○ | ⊘ | ⊘ | ⊘ | ⊘ | ⊘ | ⊘ |
| Impacts from construction and training activities on general habitat and wildlife. | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ |
| Threat to migratory birds. | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Noise and visual impacts. | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Vessel impacts on marine wildlife and habitat. | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Runoff impacts on marine wildlife and coral ecosystems. | N/A | N/A | N/A | ○ | ○ | ○ | ○/ N/A | ○/ N/A | N/A | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |

Legend is provided above under Table ES-8.

*Proposed Action*. Significant impacts from fire on sensitive species and habitat would occur at SBMR, KTA, and PTA, and project-wide. Mitigation measures will substantially reduce the severity of impact but not to less than significant levels. These impacts would be mitigable to less than significant at DMR and KLOA (see Sections 5.10, 6.10, 7.10, and 8.10). Impacts from construction and training activities on sensitive species and sensitive habitat would be significant at PTA and project-wide, and mitigable to less than significant at SBMR, DMR, and KTA. Impacts from the spread of nonnative species on sensitive species and sensitive habitat would be significant but mitigable to less than significant at all installations and project-wide.

*Reduced Land Acquisition*. Impacts from the RLA Alternative would be the same as the Proposed Action.

*No Action.* There would be a continuation of existing significant and not mitigable impacts under the No Action Alternative. This includes fire impacts on sensitive species and habitat. Since there is a risk that a wildfire could result in an irretrievable loss of individuals of sensitive species, the Army has made a conservative determination that even under the No Action Alternative species and habitat could be potentially impacted by fire under the current force activities. Significant measures have been developed to prevent and control wildfires and will be implemented through the IWFMP.

Impacts from construction and training activities and the spread of nonnative species would be significant and mitigable to less than significant for all project areas.

Ongoing Army environmental management and stewardship activities, described in Chapter 2, would continue to decrease impact intensity and to protect sensitive plants and habitats within the ROI. All determinations made through Endangered Species Act Section 7 Consultation as described above and detailed in the project location chapters would apply under this alternative as well.

The following less than significant impacts on biological resources would occur as a result of SBCT actions within each of the SBCT training area ROIs: threats to migratory birds and noise and visual impacts, impacts from construction and training on general habitat and wildlife, vessel impacts on marine wildlife and habitat, and runoff impacts on marine wildlife and coral ecosystems. These impacts would be limited and would be addressed by ongoing Army environmental management and stewardship activities.

### Cultural Resources

Table ES-17 provides an overview of Cultural Resources impacts on each installation from the Proposed Action, RLA Alternative, and No Action.

*Proposed Action.* Significant impacts on historic buildings would occur at KTA and PTA. Significant impacts on archaeological resources from range and facility construction would occur at SBMR and PTA; these impacts would also occur at KTA, but would be mitigable to less than significant. Impacts on archaeological resources from training activities would be significant at DMR and PTA, but mitigable to less than significant at SBMR. Significant impacts on areas of traditional importance (ATIs) to Native Hawaiians would occur at SBMR, DMR, and PTA. Impacts on archaeological sites from road or trail construction would be signigicant at PTA but mitigable to less than significant at DMR. Impacts on archaeological sites from road use would be mitigable to less than significant levels at PTA. Project-wide significant impacts would result on historic buildings, on archaeological sites from construction of facilities and roads, and from training activities. Significant but mitigable project-wide impacts would result on archaeological sites from road use. Mitigation for all significant cultural resources impacts has been developed in consultation with the State Historic Preservation Office, Native Hawaiians, and other interested parties,

**Table ES-17**
**Cultural Resources Impacts by Installation and Impact Category**

| Impact Issues | SBMR | | | DMR | | | KTA/KLOA | | | PTA | | | Project-wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA |
| **Cultural Resources** | | | | | | | | | | | | | | | |
| Impacts on historic buildings | ⊙ | ⊙ | ○ | ○ | ○ | ○ | ⊗/○ | ⊗/○ | ○/○ | ⊗ | ⊗ | ○ | ⊗ | ⊗ | ○ |
| Impacts on archaeological resources from range and facility construction | ⊗ | ⊗ | ○ | ○ | ○ | ○ | ⊘/○ | ⊘/○ | ○/○ | ⊗ | ⊗ | ○ | ⊗ | ⊗ | ○ |
| Impacts on archaeological resources from training activities | ⊘ | ⊘ | ⊙ | ⊘ | ⊘ | ⊙ | ⊙/○ | ⊙/○ | ⊙/○ | ⊗ | ⊗ | ○ | ⊗ | ⊗ | ⊙ |
| Impacts on archaeological sites from construction of FTI | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ○/○ | ○/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Impacts on ATIs | ⊗ | ⊗ | ○ | ⊗ | ⊗ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊗ | ⊗ | ○ | ⊗ | ⊗ | ○ |
| Impacts from installation information infrastructure architecture construction | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Impacts on archaeological sites from road or trail construction | ⊙ | ⊙ | ○ | ⊘ | ⊘ | ○ | N/A | N/A | N/A | ⊗ | ⊗ | ○ | ⊗ | ⊗ | ○ |
| Impacts on archaeological sites from road use | ○ | ○ | N/A | ⊙ | ⊙ | ○ | ⊙/⊙ | ⊙/⊙ | ⊙/⊙ | ⊘ | ⊘ | ○ | ⊘ | ⊘ | ○ |

Legend is provided above under Table ES-8.

and is memorialized in the Programmatic Agreement (PA) found in Appendix J of this FEIS. For those impacts that are significant, mitigation measures will substantially reduce the severity of the impact but not to less than significant levels.

*Reduced Land Acquisition*. Project impacts would be the same as the Proposed Action.

*No Action.* Existing conditions would continue under No Action. Less than significant impacts under No Action generally result from ongoing training activities or infrastructure projects. Ongoing training activities include continued off-road vehicle use. This would result in ongoing impacts on cultural resources in the training areas caused by ground troop activities, off-road vehicle movement, and subsurface excavations. Archaeological resources on the training areas are monitored following exercises to document adverse effects on the sites. Under No Action, current training would continue, and there would be no additional impacts on cultural resources. USARHAW will continue efforts to inventory eligible historic properties in compliance with Section 110 of the NHPA, and project planning will comply with Section 106 and its implementing regulations. Impacts on cultural resources would be mitigated in compliance with these regulatory requirements.

### *Human Health and Safety Hazards*

Table ES-18 provides an overview of impacts on Human Health and Safety at each installation from the Proposed Action, RLA Alternative, and No Action.

**Table ES-18**
**Human Health and Safety Impacts by Installation and Impact Category**

| Impact Issues | SBMR | | | DMR | | | KTA/KLOA | | | PTA | | | Project-wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA |
| **Human Health and Safety** | | | | | | | | | | | | | | | |
| Hazardous materials management | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ |
| Hazardous waste management | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ |
| Ammunition | ⊘ | ⊘ | ⊙ | ○ | ○ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊘ | ⊘ | ⊙ | ⊘ | ⊘ | ⊙ |
| Unexploded ordnance | ⊘ | ⊘ | ⊙ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ⊘ | ⊘ | ⊙ | ⊘ | ⊘ | ⊙ |
| General training | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Installation restoration program sites | ⊘ | ⊘ | ○ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ○ | ○ | ○ | ⊘ | ⊘ | ⊙ |
| Lead | ⊘ | ⊘ | ⊙ | ○ | ○ | ○ | ⊘/○ | ⊘/○ | ○/○ | ⊘ | ⊘ | ⊙ | ⊘ | ⊘ | ⊙ |
| Asbestos | ⊘ | ⊘ | ○ | ○ | ○ | ○ | ⊘/○ | ⊘/○ | ○/○ | ⊘ | ⊘ | ○ | ⊘ | ⊘ | ○ |
| Polychlorinated biphenyls | ○ | ○ | ○ | ○ | ○ | ○ | ⊙/○ | ⊙/○ | ○/○ | ○ | ○ | ○ | ⊘ | ⊘ | ○ |
| Electromagnetic fields | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Petroleum, oils and lubricants | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ |
| Pesticides/herbicides | ⊙ | ⊙ | ○ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Biomedical waste | ⊙ | ⊙ | ○ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Radon | ○ | ○ | ○ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Wildfires | ⊘ | ⊘ | ⊙ | ⊘ | ⊘ | ⊙ | ⊘/⊘ | ⊘/⊘ | ⊙/⊙ | ⊘ | ⊘ | ⊙ | ⊘ | ⊘ | ⊙ |

Legend is provided above under Table ES-8.

*Proposed Action*. Significant but mitigable impacts on range contaminant levels resulting from ammunition use increases would occur at SBMR and PTA. Significant but mitigable impacts from the risk of unexploded ordnance (UXO) in construction areas, training ranges, and along the PTA Trail would occur at SBMR and PTA. A significant but mitigable impact relating to Installation Restoration Program (IRP) site management would occur at SBMR. Significant but mitigable impacts due to possible lead exposure during demolition and lead contamination of soils would occur at SBMR, KTA, and PTA. Significant but mitigable impacts due to possible asbestos exposure during demolition would occur at BMR, KTA, and PTA. Significant but mitigable impacts to human health and safety from wildfire risks would occur at SBMR, DMR, KTA, and PTA.

*Reduced Land Acquisition*. Impacts would be the same as under the Proposed Action, except there would be additional risks from moving soils contaminated with UXOs and lead from construction of QTR2 at PTA, and an increased risk of wildfires at PTA from the increased live-fire training.

*No Action.* There would be no significant impacts as a result of No Action.

### *Socioeconomics and Environmental Justice*

Table ES-19 provides an overview of Socioeconomic impacts on each installation from the Proposed Action, RLA Alternative, and No Action.

**Table ES-19**
**Socioeconomics Impacts by Installation and Impact Category**

| Impact Issues | SBMR | | | DMR | | | KTA/KLOA | | | PTA | | | Project-wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA |
| **Socioeconomics** | | | | | | | | | | | | | | | |
| Population | ⊙+ | ⊙+ | ○ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ○ | ○ | ○ | ⊙+ | ⊙+ | ○ |
| Employment | ⊙+ | ⊙+ | ○ | ⊙+ | ⊙+ | ○ | ⊙+/○ | ⊙+/○ | ○/○ | ⊙+ | ⊙+ | ○ | ⊙+ | ⊙+ | ○ |
| Income | ⊙+ | ⊙+ | ○ | ⊙+ | ⊙+ | ○ | ⊙+/○ | ⊙+/○ | ○/○ | ⊙+ | ⊙+ | ○ | ⊙+ | ⊙+ | ○ |
| Economy (business volume) | ⊙+ | ⊙+ | ○ | ⊙+ | ⊙+ | ○ | ⊙+/○ | ⊙+/○ | ○/○ | ⊘+ | ⊘+ | ○ | ⊘+ | ⊘+ | ○ |
| Housing | ⊙ | ⊙ | ○ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ○ | ○ | ○ | ⊙ | ⊙ | ○ |
| Schools | ⊘ | ⊘ | ○ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | ⊘ | ⊘ | ○ |
| Environmental justice | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ○/○ | ○ | ○ | ○ | ⊙ | ⊙ | ○ |
| Protection of children | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ○/○ | ○ | ○ | ○ | ⊙ | ⊙ | ○ |

Legend is provided above under Table ES-8.

*Proposed Action*. Significant but mitigable impacts would occur at SBMR (see Section 5.13) relating to the increase in demand for school capacity and teachers. Significant but mitigable economic impacts to Hawai'i County would occur because of construction activities at PTA (see Section 8.13).

*Reduced Land Acquisition*. Project impacts would be the same as the Proposed Action.

*No Action.* Implementing No Action would not result in a change in the local economy or population, and no impacts on population, employment, income or the economy are anticipated. No effects on housing are expected because the number of people requiring housing on- or off-post would not change as a result of No Action. No effects on environmental justice are expected. No Action would not alter the existing health and safety, housing, or economic conditions of minority or low-income populations in Hawai'i or Honolulu Counties. No disproportionate effects on children are expected because No Action would not present any change in the public health or safety risk that could affect children. The Army would continue to provide measures to protect the safety of children, including the use of fencing, limitations on access to certain areas, and provision of adult supervision.

### *Public Services and Utilities*

Table ES-20 provides an overview of impacts on Public Services and Utilities at each installation from the Proposed Action, RLA Alternative, and No Action.

**Table ES-20**
**Public Services and Utilities Impacts by Installation and Impact Category**

| Impact Issues | SBMR | | | DMR | | | KTA/KLOA | | | PTA | | | Project-wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA |
| **Public Services and Utilities** | | | | | | | | | | | | | | | |
| Impacts to police, fire, and emergency medical services | ⊙ | ⊙ | ○ | ⊙+ | ⊙+ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Impacts to water distribution | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Wastewater and stormwater impacts | ⊙ | ⊙ | ○ | ○ | ○ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Solid waste management | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Impacts to communications | ⊙ | ⊙ | ○ | ○+ | ○+ | ○ | ○/○ | ○/○ | ○/○ | ⊙+ | ⊙+ | ○ | ⊙ | ⊙ | ○ |
| Impacts to electricity and natural gas | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙+/○ | ⊙+/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙+ | ⊙+ | ○ |

Legend is provided above under Table ES-8.

*Proposed Action.* There would be no significant impacts on public services or utilities from the Proposed Action. The Proposed Action could have beneficial effects on the telephone system at DMR and PTA (see Sections 6.14 and 8.14). The Proposed Action would have beneficial effects on the electrical system at KTA (see Section 7.14).

*Reduced Land Acquisition*. Project impacts would be the same as the Proposed Action.

*No Action.* No Action is expected to have no long-term adverse impacts on public utilities because no new facilities would be constructed to add demands to utilities infrastructure. No changes to the provision of police, fire, and emergency services would occur.

### ES.8.4 Cumulative Impacts

CEQ regulations implementing NEPA require that the cumulative impacts of a proposed action be assessed (40 CFR Parts 1500-1508). Army regulations 200-2 (32 CFR 651.39(a)(2)(ii)) also require that cumulative actions, when viewed with other proposed actions that have cumulatively significant impacts, be discussed in the same impact statement. Direct and cumulative impacts should be viewed together to determine the full impacts from each alternative identified in this EIS. However, cumulative impacts are identified in a separate section of this EIS, because there are different analytical methods for determining significance and because the ROI is often larger than that of direct and indirect impacts. (CEQ 1997). Also, this EIS may identify significant direct impacts for certain resources while finding that there are no significant cumulative impacts for the same resource. This difference is normally because of the different geographical context needed for measuring direct and cumulative impacts.

This EIS uses a variety of methods, depending on the resource area, to determine cumulative socioeconomic and environmental effects. Table ES-21 provides a summary of cumulative environmental impacts identified for this project. Methods for gathering and assessing data

**Table ES-21**
**Summary of Potential Cumulative Impacts**

| Resource Area | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Land Use/Recreation | ⊗ | ⊗ | ○ |
| Visual Resources | ⊙ | ⊙ | ○ |
| Airspace | ⊙ | ⊙ | ○ |
| Air quality | ⊙ | ⊙ | ○ |
| Noise | ⊙ | ⊙ | ○ |
| Traffic | ⊙ | ⊙ | ○ |
| Water Resources | ⊘ | ⊘ | ○ |
| Geologic, Soils, and Seismicity | ⊙ | ⊙ | ○ |
| Biological Resources | ⊗ | ⊗ | ⊗ |
| Cultural Resources | ⊗ | ⊗ | ⊙ |
| Human Health and Safety Hazards | ⊗ | ⊗ | ⊘ |
| Socioeconomic and Environmental Justice | ⊘ | ⊘ | ○ |
| Public Service and Utilities | ⊙ | ⊙ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:
⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact
N/A = Not applicable

regarding cumulative impacts include: interviews, use of checklists, trends analysis, and forecasting. In general, past, present, and future foreseeable projects are assessed by resource area. These projects, which are listed in Tables 9-1 and 9-2 (see Chapter 9), are sponsored by the U.S. Army, other federal and state agencies and private entities, and include 34 projects on O'ahu and 9 projects on Hawai'i.

Cumulative impacts from the Proposed Action and the Reduced Land Acquisition Alternative, and the No Action alternative would occur in all resource areas. Significant cumulative impacts would occur in the following resource areas: Land use, biological and cultural resources, water quality, human health and safety hazards, and socioeconomics.

There would be significant cumulative impacts on land use from the acquisition and conversion of agricultural land independent of the Proposed Action, Reduced Land Acquisition Alternative, and No Action Alternative. Significant impacts to biological resources would occur from a cumulative increase in the potential for fire to occur on O'ahu and the island of Hawai'i as a result of SBCT and foreseeable projects identified for both islands.

There would be significant cumulative impacts on cultural resources from cumulative projects and the construction and training associated with the Proposed Action or Reduced Land Acquisition Alternative.

Based on further review and public comments on the Draft EIS, the Army has determined that implementation of the Proposed Action or Reduced Land Acquisition Alternative would result in significant cumulative impacts on human health and safety from significant increases in cumulative ammunition storage, use, transportation, and disposal, and UXO hazards, considering the existing levels of ammunition and unexploded ordnance from cumulative projects. There would be significant but mitigable to less than significant long term cumulative impacts on surface water quality from suspended sediment resulting from training activities at SBMR and KTA, from the potential for chemical residues or spills at SBMR, and from sediment loading following wildfires at SBMR, KTA, and PTA.

There would be a significant but mitigable to less than significant long term cumulative impact to socioeconomics and environmental justice from cumulative projects in association with the Proposed Action and RLA Alternative for population, schools and housing. The Army proposes to mitigate these cumulative impacts through measures discussed in Section 4.13, including notification to the Hawai'i Department of Education at the earliest point practicable of any known increases of students to schools on or near SBMR and WAAF, supplementing the Hawai'i Department of Education budget through the U.S. Department of Education Federal Impact Aid Program, and long-range procurement planning for supply and demand issues related to construction activities.

## ES.9 OTHER CONSIDERATIONS

### ES.9.1 Significant Unavoidable Adverse Impacts

An EIS must describe any significant unavoidable impacts for which either no mitigation or only partial mitigation is feasible. Significant and unavoidable impacts from the Proposed Action are limited to the following:

- Unauthorized recreational access at KTA may be adversely affected by additional fencing and signs restricting access, which is necessary due to the proposed live-fire use of the area (see Section 7.2, Land Use/Recreation);
- Air quality impacts from wind erosion of areas previously disturbed by off-road vehicle maneuver activity (where vegetation has been decreased resulting in increased wind erosion) at KTA and PTA (see Sections 7.5 8.5, Air Quality);
- Noise impacts from ordnance use at SBMR (see Section 5.6, Noise);
- Soil loss from training activities at SBMR, DMR, KTA, and PTA (see Section 5.9, Section 7.9, and Section 8.9, Geology, Soils, and Seismicity);
- Biological impacts from fire on sensitive species and habitat at SBMR, KTA and PTA (see Section 5.10, Section 7.10, and Section 8.10 Biological Resources);
- Biological impacts from off-road training activities on sensitive species and habitat at PTA (see Section 8.10, Biological Resources);

- Cultural resource impacts to historic buildings at KTA (the Nike Missile Site) and PTA (the Ke'āmuku Village) (see Section 7.11 and Section 8.11, Cultural Resources);
- Cultural resource impacts to archaeological resources from range and facility construction at PTA (see Section 8.11, Cultural Resources);
- Cultural resource impacts to archaeological resources from training activities at DMR and PTA (see Section 6.11 and Section 8.11, Cultural Resources);
- Cultural resource impacts to Areas of Traditional Importance at SBMR, DMR, and PTA (see Section 5.11, Section 6.11, and Section 8.11, Cultural Resources);
- Cumulative impacts to land use (see Section 9.5, Cumulative Impacts);
- Cumulative impacts to biological resources (see Section 9.5, Cumulative Impacts);
- Cumulative impacts to cultural resources (see Section 9.5, Cumulative Impacts);
- Cumulative impacts to human health and safety hazards (see Section 9.5, Cumulative Impacts); and,
- Environmental Justice impacts to Areas of Traditional Importance at SBMR, DMR, and PTA (see Section 10.2.3, Section 10.2.4, and Section 10.2.6, Environmental Justice).

### ES.9.2 Relationship Between Local Short-Term Uses of the Environment and Long-Term Productivity

NEPA requires that an EIS include a consideration of the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity.

Construction activities associated with the proposed projects are short-term and temporary. All significant construction impacts would be mitigated where practicable under the constraints of public safety and the military mission. Short-term damage to the environment relating to construction includes direct and indirect loss of habitat and damage to sensitive species, loss of nonrenewable cultural resources, emissions impacts on air quality, and surface water quality impacts. Long-term environmental damage includes loss of important farmland, impacts on soil and water quality, impacts on habitat and wildlife from training activities, erosion, and wildfires, air quality impacts from wind erosion due to training activities, and potential damage to cultural resources in the future.

The conversion of important farmland to military use at PTA and SBMR could affect long-term agricultural productivity in Hawai'i. Therefore, there would be some adverse impacts on long-term productivity as a result of the Proposed Action, but regional socioeconomic impacts are not expected to be significant.

Long-term productivity would be served by replacing inadequate and inefficient facilities at SBMR and KTA with modern fuel-efficient buildings designed to reduce long-term reliance on nonrenewable fuel sources. Such replacement would also remove workplace hazards to Army staff, such as lead-based paint (LBP) and asbestos-containing material (ACM).

Infrastructure upgrades (such as communications and power systems) associated with the Proposed Action would result in longer life of these facilities and fewer expenses in maintaining and repairing such facilities. New facilities, such as the vehicle washes, would be designed to reduce the spread of invasive species and would use recycled water, and other facilities, such as select FTI sites, may be designed to use solar power, thus minimizing the project's long-term energy requirements.

The long-term productivity of the Proposed Action is based on the Army's mission, specifically its duty under transformation. Any measurement of long-term productivity in this context must recognize the overriding importance of national defense and the Army's obligation to adapt to changing national security needs. While the Army will take whatever actions are reasonable and practicable to preserve and protect the natural environment under its stewardship, the necessity of national defense requires the Army to provide the nation with capabilities that meet current and evolving national defense requirements. The Proposed Action is designed to meet these goals and further the security and welfare of the US, its residents, and its natural environment.

### ES.9.3 Irreversible and Irretrievable Commitments of Resources

NEPA requires that an EIS analyze the extent to which the proposed action's primary and secondary effects would commit nonrenewable resources to uses that future generations would be unable to reverse.

Implementing the Proposed Action or RLA Alternative would require commitments of both renewable and nonrenewable energy and material resources for demolishing inadequate facilities at SBMR and PTA; for constructing FTI antennas, proposed ranges, and support facilities at SBMR, DMR, KTA, WAAF, and PTA; and for constructing Dillingham Road and Helemanō and PTA Trails. Material resources that would be used include wood, concrete, metals, asphalt and other petroleum products, and nonrenewable energy would be used for the construction activities. This temporary energy expenditure would occur over the short term and would be irreversible once construction is completed. Additionally, further review has indicated that maneuver training at the WPAA may result in an irretrievable commitment of soil resources by loss through erosion of soils that support sensitive plant species and habitat.

Other nonrenewable resources would be used during SBCT training, such as the fuel used by Strykers and other vehicles in maneuvers and troop convoys; the water, power, and other resources necessary to maintain and operate the new military vehicle trails and new training facilities at SBMR, KTA, and PTA; and the increase in local resources required to support the additional military personnel and their families.

## ES.10 MITIGATION MEASURES

Mitigation actions would be expected to reduce, avoid, or compensate for most adverse effects. Table ES-22 summarizes the potential mitigation measures that have been identified as high priority mitigation measures and are likely to be implemented. These mitigation measures are either regulatory/administrative requirements, will help substantially reduce significant impacts on affected resources, or will provide a substantial benefit to the affected resources with minimal costs. Table ES-23 summarizes those proposed mitigation measures that are already in progress or not likely to be implemented. The table does not include those measures that are considered SOPs and best management practices (BMPs) and are assumed to be implemented as part of the proposed project; these additional protection measures are outlined in the various resource sections. The table also describes the benefits of a given mitigation measure. The final determination on whether any given mitigation would be implemented will be determined during the preparation of the FEIS. Section ES 9.1 describes those impacts that are significant and unavoidable and cannot be mitigated to less than significant.

Given limited resources, the Army is only able to implement a finite number of mitigation measures. The Army has considered all reasonable mitigation measures and is placing higher priority on proposed mitigation to meet independent regulatory or administrative requirements or to reduce significant impacts. Table ES-23 shows those mitigation measures included in the Draft EIS mitigation matrix or proposed by the public during the DEIS public comment periods that the Army considers lower priority, mitigation measures that are unfeasible and the impact is mitigated through more appropriate measures, and mitigation measures that have been suggested but similar measures are already in place.

**Table ES-22**
**Mitigation Likely to Occur**

| | Category | Training Area | Direct Effect | Necessary to Mitigate to Less than Significant | Mitigation Measure | Regulatory/Administrative Requirement |
|---|---|---|---|---|---|---|
| **Land Use and Recreation** | | | | | | |
| 1 | Land Use/ Recreation | SBMR | Impacts on land use as a result of training activities at SRAA. | Yes. Would reduce impacts to access in the Honouliuli Preserve and on the 100-acre portion of SRAA that TNC manages to less than significant. | The Army reoriented QTR2 so that the SDZ would no longer impact any lands within the Honouliuli Preserve.<br>The Army will:<br>• Grant TNC personnel and TNC-sponsored personnel daily, ***controlled access*** to the TNC-managed lands along a route to be determined by the Army in consultation with TNC for as long as they have legal right to use of the affected property for conservation/stewardship purposes.<br>• Develop and implement ***access controls*** to ensure the safety of all personnel.<br>• Receive ***TNC notification*** prior to their entering Army lands.<br>• ***Notify TNC of any unusual activities*** that may present, or appear to present a danger to TNC personnel in the area.<br>• ***Post signs*** on the boundary to prevent unauthorized use/trespass. | |
| 2 | Land Use/ Recreation | PTA | Impacts to recreation - hunting. | No. A significant impact to recreation and hunting was not identified. | The Army proposes to coordinate with State of Hawaii DLNR to ***create additional public hunting check in stations*** for the WPAA. | |
| **Visual Resources** | | | | | | |
| 3 | Visual Resources | SBMR | Short-term impacts on visual resources due to construction. | Yes. Would reduce impacts on visual resources due to construction activities to less than significant. | | ***Existing natural features***, including terrain and vegetative cover, ***will be conserved*** where practicable to screen the proposed project sites. Where practicable, permanent screening will be achieved with native tree and shrub plantings that compliment existing natural and ornamental plantings, earthen berms that mimic the color and texture of the surrounding area, fencing designed to fit in with the surrounding area, or some combination of these measures ***in accordance with the Installation Exterior Architectural Plan.*** |
| 4 | Visual Resources | SBMR | Long-term impacts on visual resources due to construction. | Yes. Would reduce long-term impacts on visual resources due to project features to less than significant. | | ***Existing site conditions will be enhanced*** where practicable to help screen SBCT-related projects from the surrounding area. Where practicable, mitigation measures will be designed to compliment the existing view. Existing natural features, including terrain and vegetative cover, will be conserved where practicable. Screening will be constructed of materials that mimic the color and/or texture of the surrounding area where practicable. Where practicable, USARHAW will use tree and shrub plantings that compliment existing natural and ornamental plantings, earthen berms which mimic the color and texture of the surrounding area, and fencing materials designed to fit in with the surrounding area, or some combination of these measures ***in accordance with the Installation Exterior Architectural Plan.*** |
| 5 | Visual Resources | SBMR, DMR, PTA | Long-term impacts on visual resources due to construction of the military vehicle trails. | Yes. Would reduce impacts on visual resources to less than significant. | The Army proposes to construct proposed military vehicle trails to ***conserve existing natural features,*** including terrain and vegetative cover, to the extent practicable. Use of roadbed materials that contrast sharply with existing conditions will be avoided to the extent practicable. To avoid creation of a discordant linear feature, the road alignment would, where possible, follow the natural contours of the land. Cut slopes would be minimized or avoided, where practicable. Cut slopes would be blended into the landscape by rounding the edges of the slope, differential orientation of the slope and the road bed alignments where practicable. Use of these techniques would be varied based on the specific conditions, including depth of the cut, orientation of the slope, and type of material (e.g., dirt slope, rock slope). | |
| 6 | Visual Resources | SBMR, DMR, PTA | Long-term impacts on visual resources due to the construction of the Fixed Tactical Internet. | Yes. Would reduce impacts on visual resources from the tower construction to less than significant. | Where practicable, the Army proposes to enhance existing site conditions to ***help screen the proposed tower and support shed from the surrounding area***. The tower site will be developed to conserve existing natural features, including terrain and vegetative cover, to the extent practicable. The equipment shed would be located to maximize use of natural screening if possible. If necessary, additional screening will be installed by either planting vegetation or constructed of materials that mimic the color and/or texture of the surrounding area where practicable. If possible, materials used for construction of the tower and equipment shed will be non-reflective, weathered, or otherwise painted to blend with the natural surroundings. | |

**Table ES-22**
**Mitigation Likely to Occur *(continued)***

| | Category | Training Area | Direct Effect | Necessary to Mitigate to Less than Significant | Mitigation Measure | Regulatory/Administrative Requirement |
|---|---|---|---|---|---|---|
| **Air Quality** | | | | | | |
| 7 | Air Quality | SBMR, KTA, PTA | Impacts on air quality as a result of fugitive dust from military vehicles on trails. | Yes. Would reduce impacts on air quality from fugitive dust to less than significant in conjunction with other mitigation measures. | | To reduce fugitive dust associated with the use of military vehicle trails, the Army will ***implement dust control measures*** such as dust control chemical applications, the use of washed gravel for surfacing, spraying water, or paving sections of trails. The extent of gravel washing would have to balance dust reduction goals with engineering requirements for achieving a stable roadway surface. Selection of the appropriate dust control products would be based on testing alternative products on dirt and gravel road segments. Based on general characteristics and performance elsewhere, environmentally friendly synthetic polymers (such as polyvinyl acetate and vinyl acrylic) and hygroscopic salt solutions (such as calcium chloride or magnesium chloride) appear to be the most promising groups of dust control agents. The Army will monitor road surface conditions and will apply palliatives as necessary. If moisture levels are adequate to suppress dust, than application of dust palliatives would not be necessary. To the extent possible, the Army would plan dust suppressant applications to be scheduled to immediately precede periods of significant convoy traffic. |
| 8 | Air Quality | SBMR, KTA, PTA | Impacts on air quality from fugitive dust associated with training activities over open ground. | Yes. Would reduce impacts on air quality from fugitive dust to less than significant in conjunction with other mitigation measures. | | The Army will develop and ***implement a Dust and Soils Management and Monitoring Plan (DuSMMoP)*** for the training area. The plan will address measures such as, but not limited to, restrictions on the timing or type of training during high risk conditions, vegetation monitoring, dust monitoring, soil monitoring, and buffer zones to minimize dust emissions in populated areas. The plan will determine how training will occur in order to keep fugitive dust emissions below CAA standards for $PM_{10}$ and soil erosion and compaction to a minimum. The Army will monitor the impacts of training activities to ensure that emissions stay within the acceptable ranges as predicted and environmental problems do not result from excessive soil erosion or compaction. The plan will also define contingency measures to mitigate the impacts of training activities, which exceed the acceptable ranges for dust emissions or soil compaction. |
| 9 | Air Quality | SBMR, KTA, PTA | Impacts on air quality from fugitive dust associated with training activities over open ground. | Yes. Would reduce impacts on air quality from fugitive dust to less than significant in conjunction with other mitigation measures. | | The Army will ***continue to implement land restoration measures identified in the INRMP***. Mitigation measures include, but are not limited to, implementation of the ITAM program to identify and inventory land condition using a GIS database; coordination between training planners and natural resource managers; implementation of land rehabilitation measures identified in the INRMP; monitoring of the effectiveness of the land rehabilitation measures; evaluation of erosion modeling data to identify areas in need of improved management; and implementation of education and outreach programs to increase user awareness of the value of good land stewardship. |
| 10 | Air Quality | PTA, KTA, SBER | Impacts on air quality from wind erosion associated with areas disturbed by military vehicle use. | Yes. Would reduce impacts on air quality from fugitive dust to less than significant in conjunction with other mitigation measures. | | The Army will develop and ***implement a Dust and Soils Management and Monitoring Plan (DuSMMoP)*** for the training area. The plan will address measures such as, but not limited to, restrictions on the timing or type of training during high risk conditions, vegetation monitoring, soil monitoring, and buffer zones to minimize dust emissions in populated areas. The plan will determine how training will occur in order to keep fugitive dust emissions below CAA standards for $PM_{10}$ and soil erosion and compaction to a minimum. The Army will monitor the impacts of training activities to ensure that emissions stay within the acceptable ranges as predicted and environmental problems do not result from excessive soil erosion or compaction. The plan will also define contingency measures to mitigate the impacts of training activities, which exceed the acceptable ranges for dust emissions or soil compaction. |
| 11 | Air Quality | ALL | Impacts on air quality from fugitive dust emissions associated with construction activities. | No. A significant determination to air quality from fugitive dust emission generated by construction activities was not identified. | | Construction contractors will ***comply with the provisions of Hawaii Administrative Rules***, Sec. 11-60.1-33 on Fugitive Dust as part of the requirements of construction contracts. |
| **Noise** | | | | | | |
| 12 | Noise | SBMR | Impacts on noise from ordnance use. | No. Would not reduce noise impacts from ordnance use to less than significant, but would reduce impacts substantially. | The Army proposes to ***evaluate training techniques, scheduling and location*** to reduce overall noise impacts at SBMR. In this evaluation, the Army would consider, as feasible, the benefit of timing restrictions on training and moving certain training activities to PTA. | |

**Table ES-22**
**Mitigation Likely to Occur *(continued)***

| | Category | Training Area | Direct Effect | Necessary to Mitigate to Less than Significant | Mitigation Measure | Regulatory/Administrative Requirement |
|---|---|---|---|---|---|---|
| 13 | Noise | SBMR | Impacts on noise from ordnance use. | No. Would not reduce noise impacts from ordnance use to less than significant, but would reduce impacts substantially. | The Army proposes to provide ***noise-insulating measures whenever new buildings are constructed*** or existing buildings are renovated, such as modifications to window materials and cooling systems to noise sensitive land uses that are or that may become exposed to Zone II and Zone III noise conditions. | |
| 14 | Noise | PTA | Impacts on noise from ordnance use and aviation. | Yes. Would reduce noise impacts from ordnance use to less than significant.<br><br>Noise impacts from aviation training are less than significant without any mitigation. | The Army proposes to ***establish a minimum 1,000- foot (305-meter) noise buffer*** around the Waiki'i Ranch property and the Kilohana Girl Scout Camp. In addition, the Army will consider training guidelines that minimize ***nighttime training*** activities that involve weapons fire or aviation activity within a ***minimum of 2,000 feet*** (610 meters) of those properties. The Army will continue to work with affected communities on noise buffers and may adjust the buffer size dependent upon these discussions. | |
| **Traffic** | | | | | | |
| 15 | Traffic | All | Impacts on traffic from military vehicles on public roads. | No. A significant impact to traffic was not identified. | The Army proposes to operate ***a public web site that lists a schedule of upcoming USARHAW activities,*** including training and public involvement projects. Subject to force protection measures and other security measures, the site would contain USARHAW training and convoy schedules, community projects the USARHAW is involved in, any USARHAW activity or function that the public could attend, any general USARHAW news that might be of interest to the public, and USARHAW services available to the public. | |
| **Water Resources** | | | | | | |
| 16 | Water Resources | All | Impacts from construction and explosive residues associated with sediment erosion on surface water quality. | Yes. Would reduce impacts on surface water quality to less than significant.<br><br>Only SBMR has a significant impact from explosive residues associated with sediment erosion. The mitigation measure will reduce the impact to less than significant. | | The Army will implement design measures ***in accordance with new Phase II Stormwater Management Regulations of the Clean Water Act.*** The Army will choose the most practicable solution for the specific project or project area during design. As directed via NPDES permit approval, the contractor will be required to implement a Storm Water Pollution Prevention Program during construction. |
| 17 | Water Resources | SBMR | Impacts from sediment suspension on surface water quality. | Yes. Would reduce impacts on surface water resources from Helemano Road construction to less than significant. | The Army proposes to implement design measures in accordance with ***Army design standards to reduce soil erosion and sediment loading impacts*** to Waikele Stream, Konokanahua Stream or tributaries from road construction. Mitigation design measures include, but are not limited to, hardening the roads, raising the elevation of the roadway to improve drainage, installing drainage ditches adjacent to roads to control water running on or off the road, planting grasses to slow overland flow. The Army would choose the most practicable solution for the specific project or project area during design. | |
| 18 | Water Resources | SBMR, KTA | Impacts from sediment suspension and on surface water quality. | Yes. Would reduce impacts on surface water resources to less than significant. | | The Army will develop and ***implement a Dust and Soils Management and Monitoring Plan (DuSMMoP)*** for the training area. The plan will address measures such as, but not limited to, restrictions on the timing or type of training during high risk conditions, vegetation monitoring, soil monitoring, and buffer zones to minimize dust emissions in populated areas. The plan will determine how training will occur in order to keep fugitive dust emissions below CAA standards for $PM_{10}$ and soil erosion and compaction to a minimum. The Army will monitor the impacts of training activities to ensure that emissions stay within the acceptable ranges as predicted and environmental problems do not result from excessive soil erosion or compaction. The plan will also define contingency measures to mitigate the impacts of training activities, which exceed the acceptable ranges for dust emissions or soil compaction. |
| 19 | Water Resources | SBMR, KTA | Impacts from sediment suspension on surface water quality. | Yes. Would reduce impacts on surface water resources to less than significant. | | The Army will ***continue to implement land restoration measures identified in the INRMP.*** Mitigation measures include, but are not limited to, implementation of the ITAM program to identify and inventory land condition using a GIS database; coordination between training planners and natural resource managers; implementation of land rehabilitation measures identified in the INRMP; monitoring of the effectiveness of the land rehabilitation measures; evaluation of erosion modeling data to identify areas in need of improved management; and implementation of education and outreach programs to increase user awareness of the value of good land stewardship. |

**Table ES-22**
**Mitigation Likely to Occur *(continued)***

| | Category | Training Area | Direct Effect | Necessary to Mitigate to Less than Significant | Mitigation Measure | Regulatory/Administrative Requirement |
|---|---|---|---|---|---|---|
| 20 | Water Resources | SBMR, PTA | Impacts from chemical spills on surface water quality. | Yes. Would reduce impacts on surface water quality to less than significant. | | The Army will ***implement the existing spill prevention and response plan*** to all new lands and activities under the proposed action. |
| 21 | Water Resources | All | Impacts on surface water quality from sediment or contaminant loading following wildland fires. | Yes. Would reduce impacts on surface water quality to less than significant. | | The ***Integrated Wildland Fire Management Plan*** for Pohakuloa and Oahu Training Areas was updated on October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts associated with wildland fires. The plan is available upon request. |
| 22 | Water Resources | All | Impacts on surface water quality from the dredge or fill of waters of the U.S. | No. There is no significant impact to surface water quality from the dredge or fill of waters of the U.S. | | In accordance with Section 404 and 401 of the Clean Water Act, the Army will ***avoid the placement of dredge or fill material in waters of the U.S.*** to the full extent practicable. If the Army is unable to avoid the placement of dredge or fill material in waters of the U.S., the Army will apply for and abide by all permit conditions as set forth in appropriate Section 404 and 401 CWA authorizations issued by the U.S. Army Corps of Engineers, Regulatory Branch and the State of Hawai'i Department of Health, Clean Water Branch. |
| 23 | Water Resources | PTA | Impacts due to spills associated with use of the military vehicle trail. | No. A significant impact to water resources from road construction was not identified. | The Army proposes to ***place bollards around the wellheads*** in coordination with the utility and property owners to protect the structures from potential damage. | |
| 24 | Water Resources | SBMR and KTA | Impacts from the construction of low-water crossings on surface water quality. | Yes. Would reduce the impact to water resources from construction to less than significant. | | The Army will incorporate ***Best Management Practices (BMP's) that will reduce runoff*** and sedimentation to aquatic environments in accordance with CWA regulations for stormwater runoff at construction sites. |
| **Geology, Soils, and Seismicity** | | | | | | |
| 25 | Geology, Soils, and Seismicity | All | Impacts to soil loss from training activities. | No. Would not reduce impacts to less than significant but would reduce impacts substantially. | | The Army will develop and ***implement a Dust and Soils Management and Monitoring Plan (DuSMMoP)*** for the training area. The plan will address measures such as, but not limited to, restrictions on the timing or type of training during high risk conditions, vegetation monitoring, soil monitoring, and buffer zones to minimize dust emissions in populated areas. The plan will determine how training will occur in order to keep fugitive dust emissions below CAA standards for PM10 and soil erosion and compaction to a minimum. The Army will monitor the impacts of training activities to ensure that emissions stay within the acceptable ranges as predicted and environmental problems do not result from excessive soil erosion or compaction. The plan will also define contingency measures to mitigate the impacts of training activities which exceed the acceptable ranges for dust emissions or soil compaction. |
| 26 | Geology, Soils, and Seismicity | KTA PTA | Impacts to soil loss from training activities. | No. Would not reduce impacts to less than significant but would reduce impacts substantially. | | The Army will ***implement land management practices and procedures described in the ITAM*** annual work plan to reduce erosion impacts (US Army Hawai'i 2001a). Currently these measures include: implementation of a training requirement integration (TRI) program; implementation of an Integrated Training Area Management (ITAM) program; Sustainable Range Awareness (SRA) program; development and enforcement of range regulations; implementation of an Erosion and Sediment Control Management Plan; coordinating with other participants in the Koolau Mountains Watershed Partnership (KMWP); and continued implementation of land rehabilitation projects, as needed, within the Land Rehabilitation and Maintenance (LRAM) program. Examples of current LRAM activities at KTA include: revegetation projects involving site preparation, liming, fertilization, seeding or hydroseeding, planting trees, irrigation, and mulching; a combat trail maintenance program (CTP); coordination through the Troop Construction Coordination Committee (TCCC) on road maintenance projects; and development of mapping and GIS tools for identifying and tracking progress of mitigation measures. |
| 27 | Geology, Soils, and Seismicity | All | Impacts to soil erosion and loss from wildland fires. | Yes. Would reduce impacts to soil erosion and loss from wildland fires to less than significant. | | The ***Integrated Wildland Fire Management Plan*** for Pohakoloa and Oahu Training Areas was updated on October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts associated with wildland fires. The plan is available upon request. |

**Table ES-22**
**Mitigation Likely to Occur *(continued)***

| | Category | Training Area | Direct Effect | Necessary to Mitigate to Less than Significant | Mitigation Measure | Regulatory/Administrative Requirement |
|---|---|---|---|---|---|---|
| 28 | Geology, Soils, and Seismicity | All | Impacts from slope failure. | Yes. Would reduce impacts from slope failure. | The Army proposes to ***minimize or avoid cut slopes***, where practicable. Cut slopes would be blended into the landscape by rounding the edges of the slope, differential orientation of the slope and the roadbed alignments where practicable. Use of these techniques would be varied based on the specific conditions, including depth of the cut, orientation of the slope, and type of material (e.g., dirt slope, rock slope). In accordance with Army design standards, potential mitigation measures for this impact also include, where practicable selecting the least failure-prone route, geotechnical testing soils where necessary along the route to identify problems, designing the roadbed, slope and surface to avoid slope failure, properly sizing drainage systems, designing storm drainage outfalls for efficient performance, and properly monitoring and maintaining the road. | |
| **Biological Resources** | | | | | | |
| 29 | Biological Resources | All | Impacts from constuction and training activities on sensitive species and their habitats. | No. Would not reduce impacts to less than significant but would reduce impacts substantially. | | The Army will ***implement all the terms and conditions defined in the Biological Opinions*** issued by USFWS for current force and SBCT proposed actions on the islands of O'ahu and Hawai'i. The terms and conditions which implement the reasonable and prudent measures determined during this consultation will be incorporated into the proposed action. These measures will help avoid effects and compensate for impacts on listed species that would result directly and indirectly from implementation of the proposed action. The Biological Opinions are available upon request. |
| 30 | Biological Resources | All | Impacts from constuction and training activities on sensitive species and their habitats. | No. Would not reduce impacts to less than significant but would reduce impacts substantially. | | The Army will ***implement land management practices and procedures described in the ITAM*** annual work plan to reduce erosion impacts (US Army Hawai'i 2001a). Currently these measures include: implementation of a training requirement integration (TRI) program; implementation of an Integrated Training Area Management (ITAM) program; Sustainable Range Awareness (SRA) program; development and enforcement of range regulations; implementation of an Erosion and Sediment Control Management Plan; coordinating with other participants in the Koolau Mountains Watershed Partnership (KMWP); and continued implementation of land rehabilitation projects, as needed, within the Land Rehabilitation and Maintenance (LRAM) program. Examples of current LRAM activities at KTA include: revegetation projects involving site preparation, liming, fertilization, seeding or hydroseeding, planting trees, irrigation, and mulching; a combat trail maintenance program (CTP); coordination through the Troop Construction Coordination Committee (TCCC) on road maintenance projects; and development of mapping and GIS tools for identifying and tracking progress of mitigation measures. |
| 31 | Biological Resources | All | Impacts from constuction and training activities on sensitive species and their habitats. | No. Would not reduce impacts to less than significant but would reduce impacts substantially. | The Army proposes to ***fence or flag where practicable*** any sensitive plant communities from activities that may take place in the ROI. The Biological Opinions outline fencing for the majority of the sensitive species. USARHAW will evaluate if additional fencing may be necessary. | |
| 32 | Biological Resources | All | Impacts from fire on sensitive species and their habitats. | No. Would not reduce impacts to less than significant but would reduce impacts substantially. | | The Army will ***implement all the terms and conditions defined in the Biological Opinions*** issued by USFWS for current force and SBCT proposed actions on the islands of O'ahu and Hawai'i. The terms and conditions which implement the reasonable and prudent measures determined during this consultation will be incorporated into the proposed action. These measures will help avoid effects and compensate for impacts on listed species that would result directly and indirectly from implementation of the proposed action. The Biological Opinions are available upon request. |
| 33 | Biological Resources | All | Impacts from fire on sensitive species and their habitats. | No. Would not reduce impacts to less than significant but would reduce impacts substantially. | | The ***Integrated Wildland Fire Management Plan*** for Pohakoloa and Oahu Training Areas was updated on October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts associated with wildland fires. The plan is available upon request. |
| 34 | Biological Resources | All | Impacts from the spread of non-native species on sensitive species and habitats. | Yes. Would reduce the impact of the spread of non-native species to sensitive species to less than significant in conjunction with other mitigation measures. | | As required in the terms and conditions of the Biological Opinions, the Army will ***educate soldiers and others*** potentially using the facilities and roads in the importance of cleaning vehicles, equipment and field gear. |

**Table ES-22**
**Mitigation Likely to Occur *(continued)***

| | Category | Training Area | Direct Effect | Necessary to Mitigate to Less than Significant | Mitigation Measure | Regulatory/Administrative Requirement |
|---|---|---|---|---|---|---|
| 35 | Biological Resources | All | Impacts from the spread of non-native species on sensitive species and habitats. | Yes. Would reduce the impact of the spread of non-native species to sensitive species to less than significant in conjunction with other mitigation measures. | | As required in the terms and conditions of the Biological Opinions, the Army will ***educate contractors and their employees*** about the need to ***wear weed-free clothes*** and to ***maintain weed-free vehicles*** when coming onto the construction site and to avoid introducing non-native species to the project site. |
| 36 | Biological Resources | All | Impacts from the spread of non-native species on sensitive species and habitats. | Yes. Would reduce the impact of the spread of non-native species to sensitive species to less than significant in conjunction with other mitigation measures. | | In accordance with the terms and conditions of the Biological Opinions, the Army ***will prepare a one-page insert to construction contract bids*** informing potential bidders of the ESA Section 7 consultation requirements. |
| 37 | Biological Resources | All | Impacts from the spread of non-native species on sensitive species and habitats. | Yes. Would reduce the impact of the spread of non-native species to sensitive species to less than significant in conjunction with other mitigation measures. | | In accordance with the terms and conditions of the Biological Opinions, the Army will ***inspect and wash all military vehicles*** at wash rack facilities prior to leaving SBMR, KTA, or PTA to minimize the spread of weeds, such as fountain grass, and animal (invertebrate) relocations. |
| 38 | Biological Resources | All | Impacts from the spread of non-native species on sensitive species and habitats. | Yes. Would reduce the impact of the spread of non-native species to sensitive species to less than significant in conjunction with other mitigation measures. | | In accordance with USDA regulations and requirements, ***cargo originating outside of Hawai'i will be inspected by USDA*** and certified to ensure it is not carrying the brown tree snake or other reptiles before transporting cargo for use on training ranges. |
| 39 | Biological Resources | All | Impacts from the spread of non-native species on sensitive species and habitats. | Yes. Would reduce the impact of the spread of non-native species to sensitive species to less than significant in conjunction with other mitigation measures. | | The Army will implement an ***environmental management system*** to further improve the identification and reduction of environmental risks inherent in mission activities. This would include ecosystem level management for all rare species, pest management, land rehabilitation and maintenance, and fire prevention and suppression. |
| 40 | Biological Resources | All | Impacts from the spread of non-native species on sensitive species and habitats. | Yes. Would reduce the impact of the spread of non-native species to sensitive species to less than significant in conjunction with other mitigation measures. | The Army proposes to ***use native plants in any new landscaping*** or planting efforts where practicable. When practicable, natural habitats would remain intact or adjacent areas would be restored as habitat. | |
| 41 | Biological Resources | All | Impacts from the spread non-native species on sensitive species and habitats. | Yes. Would reduce the impact of the spread of non-native species to sensitive species to less than significant in conjunction with other mitigation measures. | | USARHAW will follow ***HQDA guidance*** developed in consultation with the ***Invasive Species Council*** and compliance with Executive Order 13112, which determines Federal Agency duties in regards to preventing and compensating for invasive species impacts. USARHAW will agree to all feasible and prudent measures recommended by the Invasive Species Council that would be taken in conjunction with SBCT action to minimize the risk of harm. The Implementation of an Environmental Management System will further improve the identification and reduction of environmental risks inherent in mission activities. |
| 42 | Biological Resources | PTA | Impacts from construction and training on general habitat and wildlife. | No. There is not a significant impact to general habitat and wildlife. | The Army proposes to conduct more intensive ***surveys of lava tubes*** identified as potentially supporting native root dependent arthropods. Lava tubes found to contain or support native root dependent arthropods will be avoided where practicable. All generated construction and training related drainage will be channeled away from lava tubes where practicable. | |
| **Cultural Resources** | | | | | | |
| 43 | Cultural Resources | SBMR, DMR, PTA | Impacts from construction and training on ATIs. | No. Would not reduce impacts to less than significant but would reduce impacts substantially. | | Facility construction or training area uses will be designed ***to avoid identified traditional places and limit visual impacts on TCPs*** by site location, design, and orientation, where feasible.<br><br>If it is ***not possible to avoid*** identified TCPs or ATIs because of interference with the military mission or risk to public safety, the Army will ***consult with the SHPO and Native Hawaiians in accordance with the PA*** to identify impacts and to develop appropriate mitigation measures. Mitigation for impacts on the cultural landscape could include consulting with Native Hawaiians and monitoring of construction by a cultural monitor. |

**Table ES-22**
**Mitigation Likely to Occur *(continued)***

| | Category | Training Area | Direct Effect | Necessary to Mitigate to Less than Significant | Mitigation Measure | Regulatory/Administrative Requirement |
|---|---|---|---|---|---|---|
| 44 | Cultural Resources | SBMR, DMR PTA | Impacts from construction and training on ATIs. | No. Would not reduce impacts to less than significant but would reduce impacts substantially. | | The Army will continue to ***provide Native Hawaiians access*** to traditional religious and cultural properties in accordance with AIRFA and Executive Order 13007, on a case-by-case basis. This access program will be expanded to include new land acquisitions. |
| 45 | Cultural Resources | SBMR, DMR PTA | Impacts from construction and training on ATIs. | No. Would not reduce impacts to less than significant but would reduce impacts substantially. | | The Army previously identified Native Hawaiian burial sites in the SBCT ROI. The Army completed notification and consultation for these burial sites, in accordance with NAGPRA and, left these human remains in place. To address any impacts on any burial sites, or an inadvertent discovery of Native Hawaiian human remains or funerary objects, the Army ***will abide by all notification and consultation requirements outlined in Section 3 of NAGPRA.*** |
| 46 | Cultural Resources | SBMR, KTA, PTA | Impact from range and facility construction on archeological resources. | No. Would not reduce impacts to less than significant but would reduce impacts substantially. | | Before construction, the Army will complete ***the evaluation of any archaeological sites*** within areas subject to range and facility construction.<br><br>Sites determined to be eligible for the NRHP will be ***flagged for avoidance***. The projects will be designed to avoid all eligible and unevaluated archaeological sites, to the full extent practicable.<br><br>***GIS and GPS information will be given to project designers*** and range control to insure sites are considered in project design.<br><br>If it is ***not possible to avoid*** archaeological sites, the Army will ***consult in accordance with the PA*** to determine the appropriate mitigation for the damage to the sites such as data recovery or other mitigation measures.<br><br>To address the ***accidental discovery*** of archaeological sites, human remains, or cultural items, the Army has developed an ***inadvertent discovery plan (IDP)*** as part of the PA. |
| 47 | Cultural Resources | SBMR, DMR, PTA | Impact from training activities on archeological resources. | No. Would not reduce impacts to less than significant but would reduce impacts substantially. | | The Army will ***evaluate archaeological sites*** within training areas related to SBCT.<br><br>Sites determined to be eligible for the NRHP and sites pending evaluation will be ***identified and avoided*** through protective measures, to the full extent practicable.<br><br>If avoidance of identified archaeological sites or newly discovered sites is not feasible, the Army will ***consult in accordance with the PA*** to determine the appropriate mitigation for the damage to the sites such as data recovery or other mitigation measures.<br><br>To address the ***accidental discovery*** of archaeological sites, human remains, or cultural items, the Army has developed ***an IDP*** as part of the PA . |
| 48 | Cultural Resources | DMR | Impact from training activities on archeological resources. | No. Would not reduce impacts to less than significant but would reduce impacts substantially. | | The Army ***will monitor any subsurface excavations in the coastal area*** and the high sensitivity area around the runways area. The Army will place constraints on any training activities that might involve substantial below surface impacts. |

**Table ES-22**
**Mitigation Likely to Occur *(continued)***

| | Category | Training Area | Direct Effect | Necessary to Mitigate to Less than Significant | Mitigation Measure | Regulatory/Administrative Requirement |
|---|---|---|---|---|---|---|
| 49 | Cultural Resources | KTA PTA | Impacts from construction of trails on archaeological resources. | No. Would not reduce impacts to less than significant but would reduce impacts substantially. | | In accordance with the PA, the Army will ***identify*** cultural properties, ***evaluate*** cultural properties for NRHP eligibility, and ***implement avoidance strategies*** to the full extent practicable.<br><br>***GIS and GPS information will be provided to project designers*** to insure sites are considered in the design and construction of all the proposed military vehicle trails and training roads in WPAA.<br><br>If it is ***not possible to avoid*** archaeological sites, the Army will ***consult in accordance with the PA*** to determine the appropriate mitigation for the damage to the sites such as data recovery or other mitigation measures.<br><br>To address the ***accidental discovery*** of archaeological sites, human remains, or cultural items, the Army has developed ***an IDP*** as part of the PA. |
| 50 | Cultural Resources | SBMR, DMR, PTA | Impacts from military use of trails on archaeological resources. | Yes. Would reduce impacts to less than significant. | | Eligible and unevaluated sites will be ***flagged and mapped on a range control GPS map***.<br><br>Installation cultural resources staff will ***monitor the sites regularly***.<br><br>Participants in training activities on the ranges will be ordered to ***avoid identified sites***.<br><br>To address the ***accidental discovery*** of archaeological sites, human remains, or cultural items, the Army has developed ***an IDP*** as part of the PA. |
| 51 | Cultural Resources | KTA | Impacts from construction on historic buildings. | No. Would substantially reduce impacts on historic buildings but not to less than significant. | | The Army will consult with SHPO, ACHP, and interested parties in accordance with Section 106 of the NHPA on the Nike Missile Site complex. The Army will manage the ***Nike Missile Site*** complex and will conduct renovations ***in compliance with the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings***. |
| 52 | Cultural Resources | PTA | Impacts from construction on historic buildings. | No. Would substantially reduce impacts on historic buildings but not to less than significant. | | The Army will continue consulting with the SHPO, ACHP, and interested parties in accordance with Section 106 of the NHPA on the proposed PTA master plan to include the ***preservation and protection of historic buildings in the PTA cantonment area.***<br><br>The Army will require ***WPAA buildings be avoided*** by using range management protocols, which will require the area around the buildings to be off-limits to military training activities. Ke'āmuku Village will be marked as off limits for training to protect it from damage. |
| **Human Health and Safety** | | | | | | |
| 53 | Human Health and Safety | All | Impacts from ammunitions on human health and safety. | Yes. Would mitigate impacts from ammunitions to human health and safety to less than significant. | | All government personnel or government contractors accessing impact areas will continue to follow ***OSHA and Army standards*** and guidelines to minimize health and safety impacts from exposure to any contaminants or ordnance. The general public will only be allowed in or near impact areas at times and in group sizes approved by USARHAW Command. Army trained and certified personnel would escort the general public at all times. Access is limited to only those areas deemed safe by USARHAW Range Control. |

**Table ES-22**
**Mitigation Likely to Occur *(continued)***

| | Category | Training Area | Direct Effect | Necessary to Mitigate to Less than Significant | Mitigation Measure | Regulatory/Administrative Requirement |
|---|---|---|---|---|---|---|
| 54 | Human Health and Safety | All | Impacts from ammunitions on human health and safety. | Yes. Would mitigate impacts from ammunitions to human health and safety to less than significant. | | The Army will undertake additional ***risk based investigations*** as appropriate in the event any active range is closed and transferred out of DoD control. Based on the results of this health risk-based analysis, all remediation necessary to mitigate an imminent threat to human health and the environment would be undertaken at such time. |
| 55 | Human Health and Safety | KTA | Impacts on human health and safety from training activities at the CACTF. | Yes. Would mitigate impacts on human health and safety from the introduction of live-fire training to less than significant. | | When the CACTF is active, the Army will establish all prudent measures ***to prevent unauthorized access*** within the SDZs for SRTA, which are up to 2,300 feet (700 meters) during training operations. This would help ensure public safety during training. |
| 56 | Human Health and Safety | SBMR, KTA, PTA | Impacts from potential lead contamination from construction. | Yes. Would reduce impacts from lead to less than significant. | | The Army will expand ***existing programs for Lead Based Paint (LBP)*** to any SBCT related activities that would effect older structures that had the potential use of Lead Based Paint throughout the installations. Lead is managed in place for existing structures. In the event of demolition or renovation projects affecting such structures, a survey is required prior to demolition/renovation and appropriate actions must be taken to prevent the release of these substances into the environment. Construction workers must be properly trained/certified to handle these materials and any debris must be tested by TCLP and disposed according to the results. |
| 57 | Human Health and Safety | SBMR, PTA | Impacts from potential lead contamination from construction. | Yes. Would reduce impacts from lead to less than significant. | | The Army will ***retain lead-contaminated soils from existing berms on-site*** and use the soils in the construction of new berms associated with the UACTF, PTA AALFTR or PTA BAX. If lead-contaminated soil materials were not reused at the site for new berm construction, contaminated soils would be remediated for lead, in accordance with applicable federal and state standards. |
| 58 | Human Health and Safety | SBMR, KTA | Impacts from potential asbestos contamination from construction. | Yes. Would reduce impacts from asbestos to less than significant. | | The Army will expand ***existing programs for asbestos*** to any SBCT related activities that would affect older structures that had the potential use of asbestos through the installations. Asbestos is managed in place for existing structures. In the event of demolition or renovation projects affecting such structures, a survey is required prior to demolition/renovation and appropriate actions must be taken to prevent the release of these substances into the environment. Construction workers must be properly trained/certified to handle these materials and any debris must be tested by TCLP and disposed according to the results. |
| 59 | Human Health and Safety | SBMR, PTA | Impacts from potential Unexploded Ordnance. | Yes. Would reduce impacts from unexploded ordnance to human health and safety to less than significant. | | Prior to initiation of any construction activities, the Army will employ qualified personnel to conduct a ***UXO survey of the proposed construction area***. If the risk of encountering UXO is low, than UXO construction support will be used. If the risk of encountering UXO is high, then UXO clearance will be performed to ensure the safety of the site. The Army will document UXO surveys and removal actions in full accordance with applicable laws, regulations, and guidance. The Army will perform UXO clearance activities if rounds are fired outside of designated impact areas or present an immediate threat to human health or safety. |
| 60 | Human Health and Safety | SBMR | Impacts from construction on Installation Restoration Program sites. | Yes. Would reduce impacts from construction on Installation Restoration Program sites to less than significant. | The Army proposes to build the proposed WAAF facility to ***incorporate an existing monitoring well into the design,*** as long as construction does not impact the well by either contaminating, destroying, permanently sealing or otherwise preventing future sampling of the well. Technicians would have access to this well in order to continue the monitoring program. As the well currently exists within the apron/runway vicinity, the location is not believed to be a significant hindrance since the wellhead could be flush-mounted in the apron surface similar to those at civilian gasoline service stations. | |
| 61 | Human Health and Safety | All | Impacts to public safety due to wildfires. | Yes. Would reduce impacts to public safety from potential wildland fires to less than significant. | | The ***Integrated Wildland Fire Management Plan*** for Pohakoloa and Oahu Training Areas was updated on October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts associated with wildland fires. Public and firefighter safety is the first priority in every fire management activity. The plan considers the potential need for firebreaks and/or fuel breaks at each installation along with other safety concerns. The plan is available upon request. |

**Table ES-22**
**Mitigation Likely to Occur *(continued)***

| | Category | Training Area | Direct Effect | Necessary to Mitigate to Less than Significant | Mitigation Measure | Regulatory/Administrative Requirement |
|---|---|---|---|---|---|---|
| 62 | Human Health and Safety | KTA | Impacts of potential spread of hazardous waste due to wildland fires. | Yes, would reduce impacts from hazardous materials and waste to less than significant. | | The ***Integrated Wildland Fire Management Plan*** for Pohakoloa and Oahu Training Areas was updated on October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts associated with wildland fires. The plan is available upon request. |
| **Socioeconomics and Environmental Justice** | | | | | | |
| 63 | Socioeco-nomics and Environ-mental Justice | SBMR | Impacts on local schools. | Yes. Would mitigate potential impacts on local schools to less than significant. | | Federal aid will be made available to local schools to compensate for the increased burden through ***the Impact Aid program***. Such aid may take the form of basic support payments, or grants for construction of new facilities to house new students associated with Soldiers located at SBMR. Additional teachers would need to be hired to maintain the current student to teacher ratios. |
| 64 | Socioeco-nomics and Environ-mental Justice | SBMR | Impacts of SBCT on local schools. | Yes. Would mitigate potential impacts on local schools to less than significant. | The Army proposes to ***notify the school districts as soon as possible*** before personnel increases to give the schools time to secure funding and hire new teachers, and assist in providing these facilities. Although the local school districts receive additional funding for each military dependent attending public school, it is likely that the school districts would bear some of the costs for additional teachers and physical space, if needed. The Residential Communities Initiative (RCI) Office, as the lead department for planning Army Family Housing, closely coordinates future student requirements with the State Department of Education. To this end, the RCI Project Manager, has been working with DOE District Superintendents. On behalf of the Army, the RCI Project Manager works with the DOE, to generate School Enrollment Projections with as much accuracy as possible. The Development Partnership plans its facilities work years in advance, coordinating with the DOE. Depending on future enrollments and funding levels, the Proposed Action could still adversely affect school budgets, but the impact would be less than significant. | |
| 65 | Socioeco-nomics and Environ-mental Justice | PTA | Economic impacts on local business. | Yes. Would mitigate potential impacts on local businesses to less than significant. | Because a substantial amount of construction is proposed over the next several years, the Army plans to ***conduct long-range procurement planning*** to lessen excessive supply and demand issues on local and outside suppliers. | |

**Table ES-23**
**Mitigation Already in Progress or Unlikely to Occur**

| | Category | Training Area | Direct Effect | Additional Mitigation Measure |
|---|---|---|---|---|
| **Limited Resources** | | | | |
| 1 | Land Use and Recreation | All | Impacts of training activities on local communities. | Establish a citizens advisory board for Oahu and Hawai'i USARHAW training lands made up of local volunteers to assist the USARHAW in identifying impacts and mitigations from USARHAW determined projects and priorities. Focus groups are currently being used to address adverse impacts from training activities on communities. (Identified in the DEIS) |
| 2 | Air Quality | All | Impacts from construction emissions. | Evaluate the feasibility of measures to reduce construction emissions, including DPM, $PM_{10}$, NOx and other air pollutants. (Proposed by USEPA) |
| 3 | Noise | SBMR | Impacts to schools. | Install insulation and cooling systems for classrooms at Solomon and Hale Kula Elementary Schools that will remain exposed to Zone II noise and might be exposed to Zone Ill. (Proposed by State Dept. of Education) |
| 4 | Water Resources | All | Impacts from wastewater. | Build a treatment plant for wastewater in the mauka lands, producing water for military requirements. (Proposed by the Public) |
| 5 | Geology, Soils and Seismicity | SBMR, PTA | Impacts on geologic and water resources from range use. | Monitor surface water quality and soils as a means of measuring potential future impacts. If impacts on surface water or soils were identified through monitoring, further mitigation could include characterizing and remediating contaminant source areas. (Identified in the DEIS). |
| 6 | Biological Resources | All | Impacts on sensitive species and habitat from the spread of non-native species. | Replant any area that is damaged by fires with appropriate plants similar to those destroyed by fire. Native species would be used in areas where their establishment seems likely. Plants known to be invasive or noxious would not be used. (Identified in the DEIS). |
| 7 | Biological Resources | All | Impacts from construction and training on sensitive species and habitats. | When feasible, preserve or restore sensitive habitat for sensitive plants that are not federally listed on Army owned or leased lands. (Identified in the DEIS). |
| 8 | Human Health and Safety | KTA | Impacts from potential PCB contamination. | Conduct further studies to evaluate the status of the chemical attenuation and extent of PCB contamination at the proposed CACTF site. If the findings show there is an imminent threat to human health and safety, a remedial cleanup would be implemented to remove contamination prior to CACTF construction, if necessary. Troops and Army personnel would avoid driving or training on and around the former transformer area until the release had been abated. (Identified in the DEIS) |

**Table ES-23**
**Mitigation Already in Progress or Unlikely to Occur *(continued)***

| | Category | Training Area | Direct Effect | Additional Mitigation Measure |
|---|---|---|---|---|
| 9 | Socioeconomics and Environmental Justice | SBMR | Impacts to children's safety. | Increase Army efforts to protect the safety of children, including increased fencing at Hale Kula Elementary, Solomon Elementary, Wheeler Elementary, and Wheeler Intermediate schools, increased limitations on access to certain areas and the provision of more adult supervision. (Proposed by State Dept. of Education) |
| **Unfeasible** | | | | |
| 10 | Biological Resources | PTA | Impacts from soil erosion due to fire. | Continue to allow grazing on the West PTA Acquisition Area when it is not in use for training to keep the fuel load of the alien grasses below a dangerous level. (Identified in the DEIS) |
| 11 | Biological Resources | PTA | Impacts due to the introduction of non-native species. | Build a vehicle wash facility at Kawaihae Harbor so that any Army vehicle transported from another island/training area would undergo a mandatory vehicle wash and inspection before traveling to or from PTA. (Identified in the DEIS) |
| 12 | Human Health and Safety | All | Impacts from training activities. | Provide resources to help adjacent private landowners and/or organizations manage their properties to minimize potential impacts of fire or other threats that may result from USARHAW activities or that may originate on private property and impact USARHAW activities. (Identified in the DEIS). |
| 13 | Public Services and Utilities | All | Impacts on water conservation. | Use gray water in all dust control projects; install dual gray water and potable water systems on bases. (Proposed by the Public) |
| **Similar program in place** | | | | |
| 14 | Land Use | SBMR, PTA | Impacts on agricultural land use as a result of training activities | Establish a cooperative relationship with the landowner and lessee to allow continued pineapple cultivation at SBMR and grazing at PTA in conjunction with training on the land. (Identified in the DEIS) |
| 15 | Air Quality | All | Impacts from construction emissions. | Reduce downwind construction emissions by the use of particle traps and low-sulfur diesel fuel, by reducing trips, by using clean new equipment, by conducting maintenance inspections, and by developing a construction emission reduction plan in consultation with the Hawaii Department of Health. (Proposed by USEPA) |
| 16 | Water Resources | All | Impacts from chemical contaminants. | Further restrict the use of pesticides chemicals and fertilizers over all known aquifers. (Proposed by the Public) |
| 17 | Water Resources | All | Impacts to vegetated stream buffers. | Establish additional vegetated corridors around all streams. (Proposed by the Public) |
| 18 | Water Resources | All | Impacts to watershed discharge areas. | Further protect watershed discharge areas. (Proposed by the Public) |
| 19 | Biological Resources | All | Impacts of training activities on migratory birds. | Share information gathered on migratory birds and natural resources with the USFWS, the Biological Resources Division of the USGS, and other appropriate repositories such as the Cornell Laboratory of Ornithology. (Proposed by the Public) |

**Table ES-23**
**Mitigation Already in Progress or Unlikely to Occur *(continued)***

| | Category | Training Area | Direct Effect | Additional Mitigation Measure |
|---|---|---|---|---|
| 20 | Biological Resources | All | Impacts of training activities on migratory birds | Avoid pollution or detrimental alteration of the environment for the benefit of migratory birds and monitor migratory birds in the proposed ROI, with particular focus on species of concern. (Identified in the DEIS) |
| 21 | Biological Resources | All | Impacts on natural resources from training activities. | Investigate a new regulatory authority to work with nonprofit organizations to purchase buffer lands. (Identified in the DEIS) |
| 22 | Cultural Resources | PTA | Impacts from construction and training activities. | Construct a natural and cultural resources visitor center at PTA, adjacent to the new Saddle Road alignment. The visitor center would provide interpretive displays of the biological and cultural resources of not only PTA but also the region between Mauna Loa and Mauna Kea and would include a small theater for interpretive video or live presentations. The center also would house the PTA resource managers and lab facilities. (Identified in the DEIS) |
| 23 | Human Health and Safety | SBMR | Impacts on installation restoration program sites | Work with the EPA, Del Monte, and Campbell Estates regarding allocating, apportioning, and assigning liability and responsibilities for cleanup and would conduct any cleanup required by law. (Identified in the DEIS) |
| 24 | Human Health and Safety | KTA | Impacts from potential contamination from use of SRTA. | Follow existing USARHAW protocol of removing all target equipment and shell casings following training for SRTA rounds. Restore the range to its condition prior to use. Produce a site-specific training management plan to establish best management practices (BMPs) during training and identify preventative measures to prevent safety hazards, ensure security precautions, and otherwise maintain environmental stewardship. (Identified in the DEIS) |
| 25 | Socioeconomics and Environmental Justice | All | Impacts from dust emissions or other impacts on low-income and minority populations. | Develop mitigation, in consultation with low-income or minority communities and address how proposed mitigation reflects their needs and preferences to the extent $PM_{10}$ and other impacts present a disproportionately high, adverse effect on low-income or minority populations. Include the concerns of Native Hawaiians to avoid, reduce or mitigate adverse effects on resources of cultural importance to Native Hawaiian residents. (Proposed by USEPA) |
| 26 | Public Services and Utilities | PTA | Impacts on water conservation. | Construct rain catchment systems to use for irrigation and dust control where practicable. (Proposed by the Public) |
| 27 | Public Services and Utilities | All | Impacts on water conservation. | Install water saving devices, such as low-flow shower-heads in all of its existing buildings. Install water saving devices in all new construction in accordance with the various Federal, State, and Army design standards for housing and workspaces.(Proposed by the Public) |
| 28 | Public Services and Utilities | All | Impacts on water conservation. | After Department of Health approval of two ongoing studies, Use R1 quality effluent for irrigation to develop and maintain groundcover at SBMR and WAAF. (Proposed by the Public) |

# CHAPTER 1

# PURPOSE, NEED, AND SCOPE

# CHAPTER 1
# PURPOSE, NEED, AND SCOPE

## 1.1 INTRODUCTION

In October 1999, the Secretary of the Army and the Chief of Staff of the Army articulated a vision for the Army to meet the challenges of the 21st century. The Army must become more strategically responsive and dominant at every point on the spectrum of military operations, ranging from intensive combat to peacekeeping duties and humanitarian missions. Hawai'i has been selected as the location for an Interim Force based on the Stryker vehicle, or a Stryker Brigade Combat Team (SBCT)[1]. As the Army transforms, the Interim Force will use available technology and weapons, select new equipment, such as the Stryker, and a modified training doctrine to train Soldiers to be able to meet the goals of a fast reacting light force. This will allow them to deploy more quickly, be more agile, lethal, highly mobile, and survivable than the current force. As shown in Figure 1-1 the interim force will

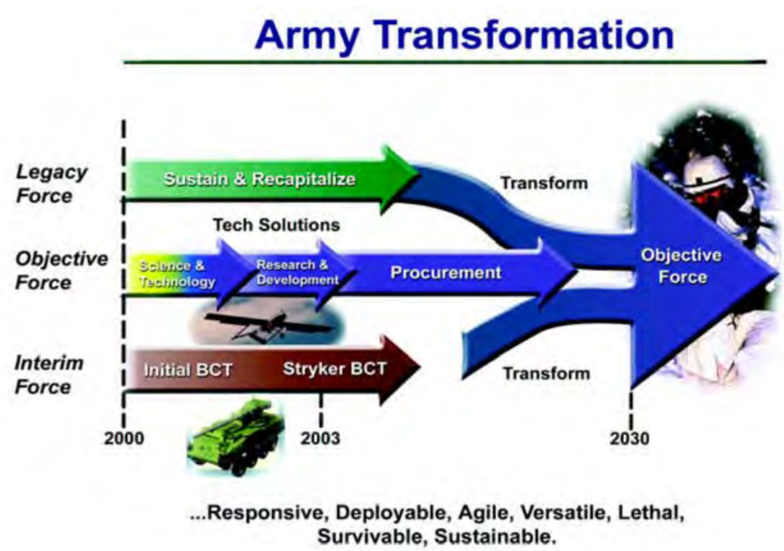



Figure 1-1 Army Transformation to the Objective Force

[1] SBCT is the new name for Interim Brigade Combat Team (IBCT), which was used during the public scoping process. This is a name change only: SBCT and IBCT are synonymous.

also serve as a "working model" to refine equipment, weapons, and training of the future force. During this process the current force will continue to fulfill the Army's responsibility to fight and win decisively against any threat while the Army transforms. The future force would come out of the development and refinement of weapons, equipment, communications, and training that will occur during the interim phase over the next 30-years when the entire Army would be transformed.

The current force, those forces that have not undergone transformation, would continue to provide the strategic insurance policy for the Army's responsibility to fight and win decisively against any threat while the Army transforms to the future force.

SBCT is a new concept that uses technology and information to improve the abilities of our Army units. This change will give the Army greater flexibility and will improve the variety of missions to which the Army can respond. The SBCT will use the lighter more efficient Stryker vehicle to transport Soldiers more quickly to areas of conflict. Because of its speed and maneuverability, the Stryker can transport Soldiers more quickly and closer to the areas where they are needed. Using improved weapons with greater accuracy, the Stryker can provide the force with protective cover as Soldiers dismount and move by foot to desired target areas. Once their task has been accomplished the Soldiers would again board the Stryker for transport back to their headquarters or another area for further operations. Soldiers are able to obtain time sensitive critical information or intelligence from their commanders, and they can remain in constant communication with each other, their commanders or other field units via refined satellite links and Internet connections that are filtered into the Stryker vehicle. This is a radical departure from the way Soldiers fight today and as such requires new ranges, training facilities, high tech communication facilities, and new training protocol. In addition, this technology gives the SBCT the ability to conduct combat operations faster and over far greater areas of land than can be achieved presently. Taken together, these requirements create a need for new training and maintenance facilities and expansion of maneuver lands to provide more realistic training conditions.

Pursuant to the National Environmental Policy Act of 1969 (NEPA), the Department of the Army prepared a programmatic environmental impact statement (PEIS) to evaluate the potential environmental and socioeconomic effects associated with transformation of the entire Army. *The Final Programmatic Environmental Impact Statement for Army Transformation* was issued in February 2002, the notice of availability was published on March 8, 2002, and the Army signed the record of decision (ROD) on April 11, 2002, indicating its decision to proceed with a program of transformation. (For the reader's convenience, a copy of the PEIS ROD is provided in Appendix A.[2]) The PEIS and the ROD provide a concise public record of the Army-wide program for transformation.

The Army Headquarters (HQDA) designated the 2nd Brigade of the 25th Infantry Division (Light) (25th ID[L]) in Hawai'i (referred to throughout this document as the 2nd Brigade) and five other units across the US as part of the interim phase of transformation. These units would be converted to SBCT. This environmental impact statement (EIS) evaluates the

[2]*The Programmatic Environmental Impact Statement for Army Transformation* is also available on the Army's Web site home page at http://www.army.mil.

environmental impacts of the transformation of the 2nd Brigade to an SBCT in Hawai'i. Figure 1-2 shows the chain of command for the US Army Pacific (USARPAC), US Army Hawai'i (USARHAW), and 25th Infantry Division(Light) (25th ID[L]).

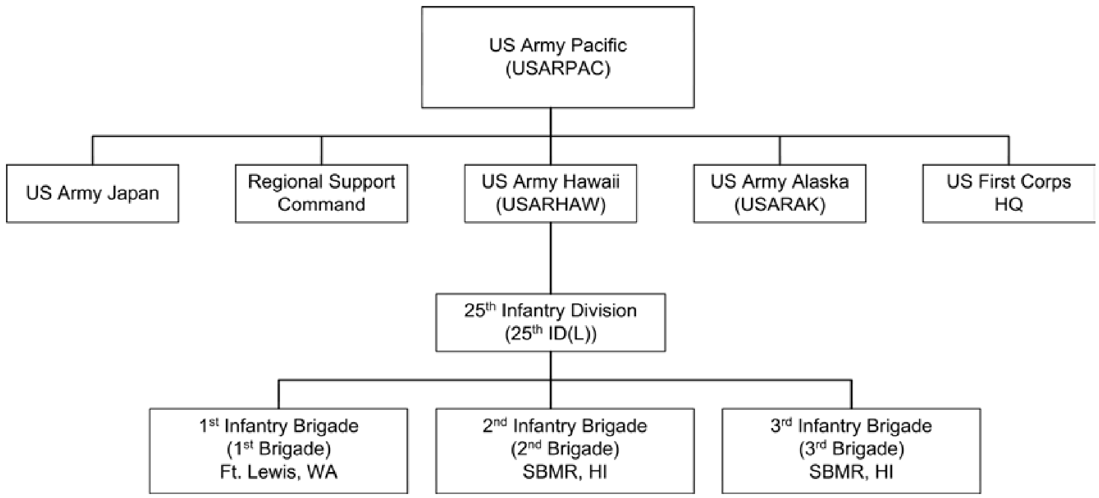



Figure 1-2 Chain of Command

The 25th ID(L) includes three light infantry brigades (two in Hawai'i and one at Fort Lewis, Washington). Principal units of the current force stationed in Hawai'i include the 2nd and 3rd brigades, their aviation brigade, support command, separate battalions, and elements of First Corps (I Corps). I Corps is a contingency force with active, reserve, and National Guard units located throughout the US, and are designated as an early deploying corps for military actions in the Pacific region. The Proposed Action includes changes to training facilities, support facilities, and infrastructure at military installations in Hawai'i to support SBCT operation and training. All units, with the exception of the 2nd Brigade and its supporting units, will remain as current force units.

The change proposed for the 2nd Brigade is one part of the Army's broad program of transformation. Aspects of doctrine, such as training, leadership, organizations, materiel (equipment and supplies), and Soldiers, within the 2nd Brigade in Hawai'i must evolve in synchronization with changes throughout the Army. The changes extend to such fundamental principles as how military forces are used on the battlefield, to force structure (how many Soldiers are in each type of unit), and to equipment, whether new or modernized.

## 1.2 BACKGROUND

Consistent with its PEIS and ROD on Army transformation, the Army is now engaged in the multi-year, phased, and synchronized program of transformation, which will occur in three phases over three decades. The initial phase involved creating two Initial Brigade Combat Teams (Initial BCTs) at Fort Lewis, Washington, to validate an organizational and operational model for SBCTs. The second phase of Army transformation, or "interim capability phase," which the Army has now entered, involves fielding SBCTs as part of the

Interim Force. The Army has designated the 2nd Brigade and five other units across the United States to become SBCTs and, as such, to serve as the key components of the Interim Force. Besides the 2nd Brigade, active component units designated by the Army for transformation include the two Initial BCTs at Fort Lewis, Washington, one brigade at Forts Richardson and Wainwright, Alaska, and the armored cavalry regiment at Fort Polk, Louisiana. A National Guard brigade in Pennsylvania also has been designated to become an SBCT. The third phase of transformation is the objective capability phase, the major goal of which is to transform the SBCTs and the remaining Army forces to the future force.

Transformation will result in not just a modernized version of the current Army but will combine the best characteristics of current forces. The transformed Army will possess the lethality of the heavy force, the rapid deployment mentality and speed of the light forces, and the unmatched precision and close combat capabilities of the special operations forces. The light force uses lighter equipment and is more mobile than the heavy force. Transformation will field the most highly trained and combat effective Soldiers in the world. A key measure of transformed forces will be their strategic mobility. The Army plans to develop the capability to place a complete combat-ready brigade with all its supporting elements and materials anywhere in the world within 96 hours after deployment from Hawai'i, a division within five days, and five divisions within thirty days. A brigade consists of approximately 3,000 Soldiers and is led by a Colonel, and a division consists of approximately 15,000 Soldiers and is led by a Major General. For Hawai'i, transformation includes the need to implement and accommodate the changes that must occur to support the SBCT, while maintaining training facilities for continued support of the units not yet designated to become part of the Interim Force or the future force.

## 1.3 Purpose of the Proposed Action

On April 11, 2002, the Army signed a ROD indicating its decision to proceed with transformation and designated Hawai'i as one of five locations for the initial transformation including enhancing training capabilities to support the nationwide transformed forces. This EIS provides an analysis of the potential environmental effects of converting the 2nd Brigade of the 25th ID(L) to a Stryker Brigade, in accordance with NEPA. The purpose of the Proposed Action therefore, is to assist in bringing the Army's Interim Force to operational capability and to provide realistic field training in Hawai'i. Twenty-eight projects are proposed for USARHAW that would improve on the existing support structure and training facilities to provide the necessary field training required for an SBCT. Reconfiguring maneuver areas, establishing combat training facilities more appropriate to the types of threats the Army expects to encounter, and strengthening infrastructure would ensure that an SBCT's leaders and Soldiers would be prepared for the full spectrum of military operations.

## 1.4 Need for the Proposed Action

The need underlying transformation of the 2nd Brigade is to provide the nation with capabilities that meet current and evolving national defense requirements. To carry out these tasks, the Army must adapt to changing world conditions and must improve its ability to respond. To achieve the skills appropriate to each member of the force, training must replicate, as closely as possible, the conditions that would arise in expected combat situations. Leaders and Soldiers must be prepared to deal with a wide range of situations.

As Army doctrine evolves, training and facilities must also change. The SBCT goal is to be able to deploy anywhere in the world and be prepared to carry out the Army's military mission within 96 hours of deployment from Hawai'i. While these units will retain the mobility and flexibility of traditional Army light forces, they will incorporate the lethality and survivability of traditional Army heavy forces. They will be equipped with new vehicles, equipment, and communications technology to achieve their missions. Training must include a greater emphasis on military operations in urban terrain (MOUT) to prepare Soldiers for a variety of situations, such as resolving general urban unrest, infiltrating and clearing buildings, and fighting at close range. Training for these kinds of activities requires constructing new ranges and support facilities on O'ahu and the island of Hawai'i. The 2nd Brigade in Hawai'i was selected to transform to an SBCT in the PEIS based on the following three factors:

- Location of the 2nd Brigade within the Pacific Rim, a critical area of interest for the United States. Stationing an SBCT in Hawai'i allows the President to rapidly respond to events in an area of increasing importance to national security. The goal of the Hawai'i SBCT would be able to deploy a brigade anywhere within the Pacific Rim within 96 hours or to combine with other SBCT brigades or future forces to place a division anywhere in the Pacific Rim within five days or five divisions within thirty days. There are two other SBCTs on the Pacific coast of the continental United States (Alaska and Washington) to support deployment to the critically important Pacific Rim, while others will be in the eastern United States to support deployment to other geographic regions.

- The 2nd Brigade's composition and mission and the benefits of transforming to an SBCT. The 2nd Brigade is already a light infantry unit, which executes full spectrum military missions in complex terrain. Hawai'i provides the terrain and conditions most likely to be encountered in the Pacific Rim. The enhancement of this unit to an SBCT would allow this already light unit to be more mobile, lethal, and survivable under a greater variety of conditions.

- The ease of deploying the SBCT because of its proximity to multiple airbases and seaports of suitable size.

If the Army does not transform in Hawai'i it may not be able to respond rapidly enough in all areas of the world for operations requiring military action. The strategic significance of land forces continues to lie in their ability not only to fight and win the nation's wars but also to provide options that shape the global environment to benefit the United States and its allies.

## 1.5 Scope of Analysis

This EIS has been developed in accordance with NEPA and the Army's implementing regulations issued by the Council on Environmental Quality (CEQ) and the Army.[3] The

[3] Council on Environmental Quality: Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act, 40 CFR Parts 1500-1508 and Army implementing regulations contained in 32 CFR Part 651.

purpose of the EIS is to inform Army decision-makers and the public of the likely environmental consequences of the Proposed Action and reasonable alternatives on transforming the 2nd Brigade in Hawai'i. It focuses on site-specific issues of how to transform the 2nd Brigade to an SBCT and the impacts on O'ahu and the island of Hawai'i. No SBCT activities will take place at Helemanō Military Reservation so no information on that installation is included in this report.

SBCT training requirements are not dependent on the use of Mākua Military Reservation (MMR). While the MMR is an integral part of USARHAW training capabilities and historically used by other services, SBCT units could perform dismounted CALFEX training at other ranges. SBCT may use MMR if the range were available and only after completion of the Makua EIS and ROD. The Makua EIS will analyze the potential environmental impacts associated with dismounted CALFEXs for both current forces and SBCT; therefore, this SBCT EIS does not analyze training impacts of SBCT at MMR.

This EIS analyzes the conversion of the 2nd Brigade to an SBCT and enhancement of training capabilities to meet the training requirements of the transformed force. The conversion of the 2nd Brigade to SBCT status would primarily involve changes in force structure (the number of personnel assigned to the unit), equipment and vehicles, and doctrine under which the unit would train for carrying out its assigned missions, as well as improvements to existing ranges and construction of new training facilities. Under transformation, the SBCT would have more personnel than the present 2nd Brigade. A principal change would involve putting the Stryker Vehicle into action, which would provide the SBCT with greater firepower and increased tactical mobility. Infrastructure projects would be needed to support this effort, including new vehicle washes and motor pools to park these vehicles. Construction of training facilities at various installations and land acquisitions would also be analyzed. See Table 2-5 for an overview of the proposed action.

If a substantial change to any specific project described in this EIS is made, as it moves forward, that may have a bearing on the Proposed Action or its impacts, additional appropriate NEPA documentation will be prepared, as required by NEPA.

Additional information concerning the scope of the EIS came to the Army's attention during the scoping process conducted in accordance with CEQ and Army regulations and guidance. That information is summarized in Section 1.9.

## 1.6 DECISION(S) TO BE MADE

The ROD for the Programmatic EIS directed the 2nd Brigade, 25th Infantry Division (Light) at Schofield Barracks, Hawai'i to transform to an SBCT. The Commanding General of the 25th ID(L) is charged with deciding how best to achieve that directive and provide for military training, readiness, and facility requirements to meet SBCT transformation needs, while enabling the current forces to continue to carry out their missions and giving due consideration to environmental factors. This decision will be based on the results of this EIS, and on consideration of all relevant factors including mission, cost, technical factors, and environmental considerations. This EIS considers a reasonable range of alternatives including several alternatives that involve transforming and/or training on the U.S. mainland.

As discussed in Section 2.6, the mainland alternatives were not analyzed in detail because they did not meet the purpose and need of the proposed action. (Complete details on the proposed action are presented in Chapter 2 and Appendix D.)

## 1.7 COOPERATING AGENCIES

CEQ defines the rights and responsibilities of cooperating agencies in Section 1501.6 of the CEQ regulations (CEQ 1970) and in Question 14 of *The 40 Most Asked Questions* (about NEPA) (CEQ 1981). Upon request of the lead agency, any other federal agency that has jurisdiction by law or that has special expertise with respect to any environmental issue, shall be a cooperating agency. CEQ issued new guidance on cooperating agencies on February 5, 2002, which includes factors for determining whether to invite, decline, or end cooperating agency status (CEQ 2002). This guidance also urges federal agencies to set time limits, identify milestones, and specify the scope and detail of a cooperating agency's contributions. No federal agencies were formally requested to be cooperating agencies, nor have any federal or state agencies requested this status. Nonetheless, the Army is working closely with pertinent agencies on Endangered Species Act (ESA), Fish and Wildlife Coordination Act, National Historic Preservation Act (NHPA) coordination.

## 1.8 INTERAGENCY COORDINATION

The Army has also sought the input of several federal, state, and local agencies in preparing this EIS. Federal agencies that have been consulted include the US Environmental Protection Agency (USEPA), US Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS), and Advisory Council on Historic Preservation (ACHP), Natural Resource Conservation Service (NRCS) and Federal Aviation Administration (FAA).

Biological assessments (BAs) have been prepared for both O'ahu and the island of Hawai'i, initiating formal consultation between the US Army Garrison, Hawai'i (USAG-HI) and the USFWS, as set forth in Section 7 of the ESA. The objectives of the BAs are to analyze how SBCT transformation could affect species listed by the USFWS as threatened, endangered, or proposed for threatened or endangered status. In addition, the BAs assess the impacts to designated critical habitat and determine how the Army would minimize any potential adverse effects to listed species or critical habitat and how it would offset these effects. The scope of the BAs includes all SBCT transformation activities on O'ahu and the island of Hawai'i. On October 23, 2003 and December 23, 2003, the USFWS issued biological opinions of "no jeopardy" for current force and SBCT activities on the islands of O'ahu and Hawai'i, respectively. These biological opinions are available upon request.

In January 2003, USARHAW entered into consultation with the State Historic Preservation Officer (SHPO), ACHP, Native Hawaiian organizations and interested parties in accordance with Section 106 of the NHPA. In February 2004, the SHPO and ACHP signed a programmatic agreement (PA) with USAHAW for Section 106 consultations on SBCT projects. Native Hawaiian Organizations and interested parties were invited to sign the PA as concurring parties. The PA is included in Appendix J of this document.

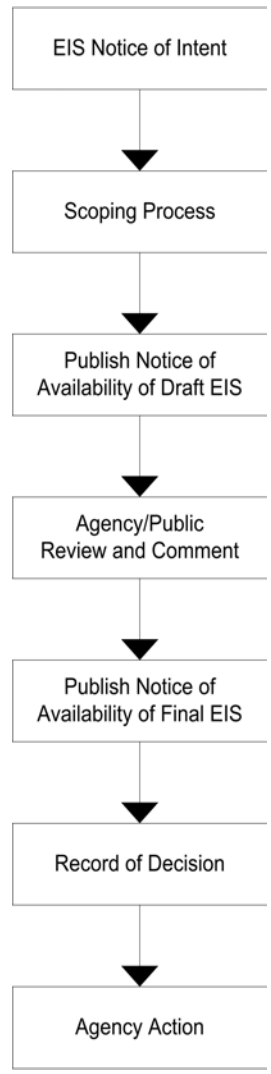



Figure 1-3
EIS NEPA Process

State and local agencies that have been consulted include the Office of Hawaiian Affairs (OHA), the SHPO, Office of Environmental Quality Control (OEQC), Department of Land and Natural Resources (DLNR), and the Department of Health (DOH). The Army has considered the information and comments provided by these agencies.

## 1.9 PUBLIC INVOLVEMENT

By providing a means for open communication between the Army and the public, the procedural aspects of NEPA promote better decision-making. Those having a potential interest in the Proposed Action, including minority, low-income, disadvantaged, and Native Hawaiian groups, were notified and invited to participate in the scoping and environmental impact analysis process.

This EIS includes an analysis of environmental justice issues (See Chapter 10). The closeness of the Hawaiian community presented an opportunity for USARHAW to reach out to numerous organizations to gather input on the NEPA process. Civic organizations consulted included Rotary and Chamber of Commerce, Military Affairs Committee, veteran groups, retired military, state and city government officials, Congressional delegates, and Neighborhood Boards. Special interest groups, including Malu ʻĀina Group and Waikiʻi Ranch Homeowners, Office of Hawaiian Affairs, Royal Order of Kamehameha, and The Hawaiian Civic Clubs were also asked for input into the NEPA process. A community relations plan has been implemented with an execution matrix. This matrix will include individuals and organizations in a three-tier notification matrix. Following the execution of the notification matrix, media releases and ads will be placed in newspapers, and public service announcements on radio and Public TV. Ongoing briefings will continue with individuals and organizations requesting information or updates on the progress of the EIS.

CEQ regulations and 32 Code of Federal Regulations (CFR) 651 guide public participation opportunities. These include issuing in the *Federal Register* a notice of intent (NOI) to prepare an EIS[4], a public scoping process, a 45-day public review period for the Draft EIS (DEIS), and publication of the Final EIS (FEIS), accompanied by a 30-day mandatory waiting period before a final decision is made and a ROD is issued. The NEPA process for an EIS is shown on Figure 1-3. Following publication of the NOI, public notices were published in the major newspapers on the island of Hawai'i and O'ahu announcing the time and location of seven public scoping meetings to solicit input and to obtain comments on the scope of the EIS. In addition the scoping meetings were announced in the April 8, 2002, issue of *The Environmental Notice,* published by the State of Hawai'i, Department of Health, OEQC. The 45 day scoping period began on April 8, 2002. Based on public comment, the scoping period was extended by 30 days and ended on June 15, 2002. Seven scoping meetings were held between April 16 and 30, 2002. For residents and groups interested in the Proposed Action at Pōhakuloa Training Area (PTA) on the island of Hawai'i, public scoping meetings were held in Hilo and Waikoloa. For residents and groups interested in the Proposed Action at Schofield Barrack Military Reservation (SBMR) training areas and other training facilities on O'ahu, public scoping meetings were held in Wahiawā, Honolulu, Hale'iwa, Kahuku, and Wai'anae. The Army published early notices of the meeting times and locations. A total of 283 people attended the seven meetings.

At the public scoping meetings, 100 individuals and persons representing organizations provided oral comments for the Army's consideration. The Army also received written comments from 199 individuals and organizations in the form of e-mails, phone calls, faxes, and individual and form letters. The Army also received 21 comments to its World Wide Web site, 7 comments by telephone, and 77 comments at separate information meetings requested by groups and organizations. The Army compiled a scoping report, identifying and assessing the issues brought forth through the scoping process. The major concerns and issues expressed during the scoping process are as followsEffects on threatened and endangered species, especially in Honouliuli Preserve, which contains a diversity of sensitive species, including Hawaiian tree snails; the potential for spread of nonnative species;

- Potential contamination of soil, water, and air; the need for clean-up of hazardous materials and waste caused by past military activities; cumulative impacts to natural resources; and potential for decreased groundwater quality beneath SBMR;
- Reduction in access to hunting, cultural sites, and open space, specifically, at Honouliuli Preserve;
- Impacts to cultural sites and traditional cultural practices; the need for additional cultural surveys to identify cultural sites and practices; collaboration with cultural practitioners and Hawaiian civic clubs to protect cultural resources;
- Increased traffic along the proposed military vehicle trails; traffic issues in the vicinity of SBMR and Saddle Road; traffic safety along Saddle Road;
- Wildfires caused by tracer rounds, pyrotechnics, indirect fire, and other sources;

[4] The notice of intent for this EIS was published in the *Federal Register,* March 4, 2002 (76 FR 9717) and is found in Appendix B.

- Changes in land use, such as conversion of agricultural and recreational lands to military uses; and
- Effects on the local economy, specifically, funding for land acquisition, costs for cleanup of hazardous materials and UXO, costs for providing housing and services for military personnel, and potential for increased revenue spent by military personnel.

The comments and concerns of the public and agencies were used to determine the focus of analysis and selection of alternatives. A summary of the comments received during the scoping process is included in Appendix B, organized by location, meeting date, and subject.

The Commanding General, 25th ID(L) and U.S. Army Hawai'i approved the July 2003 EIS for public review and it was distributed to elected officials, regulatory agencies, and members of the public. The availability of this document was announced in the *Federal Register* on October 3, 2003, and for 45 days the public was provided with the opportunity to comment on the findings of the EIS. After the public comments are incorporated and the draft is revised the General will weigh appropriate information and will decide which alternative to implement. This decision will be published in the *Federal Register.*

Notification of publication of the EIS and the opening of the public comment period was announced as both legal and display advertisements in the *Hawaii Tribune-Herald, West Hawaii Today*, *The Honolulu Advertiser*, *Honolulu Star-Bulletin, Midweek*, and OEQC's *The Environmental Notice*. Publication dates were October 3, 5, and 8, 2003. Six public meetings to receive comments on the EIS were held, on each in Honolulu, Wahiawa, Waianae, Kahuku, Waikoloa, and Hilo.

During the scoping meetings, the administrators of the public facilities would not allow the meetings to extend beyond 10:00 PM. This time restriction required that members of the public keep their oral comments short. After many public comments about the length of the meetings, and in an attempt to allow for full participation of all people present, the Army decided to hold the EIS public meetings at private facilities that were open as long as the Army needed. The majority of the EIS public meetings did not conclude until after 12:00 AM.

At the first two meetings the Honolulu Police Department arrested a total of seven people for trespassing, when they attempted to enter the facilities with signs. All individuals were advised that they were welcome to enter the facilities without the signs.

It was not the intent of the Army to restrict the public through the format and location of the public meetings. We corrected the situation by working with the other facility locations to allow signs in the meeting rooms and provide tables for members of the public to display signs and information. In addition, we worked with the facilities and the City and County of Honolulu's prosecutor and all charges were dropped against individuals involved in the situation. All of the individuals who were arrested had the opportunity to participate in subsequent meetings and most of them attended and provided public comment.

Through public meetings, the opportunity to provide written comments, and the extension of the public comment period, we believe we allowed meaningful opportunity for public participation in the process.

The total number of meeting attendees was approximately 600 individuals, almost 300 of whom submitted oral or written comments. The Web site (www.sbcteis.com) was also available for the public to review the document and to make comments. On October 31, 2003, the Army decided to extend the public comment period on the EIS until January 3, 2004. A media release was issued announcing the extension and notices were also published in the Federal Register and in *The Environmental Notice*, published by OEQC.

Public comments on the EIS raised during the EIS public meetings were similar to those of the scoping process and included:

- Impacts to recreational access, primarily at Honouliuli Preserve;
- Impacts to air quality from potential fugitive dust emissions associated with proposed training activities;
- Impacts to noise from ordnance and aircraft associated with current force and proposed training activities;
- Impacts to water resources from a potential increase on demand for water and potential increased risk of contamination from the proposed action;
- Impacts to biological resources from the potential increased risk of wildland fires;
- Impacts to access to sacred sites and areas of traditional importance from training activities and need for more detailed discussion of areas of traditional importance;
- Impacts to cultural resources from the permanent loss of a resource through mitigation measures such as data recovery;
- Impacts to human health and safety from the potential increased risk of wildland fires; and
- Impacts to human health and safety from the potential increase of unexploded ordnance and future clean-up issues of Army lands.

Comments received during the public comment period included those from federal, state, and local agencies, non-governmental organizations, businesses, and individuals. Over 600 individuals provided comments during the public comment period; these comments, and the Army's responses, are provided in Appendix P of this FEIS.

The Army will consider all comments collected on the EIS and the EIS (this document) in the decision making process. The Army's decision regarding this project will be documented in an ROD for the Proposed Action, and the ROD will be signed by the Commanding General, 25th ID(L) and US Army Hawai'i. The ROD will be issued after the NEPA-required 30-day waiting period associated with the publication of the EIS. The summary findings of the ROD will also be published in the *Federal Register.*

Individuals and organizations are invited to access information concerning the Proposed Action at the Army's Web site established for this EIS at www.sbcteis.com. Comments can also be submitted by email to sbct_eis@poh01.usace.army.mil.

# CHAPTER 2

# DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

# CHAPTER 2
# DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

## 2.1 INTRODUCTION

This section describes the Proposed Action and alternatives to the Proposed Action. Section 2.2 describes the existing USARHAW training facilities, Section 2.3 discusses the Proposed Action (Preferred Alternative), Section 2.4 discusses the Reduced Land Acquisition Alternative, and Section 2.5 discusses the No Action Alternative. Other alternatives considered but not carried forward for analysis are discussed in Section 2.5.

## 2.2 USARHAW TRAINING COMPLEX

This discussion of the USARHAW training complex is included here in order to help the reader better understand the nature of training in Hawai'i and to provide a baseline for comparing the existing conditions with the alternatives. The USARHAW training complex has 26 ranges, 49 training areas, 2 airfields, 5 airborne drop zones, and 13 surveyed field artillery and mortar firing points on O'ahu. It also has 21 ranges, 23 training areas, 1 airfield, and 113 field artillery and mortar firing points at PTA on the island of Hawai'i (Nakata Planning Group LLC 2002a).

The 25th ID(L) trains at Schofield Barracks Military Reservation (SBMR) (which includes Schofield Barracks Main Post and Schofield Barracks East Range [SBER]), Dillingham Military Reservation (DMR), Mākua Military Reservation (MMR), Kahuku Training Area (KTA), Kawailoa Training Area (KLOA), and Wheeler Army Airfield (WAAF) on O'ahu. Additional training sites are at Pōhakuloa Training Area (PTA) and Bradshaw Army Airfield (BAAF) on the island of Hawai'i. The locations of these sites are shown in Figure 2-1; lands composing these installations include federal, state, and private property. State and private lands used by installations are subject to lease and easement agreements. Additional Army installations on O'ahu, such as housing, hospitals or administrative facilities, or those that do not provide substantial training resources, are not described. Table 2-1 provides additional information on the principal locations used by the Army.

**Figure 2-1**
Hawai'i Location Map

**Table 2-1**
**USARHAW Land Areas and Personnel**

| Location | Acres | Military Personnel[1] | Civilian Personnel[2] |
|---|---|---|---|
| SBMR | 11,448 (4,633 hectares) | 9,587 | 3,105 |
| Cantonment area | 1,605 (650 hectares) | | |
| Training area | 4,286 (1,735 hectares) | | |
| SBER | 5,154 (2,086 hectares) | | |
| Other lands[3] | 4,645 (1,880 hectares) | | |
| WAAF | 1,369 (554 hectares) | 1,593 | 530 |
| KLOA | 23,348 (9,449 hectares) | 0 | 0 |
| DMR[4] | 664 (269 hectares) | 0 | 0 |
| MMR[4] | 4,190 (1696 hectares) | 0 | 0 |
| KTA | 9,398 (3,808 hectares) | 0 | 0 |
| PTA | 108,792 (44,027 hectares) | 24 | 97 |

Notes:
[1]Military personnel authorized for the site or installation.
[2]Department of Defense civilian personnel authorized for the site or installation, as well as other civilian personnel, such as unappropriated fund employees and full-time contractor personnel.
[3]Includes buffer zones west of the training area ordnance impact area.
[4]Military training and personnel access these areas, but no military or civilian personnel are stationed there.

SBMR serves as headquarters for the 25th ID(L), which is a tactical force that operates as a combined arms force with internal units or units attached to it or under its operational control. With supporting infantry, engineer, artillery, aviation, and air defense units, it has strategic responsiveness and flexibility.

The 25th ID(L) and I Corps units train at the locations on O'ahu and the island of Hawai'i shown on Figure 2-1. These training resources include an assortment of live-fire (real ammunition) and nonlive-fire (blank ammunition) maneuver training facilities, fixed-position live-fire training facilities, infantry and engineer demolition training facilities, and grenade training facilities. Blank ammunition contains powder but no solid projectile and is used to simulate gunfire. Live-fire maneuvers occur at SBMR, PTA, KTA and MMR[1], while nonlive-

[1] In 1998, after several wildland fires were started by munitions that fell outside designated impact areas, the Army suspended live-fire training at MMR. The Army is currently conducting limited live-fire training exercises and is preparing a separate EIS to evaluate a proposal to conduct routine live-fire training at MMR.

fire maneuver training occurs at the other locations. Safety barriers or buffer areas must be located in downrange or direction-of-fire areas to stop or contain the projectiles, and to prevent personnel from entering areas where projectiles could land. Many portions of the training areas are too steep for maneuver training. Company-level live-fire exercises may be conducted at two small areas of PTA, but because of the areas' restricted size, they are of limited value. The following is a brief description of the training resources that the Army is proposing to update or use for SBCT training. The proposed project features are described in Section 2.3.

*Schofield Barracks Military Reservation* is in central O'ahu and is divided into two main land areas, referred to as the Main Post (Figure 2-2) and SBER (Figure 2-3). Principal training areas at the Main Post include the West and South ranges, the ordnance impact area, and the cantonment area. SBMR is the primary range complex in Hawai'i for individual weapons qualification with limited light maneuver training areas. Training and ordnance impact areas are west of the cantonment area. The wooded eastern slope of the Wai'anae Mountains in the western portion of the installation is used primarily for tactical infantry maneuver training, including land navigation training. SBMR has approximately 11,448 acres (4,633 hectares), of which approximately 1,235 acres (500 hectares) are suitable for maneuver training.

SBER is composed of 5,154 acres (2,086 hectares) and has no live-fire training facilities or ordnance impact areas. SBER provides training lands for tactical field exercises by the 25th ID(L) or other Army and Marine Corps units. The western maneuver area on SBER is composed of about 2,223 acres (900 hectares). This area is valuable for rappelling, jungle survival, and patrolling operations. Several open areas are used for air assault and airborne operations. Unit uses include limited battalion and company-level Army Training and Evaluation Program (ARTEP) missions. Climate, terrain, and vegetation provide training conditions similar to areas of potential conflict in the Pacific and Pacific Rim. The eastern portion of SBER has extremely rugged terrain and is densely forested. No live-fire exercises are conducted on SBER; all exercises are limited to pyrotechnics and blank ammunition. The Army has established a 1,000-foot (305-meter) noise buffer zone between the boundaries of the range and the adjacent Wahiawā residential areas. The use of small arms blank ammunition is not authorized in SBER training areas 1A, 1B, 2, 3A, and 3B between the restricted hours of 6 PM and 6 AM. The use of pyrotechnics and explosion simulators is also prohibited in those training areas.

*Wheeler Army Airfield (WAAF)* is in central O'ahu and is bordered on the northwest by the Schofield Barracks Main Post, and by SBER and the Kamehameha Highway on the northeast. WAAF consists of 1,369 acres (554 hectares) and provides administration, housing, maintenance, training, and flight facilities for peacetime mission requirements, including security and law enforcement support. Additionally, the Directorate of Logistics Munitions Branch operates an ammunition supply point at WAAF. The 25th Infantry Division's Aviation Brigade at WAAF consists of two aviation battalions, one reconnaissance squadron, one medical evacuation company, and one aviation intermediate maintenance

**Figure 2-2**
Schofield Barracks Main Post

**Figure 2-3**
Schofield Barracks East Range

company. The Aviation Brigade is equipped with 108 helicopters, 280 land vehicles, and 1,000 Soldiers who work at WAAF and are housed there and at SBMR (USACE 1994, 1-1-16, 2-1-7).

Because it is immediately adjacent to SBMR and operates as an adjunct to it, WAAF is treated as a part of SBMR in this document.

*Kawailoa Training Area (KLOA)* is bordered on the south by SBER and on the north by KTA (Figure 2-1). Access to KLOA is very limited due to unimproved roads, steep terrain, and dense vegetation. A single unimproved road traverses most of the western boundary, but there is no primary access road; people, equipment, and supplies for training and land management are transported by helicopter. KLOA was established under a nonexclusive maneuver agreement with the private landowner on January 25, 1955, as a troop maneuver and training area. It is composed of 23,348 acres (9,449 hectares).

KLOA is currently used primarily for helicopter aviation training. The installation is an excellent location for mountain and jungle warfare training because of its ravines and dense vegetation. Approximately 5,310 acres (2,149 hectares) of the installation are suitable for maneuver training (e.g., on the Kawaiʻiki Trail). The remaining area is considered unsuitable for maneuver training due to excessively steep slopes. In areas with slopes greater than 20 percent, troops are deployed typically in single-file small units along ridgelines and are transported via helicopter. Live fire, tracers, incendiaries, explosives, and other pyrotechnics are prohibited per lease agreements; very rugged terrain is off-limits, and military vehicle access is restricted to Pūpūkea Paʻalaʻa Road through Helemanō Gate. Military units may train in KLOA training area K1B during weekends and federal holidays with prior public notification. Hunters and hikers are allowed access when the area is not scheduled for training. Blank ammunition is authorized on KLOA training areas. No low elevation contour-tracking (nap of the earth) helicopter flights are permitted outside KLOA boundaries due to the presence of cattle ranches on adjacent lands.

*Dillingham Military Reservation (DMR)* (Figure 2-4) is bounded on the north by the Pacific Ocean and on the south by the northeastern slopes of the Waiʻanae Mountains. DMR is composed of 664 acres (269 hectares) and has an active joint-use military/civilian airfield. Portions of the reservation, including the runway and parking area, have been leased to the Hawaiʻi Department of Transportation (DOT) for civilian light aircraft operations and support. The lease, which expires in 2008, limits civilian operations to between sunrise and sunset. Night operation is reserved for military operations. The Army can close the airfield for daytime military operations with prior notification to the Hawaiʻi DOT.

Approximately 354 acres (143 hectares) are suitable for maneuver and field training, 107 acres (43.3 hectares) are developed within the cantonment area, and the remaining 203 acres 82.1 hectares) are on steep slopes of the Waiʻanae Mountains. The airfield has extensive hardened areas that can support vehicles and headquarters activities. DMR is used for small unit (platoon and squad) maneuvers and combat support operations and supports field

**Figure 2-4**
Dillingham Military Reservation

training for headquarters and service support units. Specific training includes command post exercise operations, emergency deployment readiness exercise support operations, limited maneuver training, airborne operations, including equipment and personnel parachute operations, support operations, and night vision goggle training for helicopter pilots. Platoon-level ARTEP missions are supported at DMR.

DMR provides the space for infantry and associated support units to maneuver. This maneuver is conducted in a dry- or blank-fire scenario; that is, bullets are not fired. Blanks are used in rifles and machine guns, along with multiple integrated laser engagement system (MILES) equipment, which is provided to each unit and allows units to conduct force-on-force maneuver against the enemy, engage the enemy, and receive incoming fire. MILES fires an eye-safe laser beam; a harness worn by each Soldier senses the laser and indicates the hits and near misses. In force-on-force exercises, MILES provides feedback on the enemy threat, unit capabilities, and training status (Garo 2002).

Ammunition is restricted to blanks and use of ammunition is prohibited on the runway. Ground produced smoke is allowed in designated areas but is prohibited on the runway. The airfield portion is leased to the State Department of Transportation for light civil aircraft and airfield support operations. Maneuver training is not permitted on the portion of DMR that is leased to the state of Hawai‘i without prior state approval. There are no live-fire activities, designated ordnance impact areas, or associated surface danger zones on DMR.

*Kahuku Training Area (KTA)* is bounded on the north by private agricultural lands, by KLOA on the south and by private lands on the remaining perimeter (Figure 2-5). KTA is composed of 9,398 acres (3,803 hectares). It is the largest contiguous ground maneuver training area on O‘ahu, containing 4,569 acres (1,849 hectares) categorized as suitable for maneuver. The northern portion of the installation supports all tactical maneuver training scheduled on KTA, including mountain and jungle warfare, pyrotechnics, and air support training. KTA can accommodate a number of training scenarios involving infantry battalion ARTEP missions. A number of landing and drop zones for military aircraft and parachutists are on KTA. Aviation assets are incorporated into appropriate training events, but there are no developed airfield facilities for training use. All aviation support assets found on KTA are temporary and associated with specific training events. The southern portion of the installation is more elevated, with rugged terrain and dense vegetation. The ruggedness of this terrain makes it poorly suited for large-scale field exercises.

Portions of KTA training area are off-limits to military training during weekends and federal holidays without prior approval from Range Division-Hawai‘i. Under a permit from the state, the public (i.e., Hawai‘i Motosports Association) has obtained a lease giving the public exclusive rights to Training Area A-1 during weekends and federal holidays. Lease provisions allow the Army to close these areas for brigade or larger field exercises only if it first notifies the public. Units must submit requests during the Range Scheduling Conference for an early public notification.

**Figure 2-5**
Kahuku Training Area

Military units may train in Training Areas A-1 and A-3 during weekend and federal holidays, with prior public notification. Hunters and hikers are allowed access when the areas are not scheduled for training (typically weekends and holidays). Pyrotechnics (e.g., smoke and incendiary devices) are permitted, subject to Range Control approval. All pyrotechnics are prohibited in specific training areas and within a 3,280-foot (1000-meter) buffer zone on the inside of the KTA boundary.

*Pōhakuloa Training Area (PTA)* is the largest military training area in Hawai'i and consists of 108,792 acres (44,027 hectares) (Figure 2-6). The ordnance impact area consists of approximately 51,000 acres (20,639 hectares) and extends from central PTA to the southern boundary. This area allows for firing all types of tactical weapons currently in the USARHAW inventory. Approximately 56,661 acres (22,930 hectares) are suitable for maneuvers.

PTA supports all types of live-fire training and can support large-scale (battalion or larger) maneuver training under uniquely realistic conditions, although the terrain limits training in certain areas (Nakata Planning Group, LLC 2002b, 3). Ranges at PTA are as follows (Sato 1996): Infantry Squad Battle Course/Squad Defense Range; Combat Pistol Qualification Course; Rifle Grenade Range; Rifle Range; Hand Grenade Range; Hand Grenade Qualification Course; Rifle Zero Range; Multi-purpose Machine Gun/Sniper Range; Demolition Range; Infantry Platoon Battle Course; Multi-purpose Anti Armor Range; Grenade Machine Gun Range; Direct Fire Range; Helicopter Gunnery; Bombing Range; Forward Area Arming and Refueling Point; Forward Area Refueling Point; Drop Zone; Confidence Course; Mortar Firing Positions; and Artillery Firing Positions. See Section 2.2.3 for a more complete discussion of current training. Units are scheduled to conduct training at PTA annually, using an automated system known as Range Facility Management Support System (RFMSS). PTA provides the space for infantry and associated support units to conduct force-on-force maneuvers. Under this maneuver, live bullets are not fired, and blanks are used in rifles and small caliber automatic weapons, along with MILES equipment.

Many types of weapon systems are generally used at PTA (Sato 1996) including small arms, antitank weapons, mortars, field artillery, air defense artillery, explosives, and rockets.

PTA supports training for a variety of services, including the US Army, Army National Guard, US Navy, US Marine Corps, US Air Force, Special Operations Forces, and allied armed forces from the Pacific region. Transportation of military personnel and cargo to PTA involves use of several alternative land, sea, and air routes that employ commercial and military transportation systems (Sato 1996, 2-1).

PTA includes BAAF, which is directly west of the cantonment area and includes a 90-foot by 4,750-foot (27.4-meter to 1,448-meter) paved runway.

**Figure 2-6**
Pōhakuloa Training Area

### 2.2.1 Other Training Facilities

*Hickam Air Force Base (HAFB)* is on the south side of O'ahu, approximately nine miles west of downtown Honolulu. Currently the Army uses Building 1138 at HAFB to conduct troop rigging as part of joint deployment training.

### 2.2.2 Current Force Vehicle and Weapon Systems

Vehicles used during current force training include transport and supply trucks, High Mobility Multipurpose Wheeled Vehicles (HMMWV), and four-wheel drive vehicles of various types. The weapons systems that the current force uses are the standard 9-millimeter (mm) pistol, M-4 carbine (a lightweight rifle with a short barrel), M-16 assault rifle, M-203 40mm grenade launcher, M-240 7.62mm machine gun, M-249 5.56mm squad automatic weapon (machine gun), M-24 sniper rifle, MK-19 grenade machine gun, M-2 .50 caliber machine gun, 105mm and 155mm howitzer (towed), 60mm and 81mm mortars, AT-4 and Javelin anti-tank missile, tube-launched, optically tracked, wire-guided (TOW) missile, mine-clearing line charge, shoulder-fired Stinger missiles, and HMMWV-mounted Stinger missiles.

### 2.2.3 Description of Current Training

Primary users of USARHAW subinstallations are combat arms units, which include light infantry, combat engineers, field artillery, air defense artillery, attack aviation, ground cavalry, US Marine Corps combat forces, the US Navy, Hawai'i Army National Guard, US Coast Guard, and US Army Reserves. Major training activities associated with these users on USARHAW subinstallations are light maneuver training, weapons live-fire, support areas, and aviation training. As a rapid strike force of nearly 12,000 Soldiers, the 25th ID(L) focuses primarily on training for low intensity conflict throughout the Pacific. Principal training activities are described below. Additionally, Army units integrate Air Force, Marine, and Navy systems into live-fire training exercises.

The principal existing, ongoing current force training activities that would continue under the No Action Alternative are described in the following sections. These include maneuver, reconnaissance, live-fire, bivouac, deployment, and aviation training, along with training support operations.

#### *Maneuver Training*

There are areas considered unsuitable for maneuver training on each subinstallation because of topographic and maneuverability constraints. Limited use and restricted areas, ordnance impact areas, habitat and species protection areas, identified cultural resource sites, cantonment areas, and recreation areas within each subinstallation reduce and compartmentalize the available maneuver and training space. The total training area that would be available to the Army on O'ahu is approximately 55,571 acres (22,498 hectares), but the acreage considered suitable for maneuver training is approximately 15,119 acres (US Army 1997c). The total training area available to the Army on the island of Hawai'i is approximately 108,792 acres (44,027 hectares), of which 56,661 acres (22,930 hectares) is suitable for unit maneuver (US Army 1997c).

The subinstallations described below and addressed by this EIS are small and noncontiguous and have limited ability to support tactical exercises above company level, which range in size from 62 to 190 Soldiers. SBMR can support up to company-sized live-fire maneuver training. KTA is used as the primary mounted (vehicle) and dismounted (foot) maneuver training area for units up to brigade size and larger on O'ahu. KLOA and DMR are used primarily for helicopter training activities and small unit training. SBER is used mainly for small unit exercises and dismounted training. PTA on the island of Hawai'i allows training for up to brigade-size maneuvers and limited mounted maneuvers.

Maneuver training exercises are conducted at all levels, from squad to brigade, to ensure a combat ready fighting force and are sometimes supported by fire support assets. The typical size and composition of each Army combat element is presented in Table 2-2. Combat effects, such as smoke and obscurants, noise, and simulated artillery, nuclear, biological, and chemical conditions, are integrated into training to condition units for operations in a realistic and stressful battlefield environment. Obscurants are manmade or naturally occurring particles suspended in the air that block or weaken transmission of particular parts of the electromagnetic spectrum, such as visible and infrared radiation or microwaves.

Movement refers to the shifting of units on the battlefield (training areas). Unit leaders use a combination of formations and movement techniques to successfully move units. Formations are arrangements of units and of Soldiers in relation to each other. Units from squad to battalion use formations for control, security, and flexibility. Troop movements can be tactical or administrative. Both classifications apply to most movements but one is normally dominant. Unit movements (even tactical dismounted), maneuvers (both offensive and defensive), and extended maneuver training usually involve the use of a small number of light wheeled vehicles for command and control or support. However, range restrictions, tactical scenarios, and maneuverability constraints may keep these light wheeled vehicles to established roadways. Airborne units may parachute into designated drop zones.

**Table 2-2**
**General Structures of Army Forces**

| Element | Number of Soldiers | Commander |
|---|---|---|
| Team | 3-5 | Noncommissioned officer |
| Squad/section | 8-10 | Noncommissioned officer |
| Platoon | 16-44 | Lieutenant |
| Company/battery/troop | 62-190 | Captain |
| Battalion/squadron | 300-1,000 | Lieutenant Colonel |
| Brigade | 3,000-5,000 | Colonel |
| Division | 15,000 | Major General |

Source: USACE 2001a

Tactical movements are conducted when contact with enemy forces is likely either en route or after arrival at a destination. They emphasize tactical considerations such as security and the use of combat ready formations. They de-emphasize efficiency and ease of movement, and they anticipate ground contact with the enemy. Administrative movements are conducted when contact with enemy forces is unlikely, both en route and soon after arrival at a destination. They emphasize the best method of movement and de-emphasize tactical considerations.

All units in the 25th ID(L) conduct tactical marches. There are two types of tactical marches: foot march and motor march. A foot march is the movement of troops and equipment mainly by foot, with limited support from vehicles. A motor march is similar to a foot march, but with troops moving in military vehicles. Both foot marches and motor marches are routinely executed on roads and trails.

Maneuver also entails setting up temporary defensive positions to repel an enemy attack. Defensive positions may consist of Soldiers lying in concealed positions and designating fire zones. More complex maneuver defense entails digging individual fighting positions or trenches using hand tools and digging in larger crew-served weapons using excavators.

During extended maneuver training, Soldiers may sleep in the field. To avoid detection and allow for quick displacement, tents are not set up during light infantry maneuvers. Soldiers normally eat packaged meals in the field. Other prepared meals are brought in from support areas. Training units carry out all trash to avoid detection. Units may use blank ammunition and MILES equipment during nonlive-fire. MILES fires an eye-safe laser beam, and each Soldier wears a harness that senses the laser and indicates hits or misses. Field artillery and mortar fires are simulated by pyrotechnics that provide both audio and visual effects.

### *Reconnaissance Training*

Typical reconnaissance training operations involve small groups, from squad to platoon strength (8 to 44 Soldiers) and may occur at any USARHAW training area. No live fire is involved. The training is conducted between 20 and 40 times per year, during daytime and at night.

### *Live-Fire Training*

Live-fire training at PTA, SBMR, and MMR follows the Army standard training methodology in Field Manual (FM) 7-10. The individual Soldier qualifies with an assigned weapon and then progresses through squad, platoon, and company level live-fire exercises. Live-fire entails an individual Soldier, a crew of a weapon system, or a collective unit firing at targets on a range facility. Live-fire exercises may incorporate free maneuver within the established safety zones of a range.

The requirement for live-fire training varies depending on individual and unit mission, weapons assigned, and ammunition available. Each Soldier must demonstrate proficiency on the assigned weapon system annually or semiannually (US Army 1997a). Unit commanders must ensure that live-fire training meets readiness standards. Weapons proficiency, or qualification, is scored and recorded for each individual or crew and is reported collectively by unit.

Training may include the use of short-range training ammunition (SRTA, also known as blue-tip ammunition), which uses a plastic ball projectile. Although SRTA is classified as live-fire training in accordance with AR 385-63, the maximum range of this ammunition is only 300 to 700 yards (274 to 640 meters), depending on the caliber used. SRTA may be used at SBMR, MMR, and PTA in conjunction with other live-fire ammunition. At KTA, only SRTA or blank ammunition would be used.

Live-fire training at SBMR and PTA includes basic weapons marksmanship ranges, grenade training, urban/village assault and entrenched enemy training, small unit live-fire and maneuvers, artillery and mortar firing, and infantry demolition, using mines and bangalore torpedoes. At KTA the only live-fire training permitted is urban/village assault using SRTA.

### *Combat Service Support Operations and Training*

Combat service support operations and training occur at the installations. Support areas are those where camps are set up for rest, resupply, refit, maintenance, and support. Sites vary, depending on unit size and mission. Tactical operations may be staged from a bivouac site. Depending on unit size, support areas can contain areas for vehicle and weapons maintenance and parking, general supply, munitions supply, medical care, helicopter landing zones, and vehicle off-loading. A support site consists of a series of tents and temporary structures, which house the unit, covered with camouflage nets. Tents provide sleeping/living areas, maintenance shops, supply storage, medical facilities, operations/communication areas, and mobile field kitchens. Sites are chosen to accommodate the unit support element, to provide communication links and concealment from the enemy, and to support maneuver operations. Campfires are not allowed in support areas, which have security and observation posts and may have individual fighting positions. Vehicle access routes are guarded, and roving patrols are established for security. Areas an enemy would be likely to approach are monitored and designated for defensive planning and for repulsing an attack. Munitions used in support areas typically consist of grenade and artillery simulators and blank ammunition.

### *Deployment Training*

Deployment training teaches Soldiers how to prepare and move military units and supplies as part of a military action. Operational and training deployment activities occur at SBMR, WAAF, HAFB, Kawaihae Harbor, and BAAF, nearly all within the confines of the military installations. Training exercises may range from testing the load plan of any given vehicle in a unit to an Emergency Deployment Readiness Exercise (EDRE), which is designed to simulate the movement plans of a unit to deploy to an overseas location. All deployable units normally participate in an EDRE annually. Executed realistically, EDREs provide a process for commanders to evaluate their units' strengths and weaknesses in a deployment.

Vehicle convoys move personnel and equipment between installations. A convoy is normally defined as six or more military vehicles moving simultaneously from one point to another under a single commander, ten or more vehicles per hour going to the same destination over the same route, or any one vehicle requiring a special haul permit. Per command guidance, USARHAW convoys normally maintain a gap of at least 30 minutes between serials (a group of military vehicles moving together), and 330 feet (100 meters) between vehicles on highways and 7.5 to 15 feet (25 to 50 meters) while in town traffic. Per state regulation, military convoys are not authorized to operate on state highways during "rush hour" - between the hours of 6:00 AM and 8:30 AM or between 3:00 PM and 6:00 PM, Monday through Friday. Movements on Saturday, Sunday, and holidays are by special request only. Convoys traveling from Kawaihae Harbor to PTA must get clearance, and vehicles operating on Saddle Road within the boundaries of PTA must not exceed 25 mph.

Units must seek permission from the 25th ID(L) for convoys of 25 vehicles or more. Permission must also be granted from the State of Hawai'i DOT for convoys of six or more vehicles or to move oversized or outsized cargo over state highways. As long as all federal, state, and Department of Defense (DOD) regulations are followed no additional permits are required to move munitions. To ensure maximum safety, all convoys must comply with local policies, as specified in standard operating procedures (SOPs), which direct such matters as vehicle safety inspections and convoy safety briefings, and vehicle operators must be properly trained and licensed to operate assigned military vehicles.

Units are also deployed to PTA from Honolulu to Kawaihae Harbor. Deployment requires both barges and logistic support vessels (LSVs). Current annual vessel traffic for deployment to PTA averages about 4 barge and 60 LSV round-trips, which have a 12-foot (4-meter) draft and a top speed of 13 knots. New theater support vessels (TSVs), modern high-speed vessels with a 15-foot (5-meter) draft and a top speed of 40 knots, may be fielded in the future and appropriate NEPA documentation will be prepared at that time. Soldiers are typically transported to PTA by one to two C-130 aircraft twice a year.

### *Aviation Training*

Aviation training occurs at SBMR, SBER, MMR, WAAF, DMR, KTA, KLOA, and PTA and, depending on location, consists of aircrew training, maneuver training, and live-fire training. Aircrew training pertains to normal aviation flight skills, including takeoffs and landings; normal, nap of the earth, contour and low level flights; confined and high altitude area takeoffs and landings; and navigation for helicopters. Maneuver training requirements for aviation units are the same as for ground units, with the added capability of using the third dimension for speed and maneuver. During some training exercises, aircraft may fly at treetop level or lower. This type of training is critical for the tactical safety of the flight crews because it provides protection from enemy radar coverage and air defense weapon systems.

High mobility and combat flexibility of aircraft are important assets on the battlefield. This type of training requires up to 20 helicopters flying in smaller tactical formations of four to six aircraft while carrying ground troops and equipment to battle areas. Aircraft pick up Soldiers in pickup zones and carry them to landing zones. Aviation live-fire training follows the standard Army training methods and progresses in a similar manner as the ground units. Aviation live-fire training takes place on designated ranges, with ground targets and scoring systems to determine weapons accuracy and weapons effects. Once crews have qualified with their aircraft, they progress through section, platoon, and company live-fire exercises.

The aircraft that are used in support of current forces in Hawai'i are the armed reconnaissance OH58D Kiowa Warriors, utility lift UH60 Blackhawks, and the medium lift CH47 Chinook.

### *Combined Live-Fire/Maneuver Training*

Company combined arms live-fire exercises (CALFEXs) are conducted at USARHAW live-fire ranges and integrate different firing platforms in order to amass their effects against the enemy. A typical company-level CALFEX will include a dismounted maneuver ground force with small arms weapons (M4s, M16s, M249 SAW, M240B machine guns, M203), supported by the company mortar section equipped with two 60mm mortars, and a battalion mortar section or platoon of two to four 81mm mortars. Engineer, artillery, and aviation fire support assets will also support the company. The level of support can vary but in general can be expected to be a platoon of 105mm artillery (three howitzers) and two to four aviation gunships (OH-58D Kiowa Warrior helicopters). Maneuver training is a tactical exercise that can include but is not limited to movement by foot, vehicle, and helicopter, offensive operations, and defensive operations. CALFEXs follow a variety of tactical operations and involve more than one operation, such as attacking a trench line. The exercises may be offensive or defensive, but they generally use the same types of weapons and munitions.

The most common CALFEX is attacking a strong point, which can be anything from forces defending a built up area to forces defending from a trench line. Currently, CALFEXs at MMR are limited to daytime.

### *Force-on-Force Training*

In a force-on-force scenario at SBMR, KTA, or PTA, a battalion or brigade engages an opposing force in nonlive-fire maneuver over a relatively large area, typically for an extended period (ten or more days). In a brigade-sized operation, as an exercise progresses, the battle zone develops into a linear configuration divided into three areas of operations: the forward area or security zone, the main battle area, and the brigade rear. Different types of operations occur in each of these areas. The security zone is where the opposing force is located, forward of friendly troops. The main battle area is where most intense combat training occurs. The brigade rear area, located behind friendly combat units, is where selected headquarters elements, administrative, logistical, medical, and aviation field operating sites are positioned.

Specific military activities in a force-on-force exercise normally include cross-country vehicle maneuvers, blackout driving, using pyrotechnics and artillery simulation devices, building hasty/limited defensive positions, placing obstacles, and establishing forward/rear support areas or field hospitals. Vehicles are moved on hardened and improved all-weather roads, with limited use of unimproved roads and trails. Cross-country travel usually involves HMMWVs or other wheeled vehicles. During their nonlive-fire force-on-force training, units may designate another unit within the US or friendly foreign military to portray the enemy. During live-fire training, units may designate the targets that they will fire at to depict an enemy. Also, to prepare for force-on-force or live-fire training, units may simply train tactically, as if there were a real enemy opposing them. All of this is done to prepare Soldiers and units for combat.

### 2.2.4 Current Institutional Programs

Institutional matters can be described as good stewardship plans and programs that could affect, protect, and manage the biological, physical, and socioeconomic environment at USARHAW. Several management programs have been developed to address the sustainability of specific resources. The following programs are currently established and operating at USARHAW: range management, integrated training area management (ITAM), environmental management, and sustainable repair and maintenance.

#### *Range Management*

The Range and Training Land Program (RTLP) is the program under which the Army conducts range operations and maintenance on lands where Soldiers train in the field. A range is an area that is normally equipped for practice in weapons delivery and/or shooting at targets. The RTLP provides a military-centered framework for land management since USARHAW lands are primarily classified for military use. Range Division (which includes Range Control) implements the RTLP, operates firing ranges, and regulates use of training and ordnance impact areas. In addition, Range Division regulates access to training areas and ranges and protects and conserves sensitive natural resources from military and recreational use.

The key RTLP planning device is an installation range development plan, which defines the range and training land requirements. This plan is incorporated into the USARHAW Real Property Master Plan, the Integrated Natural Resources Management Plan (INRMP), and the Integrated Cultural Resources Management Plan (ICRMP). These efforts, together with the ITAM work plan described below, produce a sound approach for consistent and proactive management of training land while balancing mission, infrastructure, and environmental stewardship. Specific range management actions that are conducted annually at SBMR, KTA, and PTA are as follows:

- Range scheduling;
- Range inspection;
- Range target repair and replacement; and
- Range maintenance.

Range target repair and replacement and general range maintenance do not occur at DMR, SBER, or KLOA because there are no targets or ordnance impact areas at these sites.

#### *Integrated Training Area Management*

The ITAM program is the Army's formal strategy for implementing the sustainable use of training and testing lands. The intent of the ITAM program is to systematically provide uniform training land management capability across USARHAW and to ensure that the carrying capacity of the training lands is maintained over time. The Army manages its lands to minimize loss of training capabilities in order to support current and future training and mission requirements. The integration of stewardship principles into training land and conservation management practices ensures that the Army's lands remain viable to support future training and mission requirements. ITAM integrates elements of operational, environmental, master planning, and other programs that identify and assess land use alternatives. The ITAM program also supports sound natural and cultural resources management practices and stewardship of its land assets, while sustaining land attributes conducive to supporting training, testing, and other installation missions. These management requirements are as follows:

- Integrate training requirements with training land management;
- Conduct annual monitoring and analysis of resources and ranges;
- Conduct repair and maintenance of training land;
- Enhance mobility, maneuverability, access, and availability in training areas; and
- Train Soldiers in Sustainable Range Awareness to minimize training land damage.

These requirements are applicable at all training areas.

### *Environmental Management*

The Army environmental strategy consists of four pillars, which represent the major areas of activity: pollution prevention, compliance, restoration, and conservation. Projects under each major activity area are implemented and managed at USARHAW.

The primary objective of pollution prevention is source reduction. Pollution prevention eliminates or reduces the sources of pollutant discharges or emissions. This includes substituting materials and changing processes to avoid the use of hazardous substances. The program reduces operating costs and liability from environmental compliance and cleanup.

The goal of the compliance program is to meet applicable federal, state, local, and Army environmental laws, regulations, and other requirements. The compliance program at USARHAW consists of eight major program areas: air quality, asbestos, water quality, hazardous waste and hazardous materials, lead hazard, solid waste, storage tanks, and wastewater.

Under the restoration program, the Army identifies, investigates, and cleans up contamination from hazardous substances, pollutants, and contaminants. The primary priority of the restoration program is to identify and clean up the sites that present the highest risk to public health and the environment. It is the Army's priority to remediate contaminants, such as chlorinated solvents, which are regulated by the Comprehensive Environmental Restoration, Compensation, and Liability Act (CERCLA). In addition, USARHAW investigates and remediates all types of contaminants, such as PCBs and petroleum, which are not regulated under CERCLA, but are regulated under various other federal, state, and Army regulations.

The conservation program consists of natural and cultural resources management, as well as compliance with NEPA, the Endangered Species Act (ESA) and the National Historic Preservation Act (NHPA). The conservation program focuses on responsibly managing Army lands to ensure long-term natural resource productivity and cultural resources protection and preservation, so the Army can achieve its mission.

### Sustainment, Restoration, and Modernization Program

Real property management is the Army's planning process for identifying facility requirements, for designing and constructing new facilities, for maintaining existing facilities, and for reusing or disposing of obsolete facilities. This program includes activities such as writing long- and short-range plans, updating the program for tabulating facilities required and available, developing capital investment strategies, mapping installations and surrounding areas, and maintaining Installation Design Guides written to unify the overall appearance of installation facilities. Real property management also includes a variety of supporting elements, including traffic planning and inventories of historical properties.

Land is real property. It is a priceless nonrenewable asset that must be responsibly managed to support the national defense mission. Family housing, barracks, offices, roads, recreational areas, live-fire ranges, and maneuver areas are all real property assets occupying Army lands. Master planning uses land use planning, or zoning, as the primary method to balance compatible and incompatible land usage to meet industrial, residential, and recreational requirements.

### Real Property Master Plan

To manage its land, facilities, and infrastructure, USARHAW has prepared a real property management plan based on assigned mission and guidance contained in a variety of plans and other documents. These references establish trends, strategies, goals, and objectives on which Army planners can base long-range and near-term plans for economical, environmentally responsible, and effective support of Army goals, objectives, missions, and populations.

USARHAW adheres to five basic concepts in its planning goals and objectives: maximizing facilities utilization, maintaining existing facilities, meeting regulatory and environmental concerns, renewing facilities in an orderly and cost-effective manner, and providing new facilities when all other alternatives are exhausted.

Army Regulation 210-10, Real Property Master Planning, guides USARHAW's real property planning process. Each real property management plan consists of four components: long-range, capital investment strategy, short-range, and mobilization.

The real property management plan addresses the planning process associated with over 300 types and categories of installation real property, including barracks, family housing, utility systems, industrial facilities, roads, classrooms, ranges, and maneuver land. Planning quantifies the requirements for facilities to support installation missions, evaluates the adequacy of existing facilities, proposes modifications, removals and additions, and provides a planning roadmap to address shortfalls and excesses.

### *Cultural Resource Management Efforts*

The cultural resources management program at USARHAW has a staff that includes a Cultural Resources Manager, six Cultural Resources Specialists (archaeology), and an Architectural Historian. The program covers the followings tasks:

- Complying with federal preservation law;
- Reviewing installation projects to ensure compliance;
- Maintaining a cultural resources database in Access and GIS;
- Conducting field surveys and site evaluations;
- Monitoring cultural resources during training activities;
- Preserving sites;
- Engaging in Native Hawaiian consultation and providing cultural access; and
- Coordinating with other regulatory agencies.

The cultural resources team also coordinates and facilitates public outreach actions that include site tours and public education and forming cultural advisory groups on Hawai'i and O'ahu.

### *Integrated Wildland Fire Management Plan*

Since the publication of the Draft EIS, the USARHAW finalized the Integrated Wildland Fire Management Plan (IWFMP) (October 2003). As such, discussion of this program was moved from the section describing proposed institutional programs to the section describing existing institutional programs in the Final EIS. The IWFMP lays out specific guidance, procedures, and protocols in the prevention and suppression of wildfires on all USARHAW training lands with wildland fuels. The goal of the plan is to convey the methods and protocols necessary to minimize fire frequency, severity, and size while allowing military units to maintain a high level of combat readiness. The plan defines the responsibilities of all offices, departments, and agencies involved and describes strategic and tactical actions to be taken for pre-suppression and suppression of fires. The plan will be reviewed and updated every other year to ensure the latest information is consistently incorporated into Army wildfire prevention and suppression procedures.

## 2.3 PROPOSED ACTION (PREFERRED ALTERNATIVE)

Under the Proposed Action, the 2nd Brigade would be converted to an SBCT and, as such, would operate as part of the Army's Interim Force. Table 2-3 provides a snapshot comparison of a current force light brigade, such as the 2nd Brigade, and the proposed SBCT. Implementing the Proposed Action would require taking several distinct and coordinated actions and activities directly associated with transforming the 2nd Brigade. This would include fielding Stryker systems and SBCT-specific weapons, building new facilities, acquiring new land and additional easements, and conducting SBCT-specific training. Table 2-4 provides an overview of the proposed individual project actions by location (Figure 2-7 through Figure 2-11); Table 2-5 shows the proposed projects for each alternative. This EIS

**Table 2-3**
**Current Force and SBCT Light Brigade Comparison**

| Aspect | SBCT (Proposed Action) | Current Light Brigade (No Action) |
|---|---|---|
| Personnel strength | 3,818 officers and enlisted Soldiers | 3,008[1] officers and enlisted Soldiers |
| Vehicles | 1,005 emission producing vehicles (including 291 Strykers)[3] | 659 emission producing vehicles[2] |
| Weapons | Current force inventory plus use of twenty-seven 105mm Stryker mounted cannon and thirty-six 120mm mortars and a change from eighteen 105mm howitzers to eighteen 155mm howitzers | Current inventory |
| Aircraft | Current force inventory | 108 helicopters, including the OH58D Kiowa Warrior, UH60 Blackhawk, and CH47 Chinook |
| Vessels | Current force vessels. | Current inventory of LSVs and barges (For future additions, see Chapter 9, Cumulative Impacts) |
| Information systems | Computers in every vehicle | Computers in command centers |
| Communications | Internet | Voice over radio or telephone |
| Land acquisition | SRAA, WPAA, Dillingham Trail, Helemanō Road, and Kawaihae to PTA Trail | As needed on an individual case-by-case basis |
| New construction | Seven new ranges, two airfield upgrades, thirteen support facilities, and twenty communication antennas | As needed on a case-by-case basis (see Chapter 9, Cumulative Impacts) |
| Road improvements | Helemanō Road, Dillingham Trail, and Kawaihae to PTA Trail | As needed on a case-by case-basis (see Chapter 9, Cumulative Impacts) |

Source: US Army 2002b

[1]The 3,008 is based on FY04 estimates.
[2]The heaviest vehicles currently used are 5-ton 6-by-6 wheeled cargo trucks.
[3]The 20-ton Stryker is heavier than the light wheeled vehicles currently used because it has armor on it, but it is lighter than other armored vehicles, such as Bradley armored personnel carriers, and also is much lighter than the M1A1 Abrams tank, which weighs 70 tons.

**Table 2-4**
**SBCT Projects Overview**

| Graphics Code[1] | 1391 Project # | SBCT Project Title | Location | Construction Commences (Fiscal Year[2]) | Category |
|---|---|---|---|---|---|
| S1 | 58143 | Urban Assault Course and Training Facilities | Schofield | 2006 | Construction |
| S2 | 57404 | Virtual Fighting Training Facility | Schofield | 2009+ | Construction |
| S3 | 56923 | Range Control Facility | Schofield | 2009+ | Construction |
| S4 | 58144 | Battle Area Complex | Schofield | 2005+ | Construction |
| S5 | 57421/ 58925 | Motor Pool Maintenance Shops | Schofield | 2005 | Construction |
| S6 | 57416 | Tactical Vehicle Wash Facility | East Range | 2005 | Construction |
| S7 | N/A | Fixed Tactical Internet | Schofield | 2005 | Construction |
| S8 | 55270 | South Range Land Acquisition | Schofield | 2004 | Additional Land |
| S9 | 57461 | Qualification Training Range, QTR1 | Schofield (M. Flats) | 2004+ | Construction |
| S10 | 57462 | Qualification Training Range, QTR2 | Schofield (S. Range) | 2005 | Construction |
| S11 | 57422 | Multiple Deployment Facility | Schofield (Wheeler) | 2005 | Construction, Renovation |
| S12 | 57405 | Upgrade Airfield for C-130 Aircraft | Schofield (Wheeler) | 2009+ | Upgrade |
| D1 | 58161 | Land Easement/Construct Road, SB/DMR | Dillingham | 2009+ | Construction |
| K1 | 57415 | Tactical Vehicle Wash Facility | Kahuku | 2007 | Construction |
| K2 | 57305 | Combined Arms Collective Training Facility | Kahuku | 2005 | Construction, Renovation |
| K3 | 57406 | Road Construction, Schofield to Helemanō | Helemanō | 2005 | Construction |
| K4 | 57802 | Land Easement, Schofield to Helemanō | Helemanō | 2004 | Additional Land |
| P1 | 57197 | Battle Area Complex | Pōhakuloa | 2007 | Construction |
| P2 | 57183 | Anti-armor Live-fire and Tracking Range | Pōhakuloa | 2009+ | Construction |
| P3 | 58273 | Construct Military Vehicle Trail, PTA-Kawaihae | Pōhakuloa | 2009+ | Construction |
| P4 | 58273 | Land Easement for Military Vehicle Trail, PTA-Kawaihae | Pōhakuloa | 2009+ | Additional Land |
| P5 | 57417 | Ammunition Storage | Pōhakuloa | 2009+ | Construction |
| P6 | 57414 | Tactical Vehicle Wash Facility | Pōhakuloa | 2006 | Construction |
| P7 | 57411 | West PTA Maneuver Training Area Land Acquisition | Pōhakuloa | 2005 | Additional Land |
| P8 | 56994 | Range Maintenance Facility | Pōhakuloa | 2009+ | Construction |
| P9 | 57408 | Runway Upgrade/Extension, Bradshaw AAF | Pōhakuloa | 2009+ | Renovation |
| P10 | N/A | Fixed Tactical Internet | Pōhakuloa | 2005 | Construction |
| P11 | N/A | Installation Information Infrastructure Architecture | Pōhakuloa | 2005 | Construction |

Source: US Army 2002a
[1]Graphics code refers to the project locations shown on figures in Chapter 2 and in Appendix D.
[2]Fiscal Year is based on current program guidance subject to change as a result of future funding availability.

**Figure 2-7**
Northern O'ahu Project Overview Map

**Figure 2-8**
Proposed Action at Schofield Barracks Military Reservation and Wheeler Army Airfield

**Figure 2-9**
Project Locations at Kahuku Training Area

**Figure 2-10**
Pōhakuloa Project Overview

**Figure 2-11**
Cantonment Area Projects at Pōhakuloa Training Area

**Table 2-5**
**Proposed Action (Preferred Alternative), Reduced Land Acquisition Alternative, and No Action Alternative Overview**

| | Proposed Action (Preferred Alternative) | | | | Reduced Land Acquisition Alternative | No Action Alternative |
|---|---|---|---|---|---|---|
| | SBMR and Wheeler Army Airfield | DMR | KTA/KLOA | PTA | | |
| **Training** | | | | | | |
| Live-fire exercises | Live-fire exercises would continue. | None. | Live-fire SRTA[1] training introduced at the MOUT sites at KTA | Live-fire exercises would continue on existing lands, no live-fire on WPAA | Same as Proposed Action. | Live-fire exercises at SBMR and PTA as part of current training would continue at current levels. |
| Vehicles used | Increase of 346 emission-producing vehicles to 1,005 vehicles (including 291 Strykers), which would be based at SBMR.[2] Maneuvers at SRAA and SBER may involve from one to 96 vehicles (includes one to 96 Strykers). | One to 74 vehicles (includes one to 27 Strykers). | One to 200 vehicles (includes one to 96 Strykers) .. | 27 to 400 vehicles (includes 32 to 192 Strykers). | Same as Proposed Action. | 659 emission-producing vehicles. |
| Off-road maneuver training (Stryker maneuvers) | On existing 1,917acre off-road maneuver area on SBER and 1,300 new acres on SRAA. | On 364 acres currently used for off-road maneuvers. | On 3,384 new acres at KTA. None on KLOA. | On 1,800 acres currently used for off-road maneuvers at PTA and 23,000 new acres at WPAA. | Same as Proposed Action, except no off-road maneuvers on SRAA. | No Strykers would be used. Continued use of wheeled vehicles at SBMR, DMR, KTA, and PTA. |
| Weapons used | Current force weapons plus 105mm cannon on Stryker mobile gun system and the 120mm mortar a change from eighteen 105mm howitzers to eighteen 155mm howitzers. | No change in weapons fired. | No change in weapons fired. | Current force weapons plus 105mm cannon on Stryker mobile gun system and the 120mm mortar, and a change from 18 105 howitzers to 18 155mm howitzers. | Same as Proposed Action. | Existing weapons would continue to be used. |
| Aircraft and UAVs | Normal current force operations of the aviation brigade would continue, plus USAF C-130 and C-17 operations in support of SBCT deployment. UAV flights. | No new aircraft activity. UAV flights. | No new aircraft activity. UAV flights UAV flights. | No new aircraft activity except UAV flights UAV flights and USAF C-17s to move units to PTA.. However, aircraft activity use will be redistributed. There will be an increase in helicopter use over WPAA and a corresponding decrease over PTA. | Same as Proposed Action. | Continued flight support for current force training. |
| Troop transport | Trucks are used to move troops from SBMR cantonment to ranges; Strykers in a group of approximately 30 vehicles move troops on Battle Area Complex up to company level. | Troops transported from SBMR to DMR by Strykers or trucks, generally up to company level, plus support trucks. | Troops transported from SBMR to KTA/KLOA by Strykers or trucks; battalion to limited brigade level plus support trucks. | Troops would continue to be transported via aircraft or marine vessel from SBMR to PTA. Existing LSV trips would increase to 66 from 60. Troops would be transported from Kawaihae Harbor to PTA by Strykers or trucks, up to brigade level, in groups of 30 vehicles. | Same as Proposed Action. | No change in troop transport except for marine transport. Current transport includes an average of 60 individual LSV and four barge round trips per year. |
| Weapons/Ordnance Transport | No change from current force. | None. | None. | No change from current force. | Same as Proposed Action. | No change from current force. |
| **Construction/Demolition** | | | | | | |
| Range complexes | Four new ranges built: QTR1, QTR2, Urban Assault Course, and Battle Area Complex. | No new ranges. | One mock city built, called the Combined Arms Collective Training Facility (two buildings demolished, S150, S151). | Two new ranges built: battle area complex (12 targets and 1 tower demolished) and the anti-armor range (1 tower demolished). | QTR2 would be built at PTA, not at South Range Acquisition Area. | Existing ranges may be upgraded or new ranges added as future conditions warrant.[3] |
| Airfield upgrade | Upgrade parking apron at Wheeler Army Airfield for C-130 operations. | None. | None. | Upgrade, extend, and reorient runway 5 degrees to support C-17 aircraft. | Same as Proposed Action. | No airfield upgrades. |
| Tactical vehicle wash | One tactical vehicle wash would be constructed. | None. | One tactical vehicle wash would be constructed. | One tactical vehicle wash would be constructed. | Same as Proposed Action. | None. |
| Installation information infrastructure architecture (I3A) | None. | None. | None. | I3A would be constructed. | Same as Proposed Action. | Projects may be constructed on a case-by-case basis[3]. |
| Training classrooms | Virtual Fighting Training Facility. | None. | None. | None. | Same as Proposed Action. | Projects may be constructed on a case-by-case basis[3]. |
| Range control facilities | Range Control Facility built (eight buildings would be demolished: 1124, 1125, 1150, 1181, 2108, 2056, 2276, 1192). | No new facilities. | No new facilities. | Range maintenance facility built (three buildings demolished: T17, T19, T20). | Same as Proposed Action. | Projects may be constructed on a case-by-case basis.[3] |
| Support facilities | Motor pool maintenance shops and multiple deployment facility built. | None. | None. | Expand ammunition storage facility with three new ammunition storage facilities. | Same as Proposed Action. | Projects may be constructed on a case-by-case basis.[3] |
| Antennas (fixed tactical internet) | Nine antennas built: seven at SBMR and two at SBER. | Three antennas built: two within DMR and one on Dillingham Ridge. | Two antennas built within KTA. | Ten antennas built within and surrounding PTA and one antenna at Kawaihae Harbor. | Same as Proposed Action. | No new antennas to be constructed. |
| Road improvements | Construct a 15-foot- (5 meter-) wide one-lane gravel road with 3-foot (1-meter) shoulders from SBMR to Helemanō (6 miles [9.6 kilometers]). | Construct a 15-foot (5-meter)-wide (one-lane) gravel road with 3-foot (1-meter) shoulders from SBMR to DMR (12.4 miles [20 kilometers]). Telecommunication lines to be installed alongside the upgraded road. | None | Construct a 24-foot- (7-meter-) wide two-lane gravel road with a total of a 40-foot (12-meter) right of way from Kawaihae Harbor to PTA (27 miles [43 kilometers]). | Same as Proposed Action. | None. |
| Land acquisition | 1,402 acres (567 hectares) (South Range Land Acquisition). | None. | None. | Approximately 23,000 acres (9,308 hectares) (WPAA). | Approximately 100 acres (40.5 hectares) at SBMR and approximately 23,000 acres (9,308 hectares) at WPAA. | Land acquisitions may be conducted on a case-by-case basis. [3] |
| Easements | Acquire a perpetual easement of 13 acres (5.3 hectares) for new road to HMR. | Acquire a perpetual easement of 36 acres (14.6 hectares) (11 acres [4.5 hectares] for new road). | None | Acquire a perpetual easement of 132 acres (53.4 hectares) for new road from Kawaihae Harbor to PTA. | Same as Proposed Action. | See comment above. Land acquisitions may be conducted on a case-by-case basis.[3] |
| Personnel | Increase of 810 Soldiers, with 502 spouses and 1,053 children.[2] | No increase. | No increase. | No increase. | Same as Proposed Action. | 3,438 Soldiers (existing) and 3,008 predicted for future. |

[1]Short Range Training Ammunition
[2]Soldiers and vehicles would be assigned to SBMR and would use training areas as noted.
[3]Appropriate separate NEPA documents will be prepared, as necessary.
Source: US Army 2002a

analyzes only the conversion of the 2nd Brigade to an SBCT and not its ultimate conversion to the future force; a separate NEPA analysis would be done for that next phase as appropriate. Major elements of the SBCT include the following:

- Three Motorized Infantry Battalions, each composed of three Combined Arms Rifle Companies and a Headquarters Company;
- Reconnaissance, Surveillance, and Target Acquisition Squadron (RSTA);
- Antitank Company;
- Field Artillery Battalion;
- Aviation Task Force;
- Engineer Company;
- Brigade Support Battalion;
- Brigade Headquarters and Headquarters Company;
- Signal Company; and
- Military Intelligence Company.

Each major element of the SBCT is composed of a number of smaller units. Individual training activities often consist of section-, team-, squad-, and platoon-sized units operating in a dispersed but coordinated manner. Despite some changes in equipment, capability, and training doctrine, training activities are anticipated to be very similar to those currently conducted by light infantry brigades stationed on and training on O'ahu and the island of Hawai'i. However, the number of Soldiers is expected to increase by 810 and the total number of rounds to be fired by all Soldiers trained at USARHAW by 25 percent. This would increase overall training throughput, which would necessitate the construction and update of ranges and facilities to meet the SBCT training requirements. The addition of the Stryker and the need for increased mounted maneuver training would require the acquisition of additional lands.

After the publication of the EIS, the Army announced plans for an enhancement package for SBCTs. The enhancements include an aviation task force, an increase from twelve to eighteen 155mm howitzers in the direct support artillery battalion, and improvements to command, control, communications, computer, and intelligence (C4I) assets. The announcements indicated that the aviation task force would include Comanche helicopters when the aircraft were ready for fielding. In February 2004, the Army determined that no further testing or fielding of Comanches would occur and canceled the Comanche program. The SBCT aviation task force will come from existing 25th ID(L) aviation brigade assets and will result in minor changes to training, primarily some increased aviation training over WPAA in support of units training in that area. The FEIS has analyzed the impacts of the increased aviation training over WPAA and those impacts are minimal. The EIS analyzed the impacts of twelve 155mm howitzers, a change from the 18 105mm howitzers currently in the direct support artillery battalion for 2nd brigade. The addition of another six 155mm howitzers was analyzed in the FEIS and resulted in minimal changes to noise impacts and no change in the overall determination of effect. The C4I improvements are not expected to have any impacts on the environment.

Overall, the Army has determined that the enhancements are within the original scope of the Proposed Action as described in the EIS, are minor, and do not require a supplemental EIS.

An evaluation of training facilities shows that they do not provide the necessary opportunities for training an SBCT (Nakata Planning Group 2002a). Under this alternative, training capabilities would be enhanced as part of transforming the 2nd Brigade to an SBCT. The Army's proposed changes to training would rectify training resource shortfalls for SBCT units and would reorient resources to meet evolving mission-related requirements. In order to meet present and future missions, USARHAW units must have modernized maneuver areas, training facilities, and other support facilities, such as infrastructure and telecommunications.

In selecting specific construction projects to meet the training shortfall for SBCT and to minimize costs and impacts on the environment and communities, planners attempted to first use existing USARHAW lands and ranges, where possible, to upgrade existing ranges and facilities, to build new ranges on existing training areas, and, if necessary, to acquire new training lands. Once project alternatives were developed, they were further evaluated and selected based on the following factors: the extent to which they provided mission support; the extent to which they minimized environmental impacts and contributed to environmental stewardship; their economic feasibility; and the extent to which they increased training productivity. Each final site location was further adjusted as necessary to avoid or minimize impacts on natural and cultural resources.

An SBCT deploys very rapidly, executes early entry, and conducts effective combat operations immediately on arrival to prevent, contain, stabilize, or resolve a conflict. An SBCT participates in major war as a subordinate component within a division or corps, in a variety of possible roles. To deploy rapidly, the brigade's design uses a highly mobile, medium-weight armored combat/combat support platform, with a minimum of personnel and logistical support. Preconfigured in ready-to-fight combined arms packages, the entire SBCT can be deployed anywhere in the world and can begin operations within 96 hours of deployment. Once in the field, the SBCT can self-deploy up to 500 miles in a 12-hour period and can sustain operations for up to 72 hours without resupply. SBCT description, operations, and capabilities are largely derived from the SBCT organizational and operational concept (HQDA 2000). The SBCT is organized primarily as a combined arms, mounted infantry organization. The Stryker Infantry Carrier Vehicle (ICV) serves as the platform for infantry carriers, mobile gun systems, mortars, reconnaissance, surveillance, and target acquisition elements, anti-tank carriers, engineer mobility support vehicles, nuclear/biological/chemical reconnaissance, as well as many of the command and control carriers within the brigade. As a supporting brigade to a light division, the SBCT extends the tactical mobility available to the division commander and increases the firepower available to support dismounted infantry assaults. The typical size and composition of each element of a brigade is presented in Table 2-2.

### 2.3.1 SBCT Systems Fielding

This element of the Proposed Action involves fielding new and modernized vehicles, weapons systems, and equipment for Interim Forces and, ultimately, the future force, although there will be some upgrades, changes and additions.

Foremost among the new systems is the Stryker, an eight-wheeled, 23-foot (7-meter) long, 9-foot (3-meter) wide, 20-ton (18-metric ton) combat vehicle that can be transported on the C-130 aircraft. The Stryker vehicle has a 350-horsepower Caterpillar Model 3126 diesel engine and can travel at a maximum speed of 60 miles per hour for 330 miles on one full tank of fuel. It represents a substantial improvement in strategic mobility for brigade-sized units and can be designed to accomplish several different tasks. The primary design of the Stryker has two variants: the ICV and the mobile gun system (MGS). The ICV (Photo 2-1) can carry nine Soldiers and their equipment and requires a driver and a vehicle commander. The MGS (Photo 2-2) would be mounted on the Stryker and modified to incorporate a 105mm turreted cannon and autoloader system with a crew of three. Twenty-seven of the 291 Strykers would be MGSs. The actual vehicle used by SBCT may vary from the current Stryker vehicles as the system is developed, but overall will have the same characteristics as the current Stryker. (There are eight other configurations of the Stryker that could be used as part of the SBCT; information on the ICV, MGS, and the eight other Stryker variants is provided in Appendix C.)

Photo 2-1. Stryker infantry carrier vehicle.

Photo 2-2. Stryker with MGS mounted on top.

If the design of the Stryker or other vehicles used in SBCT are changed in such a manner as to result in a significant environmental impact not analyzed in this document, the Army would conduct appropriate NEPA analysis and would comply with all appropriate laws and regulations prior to implementation. In this study, the Army would analyze the potential for significant impacts on those resource areas that could be affected by the design change.

The SBCT would be equipped with a tactical unmanned aerial vehicle (UAV) similar to the RQ-7A "Shadow 200" (Photo 2-3) to provide day or night reconnaissance, surveillance, and target acquisition capability. The UAV can be likened to a large radio controlled model airplane. The UAV would allow tactical commanders a view into heavily protected battle space that could not be penetrated by other intelligence assets or that presents a high risk to piloted aircraft. Each UAV system includes three unpiloted aircraft equipped with imagery sensors, a ground vehicle to carry the aircraft, two ground control stations mounted on vehicles, and launch, recovery, and support equipment pulled on trailers behind the vehicles. The aircraft weighs approximately 325 pounds, has a wingspan of 13 feet (4 meters), and measures 11 feet (3.4 meters) from nose to tail.

Photo 2-3. Shadow unmanned aerial vehicle launch.

Barges and logistic support vessels (LSV) are currently used for transporting equipment and troops from Pearl Harbor to Kawaihae Harbor for training at PTA. LSV trips would increase by 6 per year, a 10 percent increase under SBCT. New high-speed theater support vessels (TSV) may replace the LSV in the future. Before the TSVs are fielded appropriate NEPA documentation will be prepared including ESA and NHPA consultation if required. The potential impacts of the TSV are discussed in Chapter 9 under cumulative impacts. .

The weapons systems in the SBCT would be the same as currently used by, or proposed for, existing units in the 25th ID (L) or the Hawai'i Army National Guard, with the exception of the introduction of the 105mm MGS on the Stryker and the 120mm mortar and an increase of from 12 to 18 155mm howitzers.

### 2.3.2 Construction

Proposed construction includes building, modernizing, and remodeling buildings, training facilities (e.g., live-fire training facilities), and infrastructure and demolishing buildings and facilities. It also involves ground softening at the PTA Battle Area Complex (BAX) and anti-armor live-fire and tracking range (AALFTR) by using a D-10 bulldozer that will drive back and forth over areas on the ranges to crush lava, large rocks, and hard soil to provide a softer substrate for Soldiers to train. Both of these ranges are constructed over existing ranges, so ground-softening activities would occur as needed on already heavily disturbed areas. The precise location and extent of ground softening would depend on final orientation of firing points and targets but is expected to cover a fraction of the 2,825-acre (1,143-hectare) area of the two ranges .

Proposed construction also includes Dillingham Trail, Helemanō Trail, and PTA Trail on land to be acquired as described in Section 2.3.3. Of the 25 locations evaluated for construction of the Fixed Tactical Internet antennas on O'ahu and Hawai'i, a maximum of eight will be selected on each island from the locations represented in the EIS. Locations will be chosen based on the most suitable locations for communication logistics and avoidance of environmental concerns, such as cultural and biological resources. See Table 2-4, Figures 2-7 to 2-11, and Appendix D for details on the construction projects.

### 2.3.3 Land Acquisition/Easements

This part of the Proposed Action involves real property acquisition, which means negotiating temporary or permanent control of property for Army use, mainly through purchase, lease, or permit. Under the Proposed Action, two areas would be acquired and three easements would be obtained. The two areas identified for acquisition are the South Range Acquisition Area (SRAA) (approximately 1,402 acres [567 hectares]) at SBMR and the West PTA Acquisition Area (WPAA) (approximately 23,000 acres [9,308 hectares]). These parcels were selected because of their proximity to existing installations. The parcels' acreages would provide enough land for new facilities and, when combined with existing installations, adequate acreages for mounted maneuver training.

After it has acquired WPAA, the Army plans to construct about 28 miles of gravel training roads, the location of which are as yet undetermined. The Army would comply with all applicable environmental statutes, including but not limited to NEPA, the ESA, and the

NHPA, in determining the location and potential impacts of these roads before construction. The Army would also consult with adjacent property owners and other interested parties on the location of the proposed training roads in order to address and resolve potential air quality and dust concerns.

Although the SRAA would become part of SBMR it is different from the existing South Range, which includes several existing qualification ranges and is just north of the proposed SRAA. The three easements for military vehicle trails would include the trails between SBMR and DMR (known as the Dillingham Trail, 36 acres (14.6 hectares), between SBMR and HMR (known as the Helemanō Trail, 13 acres (5.3 hectares), and between Kawaihae Harbor and PTA (known as the PTA Trail, 132 acres (53.4 hectares). While the Army would not own the underlying land, the easement is a property right to the land. Until trail construction is complete, the Army would use public roads for travel from SBMR to DMR and KTA, and from Kawaihae to PTA. See Figure 2-8 and Appendix D for maps and more details on the land acquisition projects.

### 2.3.4 SBCT Training

The following subsections describe the SBCT training that would occur under the Proposed Action, with emphasis on the differences between SBCT training and the current force training. Most of the nonlive-fire and other training that does not involve maneuvers by SBCT forces would be similar to that currently being conducted by the 25th ID (L). As with current force training, exercises would continue to be at the squad through company level, with some opportunities for battalion and above training. Urban operations training is more highly emphasized in SBCT requirements. The SBCT would use new urban warfare facilities extensively and would use existing helicopter landing and pickup zones. Nonlive-fire training also is conducted in classrooms, on rappel towers, and obstacle courses, and in a variety of specialized facilities. Table 2-6 compares training under the Proposed Action and No Action Alternatives, and Table 2-7 compares military vehicular traffic between training areas. Table 2-9, under Requirements for SBCT, lists the minimum number of days of training that would take place for specific training.

Doctrine that has thus far been developed for the SBCT may be refined, based on experience following initial operating capability of the unit.

#### *Mounted Maneuver Training*

Doctrine provides that the area of operations for which the SBCT could be responsible in combat is normally 31 miles by 31 miles (50 kilometers by 50 kilometers) (Nakata 2002b). On the premise that the Army must train as it intends to fight, the training lands must be sufficient and widely spread to approximate operating in an area that size by simulating the density of units and activities that might occur during combat.

**Table 2-6**
**Summary of Training Activities by Installation**

| | Proposed Action | | | | | | | | | | | | No Action | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Maneuver Acreage | | Training on Land (Includes night training) | | | | | | Aviation Training | | | | Maneuver Acreage | | Training on Land (Includes night training) | | | | | | Aviation Training | | | |
| | | | | Live-Fire | | Maneuver | | | | | | | | | | Live-Fire | | Maneuver | | | | | | |
| | Mounted | Dismounted | Highest Level Training | Weapons Qualification | Live-fire | Mounted | Dismounted | Maneuver-impact Miles | Airborne (Parachute Drops) | Helicopters | UAV Operations (Daylight) | C17/C130 Aircraft Operation | Mounted | Dismounted | Highest level Training | Weapons Qualification | Live-fire | Mounted | Dismounted | Maneuver-impact Miles | Airborne (Parachute Drops) | Helicopters | UAV Operations (Daylight) | C17/C130 Aircraft Operation |
| **Training Area** | | | | | | | | | | | | | | | | | | | | | | | | |
| SBMR | | | | | | | | | | | | | | | | | | | | | | | | |
| Main Post | 0 | 1,235 | Bde | ☒ | ☒ | | ☒ | 0 | | ☒ | ☒ | | 0 | 1,235 | Bde | ☒ | ☒ | ☒ | ☒ | 0 | · | ☒ | ☒ | |
| SBER | 2,223 | 2,223 | Co | | | ☒ | ☒ | 19,125 | ☒ | ☒ | ☒ | | 2,223 | 2,223 | Co | | | ☒ | ☒ | 16,740 | ☒ | ☒ | ☒ | |
| WAAF | 0 | 494[3] | n/a | | | | | 0 | | ☒ | ☒ | ☒ | 0 | 494[3] | n/a | | | | | 0 | | ☒ | ☒ | ☒ |
| SRAA | 1,300 | 1,300 | Plt | ☒ | | ☒ | ☒ | 25,855 | | | | | 0 | 0 | Plt | | | | | | | | | |
| DMR | 354 | 354 | Co | | | ☒ | ☒ | 4,335 | | ☒ | ☒ | | 354 | 354 | Co | | | ☒ | ☒ | 1,710 | | ☒ | ☒ | |
| KTA | 4,569 | 4,569 | Bde | | ☒[1] | ☒ | ☒ | 13,772 | ☒ | ☒ | ☒ | | 4,569 | 4,569 | Bde | | ☒[1] | ☒ | ☒ | 7,211 | ☒ | ☒ | ☒ | |
| KLOA[2] | 0 | 5,310 | Co | | | | ☒ | 0 | ☒ | ☒ | ☒ | | 0 | 5,310 | Co | | | ☒ | ☒ | 0 | | ☒ | ☒ | |
| PTA | | | | | | | | | | | | | | | | | | | | | | | | |
| PTA Main | 18,000 | 56,661 | Bde | ☒ | ☒ | ☒ | ☒ | 25,855 | ☒ | ☒ | ☒ | ☒ | 18,000 | 71,880 | Bde | ☒ | ☒ | ☒ | ☒ | 13,659 | ☒ | ☒ | ☒ | |
| WPAA | 23,000 | 23,000 | Bde | | | ☒[4] | ☒[4] | 61,894 | ☒ | ☒ | ☒ | | 0[4] | 0 | | | | ☒[4] | ☒[4] | | ☒[4] | | | |

Notes:
[1]SRTA only
[2]Mounted maneuver training would take place along Drum Road in transit to KTA.
[3]Although dismounted maneuver acreage is available, this training is not currently conducted at WAAF
[4] Current mounted and dismounted maneuver training at WPAA is done on a training event basis by individual lease agreement.
Co = Company
Plt = Platoon
Bn = Battalion
Bde = Brigade
n/a = Not applicable/activity does not occur
☒ = Activity occurs or will occur
Note: RLA Alternative has the same training activities as the Proposed Action, with the exception of no live-fire weapons qualification and no off-road maneuvers at SRAA.

**Table 2-7**
**Estimated Military Vehicle Traffic Between Schofield and Dillingham and Kahuku, and Between Kawaihae and PTA**

| | SBMR-DMR | | | | SBMR-KTA | | | | Kawaihae- PTA | | | | DMR-KTA[2] | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Vehicles Per Convoy | Number of Convoys | %Trail-Roadway Split[1] | Annual Frequency | Vehicles per Convoy | Number of Convoys | % Trail-Roadway Split[1] | Annual Frequency | Vehicles per Convoy | Number of Convoys | % Trail-Roadway Split[1] | Annual Frequency | Vehicles per Convoy | Number of Convoys | Annual Frequency |
| **Company Level Exercises** | | | | | | | | | | | | | | | |
| **Current** | | | | | | | | | | | | | | | |
| Trucks and HMMWVs | 15 | 1 | All road | 4 | 15 | 1 | All Road | 12 | 0 | 0 | N/A | 0 | 5 | 1 | 1 |
| **SBCT** | | | | | | | | | | 0 | | | | | |
| Strykers | 11 | 1 | 90/10 | 4 | 11 | 1 | 90/10 | 12 | 0 | 0 | N/A | 0 | 0 | 0 | 0 |
| Trucks and HMMWVs | 6 | 1 | 60/40 | 4 | 16 | 1 | 60/40 | 12 | 0 | 0 | N/A | 0 | 5 | 1 | 1 |
| **Battalion Level Exercises** | | | | | | | | | | | | | | | |
| **Current** | | | | | | | | | | | | | | | |
| Trucks and HMMWVs | 0[3] | 0 | 0 | 0 | 24 | 2 | All Road | 3 | 24 | 3 | All Road | 2 | 0 | 0 | 0 |
| **SBCT** | | | | | | | | | | | | | | | |
| Strykers | 11 | 1 | 90/10 | 4 | 24 | 3 | 90/10 | 4 | 24 | 3 | 90/10 | 2 | 0 | 0 | 1 |
| Trucks and HMMWVs | 6 | 1 | 60/40 | 4 | 24 | 2 | 60/40 | 4 | 24 | 2 | 60/40 | 2 | 8 | 1 | 0 |
| **Brigade Level Exercises** | | | | | | | | | | | | | | | |
| **Current** | | | | | | | | | | | | | | | |
| Trucks and HMMWVs | 24[3] | 8 | All Road | 2 | 24 | 11 | All Road | 1 | 24 | 10 | All Road | 2 | 24 | 3 | 1 |
| **SBCT** | | | | | | | | | | | | | | | |
| Strykers | 6 | 1 | 90/10 | 1 | 24 | 1 | 90/10 | 1 | 24 | 12 | 90/10 | 2 | 0 | 0 | 0 |
| Trucks and HMMWVs | 24 | 8 | 60/40 | 1 | 24 | 9 | 60/40 | 1 | 24 | 21 | 80/20 | 2 | 24 | 3 | 1 |

Notes:
[1]Split between trails and public roadway estimated as a worst case for public roadway travel.
[2]Travel would be entirely on public roadways.
[3]Current force would not conduct multi-location exercise.

Prior Army training doctrine called for using large areas of contiguous maneuver land. This would be preferable if available, but the advent of advanced communication makes it possible for the SBCT to train on noncontiguous parcels of land, even on separate islands, and still simulate operating in a 31-mile by 31-mile (50-kilometer by 50-kilometer) area. For example, while the entire SBCT cannot train within the WPAA, all squad, platoon, company, battalion, and a portion of the brigade tasks can be accomplished there. Only nonlive-fire maneuver training will be done in the WPAA. All training in the WPAA will be supported from PTA. Table 2-8 gives the 2002 land use requirements study (LURS) acreages for existing maneuver land available to the Army in Hawai'i (US Army 1997c). The table shows that a total of 34,637 acres (14,017 hectares) of suitable training land is available to USARHAW units for dismounted and mounted training. (Other lands are unsuitable for a variety of reasons, because they include cantonment areas, are too steep, or are set aside for environmental reasons.)

**Table 2-8**
**Existing Maneuver Land (in acres)**

| Training Area | Suitable Terrain |
|---|---|
| SBMR | 1,235 (500 hectares) |
| SBER | 2,223 (900 hectares) |
| WAAF | 494 (200 hectares) |
| MMR | 1,034 (418 hectares) |
| DMR | 354 (143 hectares) |
| KLOA | 5,310 (2,149 hectares) |
| KTA | 4,569 (1,849 hectares) |
| PTA | 56,661 (22,930 hectares) |
| Total | 71,880 (29,089 hectares) |

Source: Land Use Requirements Study (US Army 1997c)

The RTLP Range Development Plan (RDP) describes the land required for individual maneuvers necessary to meet the training requirements for combat within a 31-mile by 31-mile (50-kilometer by 50-kilometer) area (Nakata Planning Group, LLC 2002a). By looking at the amount of land required to support these individual maneuvers the total maneuver lands needed can be determined. The largest of these maneuvers is the semiannual "movement to contact" exercise for the SBCT as a whole, which requires 122,564 acres (49,600 hectares). The same maneuver at the battalion level is to be conducted four times per year and requires only half as much land (61,284 acres [24,801 hectares]).

The Proposed Action encompasses two land acquisitions that would increase the amount of maneuver land available: the South Range land acquisition of approximately 1,402 acres (567 hectares), approximately 1,300 acres (526 hectares) of which would be used for maneuver, and the West PTA maneuver training area land acquisition of up to 23,000 acres (9,308 hectares). These land acquisitions would add up to 24,300 acres (9,834 hectares) to the inventory of 71,880 acres (29,089 hectares) of existing maneuver lands shown in Table 2-8, bringing the total available to 96,180 acres (38,923 hectares). This is approximately 78 percent of the goal, which, when combined with training available along the proposed military use trails, will meet mounted maneuver training needs. Although the most notable physical difference between the current force and SBCT forces is the introduction of the Stryker vehicle, operations and capabilities would also change. The Stryker vehicle is primarily a troop transport vehicle that would traverse terrain and obstacles to ensure protected delivery of infantry squads to their dismount points. Because of the limitations of the Stryker, most mounted movement takes place on roads or unrestricted terrain. The Stryker can maneuver across a slope that is less than 30 percent, up a slope that is less than 60 percent, and over trees less than five inches (13 centimeters) in diameter. In addition, the Stryker would not be allowed in areas subject to other restrictions, such as those containing sensitive species or cultural features resources. The number of Strykers involved in training exercises would depend on the capacity of the training area involved. All 1,005 emission-producing vehicles (including 291 Strykers) would be based at SBMR and would deploy for training as required. Mounted maneuver training at the South Range Acquisition Area would involve from one to 96 Strykers, one to 27 at DMR, one to 96 at KTA, and 32 to 192 at PTA. There would be no mounted maneuvers in KLOA, except along Drum Road.

### *Dismounted Maneuver Training*

As described above, Strykers would rapidly transport troops to a predetermined action area, where they would conduct dismounted maneuvers to train for enemy engagement. At times, training may include only dismounted maneuvers without the Stryker. During dismounted maneuvers Soldiers would walk in dispersed groups overland toward a given objective. During simulated engagement, Soldiers would seek cover or concealment, and one section may provide a base of weapons fire, while another maneuvers toward the objective.

During extended maneuver training, Soldiers may sleep in the field. To allow for quick deployment, they would not set up tents. Training may involve live-fire and nonlive-fire exercises. Nonlive-fire exercises use blank ammunition, laser weapons, and simulated artillery and mortar fire with pyrotechnics. During nonlive-fire training there would be no aerial pyrotechnics allowed. If used, helicopters would land in established landing zones.

### *Reconnaissance Training*

Reconnaissance training would be carried out in a similar manner as the current force reconnaissance training, except that UAVs would provide air reconnaissance that, in combination with ground reconnaissance, would provide situational awareness and knowledge throughout a larger area.

It is anticipated that the UAV's total flying hours would amount to 2,400 hours of flight per year (4 UAVs at 600 hours per year), or 600 takeoffs and landings per year. The UAVs would not need to take off from or land at ordinary airfields but could be launched from any location using their own hydraulic launchers. An arrested recovery system using nets and/or cables would also be used, minimizing the area required for launch and recovery. Due to this mobility, most of the launch and recovery sites would be within the existing restricted airspace on O'ahu and the island of Hawai'i. However, launching from WAAF or BAAF may be desired for routine training and maintenance. Before such training and maintenance flights, the Army would coordinate with and obtain approval from the Federal Aviation

Administration (FAA). UAVs would not be launched or recovered at DMR, KTA, KLOA or West PTA, although they would be flown over KTA and WPAA under visual ground monitoring.

### *Live-Fire Training*

The transformed brigade would use new and existing live-fire ranges and firing points. SBCT units would perform individual weapon and combined arms live-fire training. Use of pyrotechnics, obscurants, and simulators is anticipated to be similar to current force use. All SBCT training would be planned and conducted in accordance with established USARHAW range and training land regulations and standard operational procedures (SOPs). The SBCT would use the same weapons and explosives as the current force, with the addition of the 105mm mobile gun system on the Stryker and the 120mm mortar and a change from 12 105mm howitzers to 18 155mm howitzers.. All current forces at USARHAW use approximately 16 million rounds and individual explosives per year at the various ranges in Hawai'i. SBCT forces with a current force Brigade would use approximately 20 million rounds and individual explosives per year as part of SBCT training, an increase of 25 percent. No live-fire training would be conducted at WAAF, KLOA, DMR or WPAA. Table 2-9 compares the ammunition used for the Proposed Action to the No Action Alternative.

**Table 2-9**
**Comparison of Ammunition Use**

| Ammunition | No Action | PA |
|---|---|---|
| HE Artillery (>40 mm) | 17,952 | 22,434 |
| Non-HE Artillery (>40 mm) | 174,520 | 284,390 |
| Mortar Rounds (60, 81, 120 mm) | 6,836 | 14,022 |
| Non-HE Mortar Rounds (60, 81, 120 mm) | 11,740 | 18,176 |
| Rockets | 44 | 44 |
| Mines | 1,088 | 1,087 |
| Demolition/Breeching Charges | 283,675 | 205,229 |
| Standard Live Ammunition (Small Arms) | 7,297,358 | 9,314,025 |
| Tracer Rounds (Small Arms) | 2,807,282 | 4,051,655 |
| Blanks/SRTA Rounds (Small Arms) | 3,738,584 | 5,127,061 |
| Pyrotechnics | 588,380 | 91,955 |
| Fuses | 575,378 | 120,248 |

Existing military operations on the urban terrain assault course at SBMR are inadequate to satisfy the SBCT training requirements for the Stryker MGS, light armored vehicle and reconnaissance armored vehicle because it does not have an urban assault course training facility (UACTF), breach facility, or live-fire shoot house. The proposed UACTF at SBMR would provide facilities to train Soldiers in the proper techniques associated with urban combat. These exercises would be conducted with mobile support. The BAX is proposed to provide a realistic battle area for company-level infantry units (dismounted or with supporting vehicles) in need of live-fire training required for an SBCT, which does not exist on O'ahu and the island of Hawai'i. QTR1 is proposed at SBMR to allow consolidation of small arms qualification training that currently is spread across a wide area, requiring units to occupy numerous antiquated ranges. Ranges for modified record fire and combat pistol qualification on SBMR are nonstandard and conflict with higher priority ranges or other proposed ranges. The construction of QTR2 would eliminate this conflict and would provide a modern training facility. A special use airspace, called a controlled firing area (CFA), would be established above QTR2 to contain activities that, if not conducted in a controlled environment, would be hazardous to nonparticipating aircraft. Hawai'i-based units lack a large range to train Soldiers in an urban environment under simulated conditions. The proposed CACTF at KTA would provide a 24 building, SRTA live-fire, facility and range operation support facility to fill that need.

A BAX is proposed at PTA to provide brigade-level CALFEXs not found in Hawai'i. The BAX would provide for gunnery training for MGS, armored vehicle training, or armored vehicle reconnaissance vehicles. Construction at PTA allows enough space for brigade-level CALFEXs that cannot be conducted at SBMR. There currently is no range for anti-armor live-fire and tracking training, which is necessary for supporting Strykers and anti-armor forces firing from HMMWVs. The AALFTR would enable individual and collective gunnery training that simulates sweeping gunfire during movement along the flank of an opposing force.

### Service Support Operations and Training

There would be no change in service support operations and training under the Proposed Action. Training would be carried out in a manner similar to current force training.

### Deployment Training

Deployment training would principally involve moving troops and equipment from SBMR to the other training areas in Hawai'i or to the continental US. As with current force training, transportation would use a combination of vehicles, high-speed vessels, and C-17 and C-130 aircraft, depending on the type and location of training. Deployment training would be similar to the current training, except SBCT units would be deployed at least twice a year to PTA from HAFB or WAAF using one to two C-17 or C-130 aircraft. Equipment would be deployed to PTA by 6 more individual LSV roundtrips a year. There are no adequate facilities to support deployment activities from multiple airfields in Hawai'i. The proposed Multiple Deployment Facility would provide the facilities necessary for SBCT to prepare equipment and vehicles for deployment from either WAAF or HAFB. Stryker vehicles and trucks would also move Soldiers and equipment from SBMR to other training areas. Those that travel on public roads would follow the rules for convoys as spelled out in Section 2.2.3.

### Aviation Training

The number and types of aircraft used for aviation training are expected to be the same as under current force training, with the exception of UAVs. However, the SBCT will not rely on helicopters in the same way light infantry units do. SBCT aviation units will not be used to transport troops but will be used more for supply, convoy support, and close air support. There will not be as many air assault operations during SBCT training.

The aircraft that are used in support of current forces in Hawai'i are the armed reconnaissance OH58D Kiowa Warriors, utility lift UH60 Blackhawks, and the medium lift

CH47 Chinook. The individual use and frequency of the UAVs has yet to be determined, as it would be dictated by each individual training scenario.

### *Combined Live-Fire/Maneuver Training*

SBCT forces would conduct dismounted training to include company-level CALFEXs. The only increase in CALFEXs would be from the introduction of the RSTA Squadron, which could conduct up to three company CALFEXs per year. The SBCT dismounted CALFEXs would be similar to the CALFEXs conducted by the current force, using the same types of weapons and similar tactics. SBCT dismounted CALFEX training would occur at several ranges throughout Hawai'i including the SBMR BAX (company-level), PTA BAX (brigade-level), and possibly MMR (company-level).

MMR is important to military training in Hawai'i. Although SBCT training does not depend on it, SBCT forces would use MMR if the range were available after completion of the MMR FEIS and ROD. The MMR EIS will analyze the potential environmental impacts associated with dismounted CALFEXs for both current force and SBCT; therefore, this SBCT EIS does not analyze training impacts of SBCT at MMR.

### *Force-on-Force Training*

There would be no change in force-on-force training under the Proposed Action, except for the nonlive-fire training at WPAA. However, there would be additional organizations, such as the RSTA Squadron and Anti-Armor Company, which would support the force-on-force units. Force-on-force training would still occur at SBMR, KTA, and existing PTA installations.

## 2.3.5 Institutional Programs

Total Army transformation also affects installation management. Installation management that directly affects the environment includes range management, environmental management, and real property management. The programs described below reflect ongoing programs and total Army transformation changes.

### *Implement Sustainable Range Program*

The Army is undertaking a new approach to its range management. The Sustainable Range Program (SR Program) will improve the integration of all programs that affect or are affected by live training. The SR Program begins at Headquarters, Department of the Army, and will be integrated at the Major Army Command and installation level. Through the SR Program, the Army seeks to ensure that its ranges will be available indefinitely to support training readiness. Army ranges are considered to be a combination of live training infrastructure, installation facilities, and the environment. The SR Program integrates training, facility, and environmental management.

### *Implement Ordnance Impact Area Management*

After each training event all range trash, including spent shell casings, outside the ordnance impact areas would be cleaned up. In addition all range trash would be cleaned up as feasible during range maintenance.

### *Implement an Environmental Management System*

An Environmental Management System (EMS) is a tool that could provide the Army with a means for the management of environmental activities and resources. The EMS would require the Army to define its environmental goals and to document the processes it uses to achieve those goals. By imposing this discipline, the Army would be able to improve compliance with environmental laws and to reduce environmental impacts. USARHAW already has mature environmental programs with many elements of an EMS.

Executive Order 13148, Greening the Government Through Leadership in Environmental Management, requires implementing an EMS at all appropriate federal facilities by December 31, 2005. The policy calls for systematic integration of environmental management into all missions, activities, and functions. The policy requires current processes to be continually reviewed to identify better ways to reconcile national defense and environmental stewardship missions.

EMS is not a new requirement but a change in management practices. It requires the Army to adapt existing management processes to identify and reduce the environmental risks inherent in mission activities. This approach is intended to make complying with environmental laws simpler, less costly, and a routine part of mission planning and execution.

### *Continue Cultural Resources Management Planning*

The Army will continue with cultural resources management as it currently exists.

### *Continue Environmental Management Programs*

As discussed previously, the current Army environmental strategy consists of four major areas of activity: pollution prevention, compliance, restoration, and conservation. Projects under each major activity area are implemented and managed at USARHAW. Activities currently conducted under these programs would continue under the Proposed Action and would ultimately be integrated into the EMS.

### *Continue Ongoing Management Programs to Manage Training and Protect the Environment, as Detailed under the No Action Alternative and Fully Implement Existing Management Plans*

Several plans and programs are in place or would be developed to mitigate potential impacts of the Proposed Action, as well as to protect and manage the biological, physical, and socioeconomic environment at USARHAW during transformation. The following programs are in place and operating at USARHAW and would be fully implemented under the Proposed Action:

- Integrated training area management;
- Integrated natural resources management plan;
- Integrated cultural resources management plan;
- Range development plan; and

- Real property master plan.

## 2.4 REDUCED LAND ACQUISITION ALTERNATIVE

This alternative would involve downsizing the proposed SRAA by approximately 93 percent, from approximately 1,402 acres (567 hectares) to approximately 100 acres (40.5 hectares). The 100 acres (40.5 hectares) of land would be necessary within the SRAA for constructing the proposed SBCT motor pool because the motor pool must be located close to SBMR where the Soldiers are based and no space is available for building this facility at SBMR or WAAF. This alternative is identical to the Proposed Action, with two exceptions: moving QTR2 to PTA and reducing the land acquired at SRAA. This would require that an expanded version of QTR2 be constructed at PTA rather than at the home station, SBMR. This is contrary to current training of the 25th Infantry Division, which is based on troops completing qualification training at SBMR prior to deploying to PTA. The larger exercises conducted at PTA are more effective if each Soldier is fully qualified at SBMR before deploying to PTA. However, the length of deployment at PTA could be extended to allow training at QTR2 before other training is conducted at PTA. Soldiers not able to qualify during deployment would have to return to PTA to complete their qualifications. The best available site for the proposed QTR2 at PTA is on the site of the current Range 8. A controlled firing area over the QTR2 at PTA would not be necessary since the range would be overlain by the existing R-3103 restricted area. This location falls within the overall boundaries of the anti-armor and live-fire tracking range (AALFTR) also proposed for this site, meaning that both ranges could not be used for live-fire at the same time. An expanded version of QTR2, to include sniper and machine gun training, as well as pistol and M16, would be constructed at PTA, overlaying the proposed AALFTR, so no new area would need to be used or ordnance impact area created. Although the purpose and need for transforming the 2nd Brigade, 25th ID(L) would still be fulfilled, it would not be as efficient, and in some circumstances not every Soldier would become qualified, requiring additional training.

## 2.5 NO ACTION ALTERNATIVE

CEQ regulations state that an EIS must evaluate a No Action Alternative, to serve as a benchmark against which the potential effects of actions can be evaluated. The No Action Alternative represents what would occur if the Army were not to carry out the Proposed Action.

Under the No Action Alternative, the Army would not undertake the proposed conversion of the 2nd Brigade to an SBCT in Hawai'i and therefore would not meet the purpose and need for transforming the USARHAW 2nd Brigade, 25th ID(L). The 2nd Brigade would continue to train and operate as a conventional light infantry force.

### 2.5.1 Current Force Vehicle and Weapon Systems

Vehicles and weapons used under the No Action Alternative would be similar to those that are used now.

### 2.5.2 Construction

Construction projects under No Action assume that projects proposed for maneuver training facilities and USARHAW's inventory of facilities for an SBCT would not proceed. However, other projects in support of current training may be constructed on a case-by-case basis, as dictated to meet the continuing needs of the Army's conventional forces. These projects would be evaluated under separate NEPA documentation as appropriate. These projects are described in discussion in Chapter 9, Cumulative Impacts.

### 2.5.3 Land Acquisition

None of the land acquisitions, which are a part of the Proposed Action, would be undertaken. Land could be acquired in support of current training on a case-by-case basis, as might be dictated to meet the continuing needs of historically conventional forces. For example, under No Action, some or all of the SRAA could be acquired for current force maneuver land requirements. While the acreage and precise locations are not known at the present time, these projects would be evaluated in separate NEPA documents, as appropriate.

### 2.5.4 Description of Training

Under No Action, current training is expected to continue, and may include future changes in training as appropriate. These changes could result in requirements for new weapons that are yet to be developed or the development of new strategies as potential conflicts may dictate.

### 2.5.5 Institutional Programs

USARHAW has implemented the following institutional programs at all training areas: ITAM, an INRMP, an ICRMP, a range development plan, institutional controls, and a real property management plan. Chapter 2, Section 2.3, describes these programs in more detail. The Army would continue to fund these programs under the No Action Alternative, as funding is available, with the complexity and scope of the program proportional to the proposed land use.

## 2.6 ALTERNATIVES CONSIDERED BUT NOT STUDIED IN DETAIL

Table 2-10 compares each alternative to the training requirements for an SBCT. Several factors shape alternatives available to USARHAW. First, any alternative must meet the purpose of and need for the action by assisting to bring the Army's Interim Force to operational capability and by providing realistic field training in Hawai'i while providing the nation with capabilities that meet current and evolving national defense requirements. Alternatives must be practical and feasible; that is, they must be capable of being implemented by the Army or another agency, be technically feasible, and not require commitment of resources that cannot practically be obtained. In addition, in framing alternatives, USARHAW has taken into consideration information and suggestions submitted by individuals, organizations, and public agencies. Finally each alternative, with the exception of the No Action Alternative, must meet the training needs required for an SBCT, as outlined in Table 2-10.

### 2.6.1 Transformation of a Different Brigade at Another Location

The Army has identified the first units to be converted to Interim Force status as the "bridge" to the future force. Headquarters, Department of the Army designated the action proposed for implementation by the 2nd Brigade, the effects of which have been evaluated by the Army's headquarters. Section 4.2.2 of the final *Programmatic Environmental Impact Statement for Army Transformation* states, "The Army's operating forces are stationed at those installations that can provide adequate facilities (maneuver areas and training facilities) and infrastructure support. For the foreseeable future, the Army would expect to conduct its transformation of existing operating forces 'in-place.' Relocation of units would not be expected" (US Army 2002c). The long-term view is that the entire Army would transform. In the short-term, as indicated by the ROD for the programmatic EIS, converting units to the future force would be sequenced as directed by Headquarters, Department of the Army. The initial sequencing includes the conversion of the 2nd Brigade.

Headquarters, Department of the Army directed the 2nd Brigade to transform in Hawai'i because the Pacific Rim is a critical area of interest for the United States. Stationing an SBCT in Hawai'i allows the President to rapidly respond to events in an area of increasing importance to national security. This alternative does not meet the purpose and need and is not included in Table 2-10.

### 2.6.2 Transformation with Existing Facilities

Under this alternative the Army would attempt to transform but would rely on existing facilities. USARHAW would propose and undertake military construction projects only on a piecemeal basis for the primary purpose of maintaining resources in an acceptable useful condition for current training and as needed as SBCT moves toward the future force. Projects not associated with transformation could continue to be funded and programmed (e.g., family housing improvements or in-kind replacement of deteriorated facilities). Those associated with transformation would have to be funded on a piecemeal basis, and separate NEPA documentation would have to be prepared as each project is identified. Training would continue using existing maneuver and training facilities, under constraints similar to those now managed by unit commanders and would use new facilities as they are constructed.

The principal differences between the current force and the SBCT would be an increase in the number of personnel, introduction of the Stryker, and modification of the training requirements to guide the unit's readiness training. Current facilities would not accommodate the needs of an SBCT, such as sufficient maneuver training land for the Stryker and automated digitally capable ranges and training facilities. The Army seeks to have the 2nd Brigade capable of executing assigned combat missions in 2007.

This would occur after Strykers, MGSs, and UAVs have been fielded and the Soldiers in the 2nd Brigade have demonstrated their ability to execute their assigned tasks, individually and collectively. The Initial Operating Capability (IOC) cannot be attained without the appropriate types of modernized training facilities with adequate capacity to train individual Soldiers and units available. As is shown on Table 2-10, the existing facilities do not have the

**Table 2-10**
**Comparison of Alternatives Considered to Training Requirements**

| | | Alternative | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Function | Requirements for SBCT (Source of Requirement)[1] | No Action (Current Force Training) | Proposed Action (Preferred Alternative): Transform with New Facilities on O'ahu and Hawai'i | Transform with Reduced Land Acquisition (Construct QTR2 at PTA) | Transform with Existing Facilities (No New Construction or Land Acquisition) | Transform with Maneuver Training on a Continental US Installation (Includes Maneuver Live-Fire Training) | Transform by Using Other Existing Military Facilities (e.g., Marine or Navy Bases) | Move All Training to PTA |
| **Qualification training (fixed firing ranges)** | | | | | | | | |
| Sniper and machine gun training | 355 days/year (RDP[1] pp 7-25). | 230 days/year does not meet requirements<br><br>(RD Plan pp 7-25). | 355 days/year does meet requirements<br>(construct QTR1and QTR2 at SBMR). | 355 days/year does meet requirements (construct QTR1 at SBMR and QTR2 at PTA). | 230 days/year does not meet requirements (existing capacity per RDP pp 7-25) | 355 days/year does meet requirements (construct QTR1 at SBMR). | Does not meet requirements. | Meets requirements. Would require replication of all Schofield Barracks ranges (including Tars]) at Pōhakuloa Training Area |
| M4/M16 qualification | 281 days/year (RDP pp 7-10). | 230 days/year does not meet requirements<br><br>(RDP pp 7-10). | 281 days/year does meet requirements (construct QTR1 and QTR2 at SBMR). | 281 days/year does meet requirements<br>(construct QTR1 at SBMR and QTR2 at PTA). | 230 days/year does not meet requirements (RDP pp 7-25) | 281 days/year does meet requirements (construct QTRs 1 and 2 at Schofield Barracks). | Does not meet requirements 0 days/year available; Marine Corps Base Hawai'i has one multipurpose small arms range, used by their forces (http://www.mcbh.usmc.mil/g3/g3rrkb.htm). | Meets requirements. Would require replication of all Schofield Barracks ranges (including QTRs) at Pōhakuloa Training Area. |
| Virtual training | Virtual training is an essential element of Army Transformation. | Does not meet requirements VFTF[2] and FTI[3] not available; cannot conduct virtual training. | Meets requirements. Construct a VFTF and FTI. | Meets requirements. Construct a VFTF and FTI. | Does not meet requirements. VFTF and FTI not available; cannot conduct virtual training | Meets requirements. Construct a VFTF and FTI. | Does not meet requirements Not available--no other service has comparable facility | Meets requirements. Construct a VFTF and FTI at PTA. |
| **Collective training** | | | | | | | | |
| Urban combat training | 230 days/year use of Combined Arms MOUT Training Facility (RDP pp 9-7). | Does not meet requirements. Existing MOUT assault course, grenade house, and 17-building MOUT does not meet standard (RDP pp. 7-65). | 230 days/year does meet requirements. Split facility at KTA (SRTA live-fire CACTF) and SBMR (urban assault course).. | 230 days/year does meet requirements. Split facility at KTA (live-fire CACTF) and SBMR (urban assault course). | Does not meet requirements. Existing MOUT assault course, grenade house and 17-building MOUT do not —RDP pp 7-65 | 230 days/year does meet requirements. Split facility at KTA(live-fire CACTF) and Schofield Barracks (Urban Assault Course). | Does not meet requirements Not available; no other service has comparable facilities | 230 days/year does meet requirements Would require construction of live-fire CACTF and UACTF facility at PTA. |
| Anti-tank Missile (Javelin and TOW) training | Anti-armor live-fire and tracking range (RDP pp 7-39). | Does not meet requirements. None. | Meets requirements. Anti-armor live-fire and tracking range constructed at PTA. | Meets requirements. Anti-armor live-fire and tracking range constructed at PTA. | Does not meet requirements. None. | Does not meet requirements. No capacity to train additional SBCT units. | Does not meet requirements. Not available; no other service has comparable facilities. | Meets requirements. Anti-armor live-fire and tracking range constructed at PTA. |
| Collective live-fire training | 241 days/year use of Battle Area Complex, Multipurpose Range Complex, Multipurpose Training Range (RDP pp 7-69). | Does not meet requirements. All collective live-fire ranges are nonstandard | Meets requirements. Construct BAXs at SBMR and PTA. | Meets requirements. BAXs at SBMR and PTA. | Does not meet requirements. All collective live-fire ranges are nonstandard. | Does not meet requirements. No capacity to train additional SBCT units. | Does not meet requirements. Not available; no other service has comparable facilities. | Meets requirements. Construct BAXs at PTA only. |

[1]Range Development Plan
[2]Virtual Fighting Training Facility
[3]Fixed Tactical Internet

ability to provide specific training, such as virtual training with a fixed tactical internet (FTI) and antitank missile training. Furthermore shortcomings in capacity and capability of live-fire and simulation training facilities would make it impossible to train the Soldiers of the SBCT to the Army standard. Reduced training time would mean that fewer Soldiers were qualified on their individual weapons systems and that elements of the brigade would not be trained in their collective tasks. This alternative would not meet the purpose and need of transforming the USARHAW 2nd Brigade, 25th ID(L).

### 2.6.3 Transformation in Hawai'i with Maneuver Live-Fire and Nonlive-Fire Training on the Continental US Instead of on Hawai'i

Under this alternative, the Army would transform by conducting collective live-fire and maneuver training on a continental US installation. All proposed cantonment facilities required to support an SBCT would be built, but no new collective maneuver ranges (nonlive-fire and live-fire) would be constructed. The Army would not acquire the 23,000-acre (9,308 hectare) WPAA adjacent to PTA. In addition the following projects would not be built in Hawai'i under this alternative because they are tied to the relocated maneuver training:

- The battle area complexes at SBMR and PTA;
- The Combined Arms Collective Training Facility (CACTF) with SRTA live-fire training at KTA;
- The Urban Assault Course (UACTF) at SBMR; and
- The Anti-Armor Live-Fire and Tracking Range at PTA.

QTR1 and QTR2 would still be constructed, and the SRAA would still be needed to provide space for QTR2 and the SBCT motor pool. Both QTRs would be needed to provide day-to-day training of Soldiers on their individual weapons. The Virtual Flight Training Facility (VFTF) to be built at SBMR is a key element of the training requirements for an SBCT because their suite of simulators and specialized training equipment are an integral part of the transformation process.

The Army considered ranges west of the Mississippi River to minimize travel time. Based on these criteria, continental US Army installations considered as potential sites for 2nd Brigade live-fire and maneuver training include Fort Richardson and Fort Wainwright and the Donnelly Training Area in Alaska (considered as one installation for this analysis and collectively called US Army, Alaska (USARAK), Fort Lewis and Yakima Training Center in Washington State (considered a single installation and referred to as Fort Lewis), the National Training Center at Fort Irwin in California, Fort Carson and Piñon Canyon Training Area in Colorado (considered as one installation and referred to as Fort Carson), Fort Hood in Texas, Fort Riley in Kansas, and Fort Polk in Louisiana. These are the major Army installations in the western US devoted to training US Army forces command units. Table 2-11 provides an overview of the installations.

In Table 2-11, "total area" is the land area in acres occupied by each military reservation. Ranges, environmental constraints, cantonment areas, and other factors, such as regulatory requirements and access, reduce actual lands available for training at each installation. “Current mission” describes the major functions of each installation. As indicated in the last column of the table, USARAK, Fort Lewis, and Fort Polk are undergoing transformation to receive SBCTs; one will be stationed in USARAK, two at Fort Lewis, and one at Fort Polk. The specialized ranges, as well as the MSTF/ISF, VFTF, FTI, and Installation Information Infrastructure Architecture (I3A) projects required for SBCT training are already programmed to be built at these installations. The other installations may eventually receive similar facilities as transformation to the future force occurs over the next 30 years, but at present Forts Irwin, Riley, Hood, and Carson are not capable of providing the specialized training an SBCT requires, and there are no current plans to construct the required facilities at those installations.

Table 2-11 shows that, of the six installations considered, only USARAK, Fort Lewis, and Fort Polk will have the facilities required to train a Stryker brigade; therefore, the others are excluded from further consideration.

If the 2nd Brigade is to train at either of these installations, all the people, equipment, and vehicles associated with each element of the brigade would have to be transported to Alaska or Washington. This would be required to ensure that the Soldiers could train with their own equipment in accordance with Army doctrine. In addition equipment belonging to the Stryker brigades in Alaska and Washington cannot be assumed to be available for use by Hawai‘i personnel. While it is possible to move equipment by barge from O‘ahu to the island of Hawai‘i, Alaska and Washington are too far away for this type of transport to be practical, and the equipment and personnel would need to be airlifted. Military Traffic Management Command’s Traffic Engineering Agency estimated in December 2000 at least 79 C-5 aircraft and 110 C-17 aircraft would be required to move one Stryker brigade (USARHAW 2001a), effectively removing over 80 percent of the Air Force’s transport capabilities during training of one SBCT. The Air Force will receive the last of its 120 C-17 aircraft in November 2004 (FAS 2002a) and has 109 C-5 aircraft, with no more in the pipeline (FAS 2002b). Only six C-17s are proposed to be stationed in Hawai‘i and will replace four C-130s currently stationed there.

Even though the entire brigade may not need to be transported at one time, moving even one rifle battalion would tie up a substantial portion of the Air Force’s airlift capability for an extended period of time. Air Force airlift support would be unavailable for other uses, including actual wartime deployments of the force. Aside from the substantial costs of such operations, it is impractical to expect the Air Force to commit so large a percentage of its resources to support a training exercise.

USARHAW staff estimates that preparation prior to and after each deployment would take five days total. Flight times are estimated at six hours each way. Assuming that maneuver training is to be conducted four times per year, approximately 40 training days of the available 270 would be lost during deployments to Alaska or Washington.

**Table 2-11**
**Continental US Army Installations Considered**

| Installation, State | Total Area (acres) | Current Mission | SBCT Required Facilities? |
|---|---|---|---|
| Fort Richardson<br>Fort Wainwright<br>Donnelly Training Area, Alaska | 71,441 (28, 923 hectares)<br>656,241 (265.684 hectares)<br>640,488 (259,290 hectares) | Home to 172nd Infantry Brigade; programmed for one SBCT. | Will be constructed.[1] |
| Fort Lewis<br>Yakima Training Center, Washington | 86,174 (34,888 hectares)<br>316,786 (128,253 hectares) | Home to I Corps, 1st Brigade of the 25th ID(L), and the 3rd Brigade of the 2nd Infantry Division. Programmed for two SBCTs. | Will be constructed.[1] |
| National Training Center at Fort Irwin, California | 636,251 (257,591 hectares) | National Training Center—desert training of heavy Army forces. | No |
| Fort Carson<br>Piñon Canyon Maneuver Site, Colorado | 137,404 (55,629 hectares)<br>235,896 (95,504 hectares) | Home to 7th Infantry Division (mechanized). | No |
| Fort Hood, Texas | 214,352 (86,782 hectares) | Home to III Corps, 1st Cavalry Division, 4th Infantry Division (mechanized). | No |
| Fort Riley, Kansas | 100,656 (40,751hectares) | Home to the 24th Infantry Division (mechanized). | No |
| Fort Polk, Louisiana | 198,143 (80,220 hectares) | Home of the Joint Readiness Training Center and 2nd Armored Cavalry Regiment. | Will be constructed.[1] |

[1]Facilities of the type used to train an SBCT will ultimately be built at all major Army training installations as part of Transformation to the future force, except the AALFTR, which is specifically designated for Hawai‘i, but not in time for the 2nd Brigade to meet its 2007 IOC target date.
Source: Acreage from Table C-8, US Army 2002c

An analysis of USARAK and Fort Lewis training facilities and capacity was conducted as an appendix to the USARHAW RD Plan (Nakata Planning Group LLC. 2002a). It showed that Fort Lewis and USARAK would lack adequate collective live-fire training facilities to support an additional SBCT. Neither USARAK nor Fort Lewis is proposing to build an anti-armor live-fire and tracking range to provide the capacity for training that has been programmed for Hawai‘i. The Army proposes to conduct anti-armor live-fire training at these facilities on ranges constructed for other uses. This requires careful scheduling to avoid conflicts, and adding an additional SBCT would reduce the throughput capacity to unacceptable levels. Because Fort Polk will already be training an SBCT unit, as well as conducting joint readiness training, the addition of a second SBCT would compromise the throughput capacity of Fort Polk, a situation that is considered unacceptable.

Owing to climate limitations, training can be conducted only 205 days per year at Fort Wainwright and 224 days per year at Fort Richardson (Nakata Planning Group, LLC 2002a), weather permitting, whereas training in Hawai'i can be conducted 270 days per year. This limitation of training for the SBCT to be stationed in USARAK is considered an acceptable compromise when taken as a part of the Army's overall stationing strategy. However, if the SBCT proposed for stationing in Hawai'i were limited to training only when weather allowed in Alaska, the SBCT's ability to train its units could be diminished, as USARAK's forces would have priority.

In addition, if wartime situations required deploying Hawai'i's SBCT while training on the continental US, the SBCT forces would need to return to Hawai'i for full deployment, making it impossible to meet the 96-hour deployment goal.

In summary, the alternative of conducting collective live-fire training of the 2nd Brigade of the 25th Infantry Division on continental US installations is not feasible or practical for the following reasons and as such will not meet the purpose and need of transforming the 2nd brigade, 25th ID(L):

- The Hawai'i-based SBCT could not meet its training requirements using facilities at Forts Irwin, Hood, Riley, and Carson due to the lack of specialized facilities required to train an SBCT, and at present there are no plans to construct them;
- The Hawai'i-based SBCT could not meet its training requirements at Fort Lewis and USARAK, which are also to receive SBCTs, because they would not have adequate collective live-fire training capacity to support the requirements of an additional SBCT;
- Transporting a Hawai'i-based SBCT to the continental US for training would consume an unacceptably large portion of the Air Force's strategic airlift capability needed to meet its other missions and would result in a loss of at least 28 training days while in transit; and
- If an SBCT were training at either USARAK or Fort Lewis and military actions required its deployment to an action area, the brigade would have to return to Hawai'i to assemble for full deployment. This would prevent the SBCT from meeting its goal to deploy worldwide within 96 hours.

### 2.6.4 Transformation Using Other Existing Military Facilities and Existing USARHAW Facilities in Hawai'i

Under this alternative the Army would attempt to transform relying on existing facilities at USARHAW and other military facilities in Hawai'i not under USARHAW's control. Other branches of the Armed Forces in Hawai'i train at existing Army facilities because they do not have adequate live-fire ranges themselves. In addition there are no additional maneuver lands available at other bases in Hawai'i.

The Army seeks to have the 2nd Brigade obtain IOC in 2007. This would occur after the unit receives its required Strykers and MGSs and the training necessary to execute its mission. Adequate facilities are required to effectively train to Army-established IOC standards. IOC cannot be attained without the appropriate types of modernized training facilities with adequate capacity to train individual Soldiers and units available. Limited facilities would result in reduced training time, which would mean that fewer Soldiers were qualified on their individual weapons systems and that elements of the brigade would not be trained in their collective tasks. Shortcomings in capacity and capability of live-fire and simulation training facilities for individual and crew-served weapons, including the lack of a shoothouse, mock villages, and other modernized training facilities, would make it impossible to train the Soldiers of the SBCT to the Army standard.

### 2.6.5 Transforming by Moving All Training to PTA

Under this alternative the Army would attempt to transform by moving all SBCT training to PTA. USARHAW would propose and construct all military construction projects and would also construct new barracks, unit headquarters, classrooms, simulation training facilities, family housing, qualification training ranges, and community support facilities on the island of Hawai'i. All training requirements for SBCT could be met, with the exception of the maneuver training, as approximately 15,219 acres (6,159 hectares) of maneuver lands on O'ahu would not be available or acquired for use. However, a significant amount of land would need to be acquired to accommodate all the new support facilities required for this alternative, essentially everything that now exists on SBMR and WAAF. Aside from the enormous cost, PTA lacks sufficient water, electric power, sewage treatment capability, and road access to support the required population. In addition construction of all these support facilities would eliminate additional maneuver lands, further increasing the shortfall for maneuver lands.

The Army seeks to have the 2nd Brigade obtain IOC in 2007. This would occur after the unit receives its required Strykers and MGSs and the training necessary to execute its mission. IOC cannot be attained without the proper types of facilities being readily available and having adequate capacity for training the requisite number of units. Although enough land may be available for acquisition for maneuver training and the required construction of an entire new military installation, SBCT Soldiers would not be able to conduct air deployment training operations between SBMR and PTA. Table 2-11 has a comparison of all alternatives to the training requirements for an SBCT. In the absence of adequate maneuver training, Soldiers would not be adequately trained for deployment.

This alternative is not feasible even though the training requirements for an SBCT would be met because the infrastructure at PTA could not handle the housing and other needs of stationing the SBCT at PTA. This would require significant travel between housing at O'ahu and training at PTA, resulting in lost training days; therefore, this alternative was not evaluated in detail in the EIS.

### 2.6.6 Alternative Land Purchases Considered

In response to public comments about alternative land acquisitions the following previously considered information has been added to the EIS.

### *Pu'u Pā*

Pu'u Pā is approximately 14,000 acres (5,666 hectares) located northwest of WPAA, next to the town of Waimea. This parcel is close to but not contiguous with PTA. USARHAW has habitually used the WPAA more often because it is adjacent to PTA, but the current and proposed tank trail goes through both WPAA and Pu'u Pā. The Pu'u Pā parcel was eliminated from detailed analysis because of the following factors:

- The terrain is rougher and less likely to support vehicle maneuvering than the WPAA, and the parcel is too small, which would require buying additional land elsewhere;
- The area is not contiguous with PTA, requiring the use of public roads to transit from PTA;
- It could have a greater environmental impact in some portions because there is excessive grass that has not been grazed in several years;
- The area is located between the community of Waimea and the ocean and would have a greater impact on the scenic viewshed because of visible maneuver activities and dust;
- There are numerous known archaeological sites that would result in additional legal requirements; and
- The parcel is closer to built-up areas (Waimea), increasing concerns about noise and dust.

### *Lualualei*

Naval Magazine Lualualei lies in a large coastal valley near the southwestern shoreline of O'ahu, approximately 10 miles southwest of Wahiawa, and occupies 8,105 acres (3,280 hectares) of the valley. The nearest urban area is Maili, which lies approximately one mile west. Waianae and Nanakuli are also nearby. The parcel was eliminated from further analysis because of the following factors:

- The site has extensive environmental and encroachment concerns, including 192 cultural sites, over 25 endangered species in close proximity, wetlands, and a possible hazardous material spill site;
- The site cannot accommodate vehicle maneuvers, so additional lands would need to be purchased and public roads would have to be used to access the site; and
- The cost would be very high, considering the limitations on construction and potential cleanup costs.

# CHAPTER 3

# AFFECTED ENVIRONMENT OVERVIEW

# CHAPTER 3
# AFFECTED ENVIRONMENT OVERVIEW

## 3.1 INTRODUCTION

This chapter provides an overview of the baseline physical, biological, social, and economic conditions that occur within the region of influence (ROI) of the Proposed Action. Only those environmental and socioeconomic conditions relevant to the proposed project are presented, including land use, recreation, visual resources, airspace, air quality, noise, traffic, water resources, geology, soils, and seismicity, biological resources, cultural resources, human health and safety hazards, socioeconomics and environmental justice, and public services and utilities.

The chapter is organized by sections on each resource area. As applicable, each section gives a background on how the resource is related to the Proposed Action, a general overview of relevant legislative requirements governing the resource, followed by any standard operating procedures the Army maintains to protect the resource. The remainder of the section discusses the general conditions of the resource within the ROI. Specific information on resources within the ROI of each project area can be found in Chapters 5 through 8 (SBMR and WAAF, DMR, KTA and KLOA, and PTA).

## 3.2 LAND USE/RECREATION

Land use in Hawai'i has been influenced by changes in both local and international political and economic conditions. The percentage of land owned by the state, the federal government, and large private landowners has decreased since 1970, and the percentage of land owned by small private landowners has increased (Juvik 1998). The range of recreational activities, from surfing and fishing to mountain biking to visiting national monuments, reflects the diversity of resources available to the community and visitors alike. In general, most project activity is within Army installation boundaries. Project areas located outside of the installations include FTI sites within state-designated Conservation District land, acquisition and use of agricultural land (pineapple cultivation and cattle ranch land), and construction of military vehicle trails on agricultural roads or undeveloped areas.

### 3.2.1 Introduction/Region of Influence

The land uses and recreational resources of the affected environment were identified by reviewing the following:

- Military real property master plans provide a framework of facilities management, programming, and design and construction and establish a logical plan for developing military installations (Belt Collins 1993, 1994);
- Integrated Natural Resources Management Plans are comprehensive plans for managing installation resources, including recreation resources (USARHAW and 25th ID[L] 2001a, 2001b);
- The Hawai'i State Plan was prepared to improve the planning process, to increase the effectiveness of government and private actions, to improve coordination among agencies and levels of government, to provide for the wise use of Hawai'i's resources, and to guide the future development of the state (HDBEDT 1991);
- State functional plans set specific objectives and establish policies to implement actions for a particular field of activity;
- State Land Use District designations list all lands in one of four districts: Urban, Agriculture, Conservation, or Rural (State of Hawai'i 2002a). Conservation District Subzone designations, regulated by DLNR, are Protective, Limited, Resource, General, and Special;
- The state designations for Agricultural Lands of Importance to the State of Hawai'i (ALISH) categorize agricultural land as Prime, Unique, or Other (State of Hawai'i 2002a);
- The General Plan for the City and County of Honolulu is a statement of objectives and policies that set forth the long-range aspirations of O'ahu residents and strategies of action to achieve them (City and County of Honolulu 1992);
- The sustainable community plans on O'ahu relevant to the project alternatives are Central O'ahu (City and County of Honolulu 2002a), North Shore (City and County of Honolulu 2000a), and Ko'olau Loa (City and County of Honolulu 2002b);

- Tax map key identifications and property boundaries (City and County of Honolulu 2003; County of Hawai'i) (tax map key is defined in this section);
- City and County of Honolulu Land Use Ordinance identifies zoning on O'ahu (City and County of Honolulu 2001);
- County of Hawai'i General Plan is a policy document for the long-range comprehensive development of the island of Hawai'i (County of Hawai'i 1989). The December 2001 draft revision of the County of Hawai'i General Plan is under review (County of Hawai'i 2001a);
- County of Hawai'i Zoning Code identifies zoning on the island of Hawai'i (County of Hawai'i 2001b); and
- Special Management Area designations and Shoreline Setbacks are designated areas, regulated by the counties, for more intensive management (State of Hawai'i 2002a).

The proposed federal activities are subject to the federal authorities listed in Appendix N, but they are not required to conform to state plans and policies or related land use documents.

The ROI for the land use and recreation analysis is the project area itself. Surrounding land uses are considered when there is a potential conflict with a proposed project. The land use and quality of the recreational experience in a project area may also be indirectly affected through short- or long-term changes in ambient conditions, such as dust and odor, noise, traffic, human health and safety, socioeconomics, public services and utilities, and loss of views; these changes are evaluated in detail in the sections of this document that pertain to them.

### *Definitions*

**Ceded Land.** Ceded lands were either Crown or government lands until 1893, when the Hawaiian Kingdom was overthrown. The successor government, the Republic of Hawai'i, assumed ownership and control of these lands and continued their public use. When the Republic of Hawai'i was annexed as a territory of the United States in 1898, it ceded these lands to the United States, which took ownership of them in fee simple. During the territorial era, the United States set some of the lands aside for military and other public purposes. When Hawai'i became a state in 1959, the United States retained ownership of the ceded lands it needed for military and public purposes and conveyed the remaining ceded lands to the state.

**Tax Map Key.** A tax map key is the description of a physical land unit of the state, using the division, zone, section, plat, and parcel. It is prepared especially for taxation purposes and in accordance with the requirements of the City and County of Honolulu Real Property Assessment Division and the County of Hawai'i Real Property Tax Division.

### 3.2.2 Resource Overview

#### *Schofield Barracks Military Reservation/Wheeler Army Airfield*

*Main Post*

Schofield Barracks Main Post totals 11,448 acres (4,633 hectares). The installation master plan identified land uses within the project areas, which include training ranges, an ordnance impact area, conservation land, and the cantonment area (Belt Collins 1993). The Main Post includes lands within the state-designated Urban, Agricultural, and Conservation Districts (State of Hawai'i 2002a). Recreational opportunities at the Main Post include the 18-hole Kalākaua golf course, archery, skeet shooting, and hiking (R. M. Towill Corp. 1997a).

Land uses surrounding the Main Post include agriculture, forest, urban, and military. The Ka'ala Natural Area Reserve is northwest of the Main Post, with agricultural land to the north. The town of Wahiawā is east of the Main Post, with WAAF to the southeast. Land to the south of the Main Post includes the military's Field Station Kunia, Del Monte pineapple fields, the Honouliuli Preserve, and Naval Magazine Pearl Harbor Lualualei Branch. Land use to the west of the Main Post includes the Wai'anae Kai Forest Reserve, which includes a remnant native forest (DLNR 2003b).

*Schofield Barracks East Range*

SBER is east of the Main Post and totals 5,154 acres (2,086 hectares). The installation master plan identified land uses at SBER as training, education facilities, the US Army Non-Commissioned Officers Academy, warehouses, and a maintenance facility (Belt Collins 1993). Land uses at the SBER project areas are training, conservation/buffer, and supply/storage (Belt Collins 1993). Training areas at SBER are within the state designated Conservation District Resource and Protective Subzones (State of Hawai'i 2002a). Recreational opportunities at SBER include the 18-hole Leilehua Golf Course and hiking (R. M. Towill Corp. 1997a).

Land uses surrounding SBER include urban, military, forest, and agriculture. The town of Wahiawā is along the northwestern border of SBER. KLOA is along the northeastern border and includes the 'Ewa Forest Reserve. The eastern slope of the Ko'olau Mountains and Ahupua'a O Kahana State Park are to the east of SBER. Land south of SBER includes forest, agricultural lands, and Mililani Town.

*Wheeler Army Airfield*

WAAF, a subinstallation of SBMR, consists of 1,369 acres (554 hectares) and provides administration, housing, maintenance, training, and flight facilities for peacetime mission requirement, including security and law enforcement support. The installation master plan identified land uses in the project areas as operations/airfield, supply/storage, and training (Belt Collins 1994). WAAF includes lands within the state designated Urban and Agricultural Districts (State of Hawai'i 2002a).

Land uses surrounding WAAF include urban, military, and agriculture. The town of Wahiawā is to the north, and Mililani town is to the east-southeast of WAAF. The Main Post and Field Station Kunia are to the west of WAAF, and SBER is to the east. Land to the south of WAAF is used for agriculture.

*South Range Acquisition Area*

Under the Proposed Action, the acquisition area would consist of approximately 1,402 acres (567 hectares); under the RLA Alternative, the acquisition area would consist of approximately 100 acres (40.5 hectares). The SRAA is used for pineapple agriculture and contains state-designated Unique and Other agricultural lands (State of Hawai'i 2002a).

The Proposed Action configuration includes land within the Conservation District Resource Subzone. This land also encompasses forest reserve land that is included in the Honouliuli Preserve, which is managed by The Nature Conservancy (TNC). The preserve includes a hiking trail that is open for monthly interpretive organized hikes and access to TNC work areas (LaPierre 2002).

Land uses surrounding the SRAA include military, agriculture, and forest. The Main Post is to the north, and Field Station Kunia and WAAF are to the east. Land to the south is used for pineapple agriculture, and land to the south and west is forest reserve, which is part of the Honouliuli Preserve.

*Helemanō Trail*

The trail alignment, consisting of 13 acres (5.3 hectares), uses agricultural roads within state-designated Prime and Unique agricultural land (USGS 1999a; State of Hawai'i 2002a).

Land surrounding the Helemanō Trail alignment is military (Main Post) and agricultural.

### *Dillingham Military Reservation*

*Dillingham Military Reservation*

Land uses at the 664-acre (269-hectare) DMR include an airfield and associated roadways, bunkers, and earthen airplane hangars. Land within the DMR project areas is used for training, with one antenna location outside of DMR, within the state-designated Conservation District Resource Subzone (State of Hawai'i 2002a). Most of DMR is within the state-designated Agricultural District but is not used for agriculture. The Special Management Area includes the airfield portion of DMR (State of Hawai'i 2002a). Public recreation/nonmilitary uses at DMR include glider plane operation, parachuting, skydiving, hang gliding, and hiking.

The land surrounding DMR is generally undeveloped and includes state-designated Prime agricultural land to the east and beaches to the north, with some residences to the northeast. The Kawaihāpai reservoir and associated pumping station and aqueducts are east of DMR (USGS 1998c). Land south of DMR is mountainous and includes a state hunting area to the southwest. Land uses to the west include an inactive quarry, the YMCA's Camp Erdman, and the military's Camp Ka'ena.

*Dillingham Trail*

The Dillingham Trail would connect the Main Post and DMR. The trail alignment, consisting of approximately 36 acres (14.6 hectares), is along agricultural roads and undeveloped lands (USGS 1999a, 1998c). The land surrounding Dillingham Trail is generally agricultural. The trail crosses the Special Management Area as it passes to the north and west of Thomson Corner, a residential subdivision (State of Hawai'i 2002a).

The land surrounding Dillingham Trail is generally agricultural or undeveloped. The trail passes near the residential subdivision Thomson Corner.

*Kahuku Training Area*

KTA consists of 9,398 acres (3,808 hectares) and is used for Army tactical maneuver training, including mountain and jungle warfare, and can support multiple infantry battalion-sized missions. KTA project areas are used for training. Ammunition used on KTA is limited to blanks and pyrotechnics (e.g., smoke and incendiary devices), but no pyrotechnics are allowed in training areas A1 and A3 or within 3,281 feet (1,000 meters) of the KTA borders (Nakata Planning Group, LLC 2002a). There are no ordnance impact areas or SDZs on KTA. About half of KTA lands are within the state-designated Conservation District Resource Subzone, and the remaining lands are within the Agricultural District (State of Hawai'i 2002a). Public recreational use of KTA is primarily hiking, biking (including motocross activities), and hunting in two Army-maintained areas.

Land to the north, east and west of KTA, including land near the coast, is agricultural and includes the town of Waiale'e. Beyond Kamehameha Highway are the Waiale'e Beach Park and the Turtle Bay Resort, Kawela Bay Beach Park, Punamanō National Wildlife Refuge, an aquaculture facility, Ki'i National Wildlife Reserve, the town of Kahuku, Mālaekahana State Recreation Area, La'ie Point County Park, and Brigham Young University. Forest and agricultural land is to the southeast, and KLOA is south and southwest of KTA. Agricultural land is west of KTA, with Pūpūkea Paumalū Forest Reserve, the Pūpūkea Paumalū Homesteads, and Camp Paumalū. Land uses to the northwest of KTA include agriculture, park, and rural communities.

*Kawailoa Training Area*

KLOA consists of 23,348 acres (9,449 hectares) and is used for maneuver, helicopter, and mountain/jungle warfare training. KLOA can support small infantry unit maneuver and helicopter training. Ammunition used at KLOA is limited to blanks; no pyrotechnics or live fire are allowed (Nakata Planning Group, LLC 2002a). The project area at KLOA is used for training. KLOA is included in the state-designated Conservation District Resource and Protective Subzones. Most of KLOA is included in the Kawailoa Forest Reserve, and the southern portion of KLOA includes the 'Ewa Forest Reserve. Recreational resources at KLOA include hiking.

Land surrounding KTA is used for military, forest, agricultural, and park land. KTA is north of KLOA. To the east are private land, Kaipapa'u Forest Reserve, Hau'ula Forest Reserve, and Sacred Falls State Park. The eastern side of the Ko'olau Mountains, with the Ahupua'a

O Kahana State Park, are southeast of KLOA. SBER is to the south, and private agricultural lands are to the west.

*Drum Road*

Drum Road is a dirt and gravel road from HMR to KTA. The proposed Drum Road realignment crosses a state-designated Agricultural District and Conservation District Resource, General, and Limited Subzones (State of Hawaiʻi 2002a). The alignment also crosses portions of the state's Prime agricultural land, but most of this alignment is on existing roads (State of Hawaiʻi 2002a). The northern portion of Drum Road is within the Special Management Area (State of Hawaiʻi 2002a).

Land uses surrounding Drum Road are Open and Forested Areas, Agriculture, and Military/Federal (City and County of Honolulu 2000a).

### Pōhakuloa Training Area

*Pōhakuloa Training Area*

PTA is the largest Army training area in Hawaiʻi, totaling 108,792 acres (44,027 hectares). Land uses within project areas at PTA include training ranges, an ordnance impact area, the cantonment area, and BAAF. Land uses within project areas outside of PTA include agriculture, forest reserve, and urban (Kawaihae Harbor). PTA lands are within the Conservation District General, Limited, and Resource Subzones (State of Hawaiʻi 2002a). Recreation at PTA includes archery, biking, motor sports, and hunting, which is coordinated with the state (R.M. Towill Corp. 1997a).

Land uses surrounding PTA include cattle grazing, game management, forest reserves, and undeveloped land. Land to the northwest of PTA is agricultural and is primarily used for cattle grazing and also provides limited hunting opportunities for big game species and game birds. Parker Ranch manages the WPAA hunting lands. Land to the north of PTA includes the Kaʻohe Game Management Area, Mauna Kea State Park, and Mauna Kea Forest Reserve. Land to the east and south is included in the Mauna Loa Forest Reserve.

*West PTA Acquisition Area*

The proposed WPAA, consisting of approximately 23,000 acres (9,308 hectares), is used for cattle grazing, limited hunting, occasional military maneuver training, and a quarry. The WPAA is state designated as Other Agricultural Land (State of Hawaiʻi 2002b). The WPAA is a hunting area managed by Parker Ranch.

Land uses surrounding the WPAA include cattle grazing, military training, agriculture, residential lots, and open space. PTA is to the south-southeast of the area, and the Puʻu Paʻa Military Maneuver Area is adjacent to the northern tip, west of Māmalahoa Highway. The remaining surrounding lands are used for recreation and ranching or are undeveloped.

According to the USACE, the overall ordnance and explosives hazard level for the WPAA is low (Earth Tech 2002). The institutional controls for these low risk areas include community awareness outreach programs, educational media, and pre-coordinated construction support.

UXO hazards along the Saddle Road corridor (extending approximately 164 feet [50 meters] from the road) need to be cleared to a safe depth to support the heaviest track and wheeled vehicle that will use the area.

*Pōhakuloa Training Area Trail*

PTA Trail would include approximately 132 acres (53.4 hectares) of land between PTA and Kawaihae Harbor. Land uses within the proposed military vehicle trail corridor include cattle grazing, agriculture, periodic military training, open space, utility easements, a portion of a former military vehicle trail, and Kawaihae Harbor. PTA Trail land is mostly agriculture, with urban areas at and near Kawaihae Harbor. The southern portion of the proposed military vehicle trail is designated as Other Agricultural Land (State of Hawaiʻi 2002a). The trail alignment near Kawaihae Harbor is included in the Special Management Area (County of Hawaiʻi 2001b). There is also a shoreline setback along the harbor property. The southern portion of the PTA Trail crosses the Parker Ranch-managed hunting area, located within the WPAA.

Land uses surrounding the proposed military vehicle trail include cattle grazing, residential (Waikoloa Village and Kawaihae Village), Puʻukoholā Heiau National Historic Site, agriculture, agricultural subdivision, open space, and periodic military training.

According to USACE, the ordnance and explosives hazard level for the PTA Trail alignment ranges from low to high, and the policy regarding use of roads and trails primarily depends on landowners and current land use (Earth Tech 2002; Streck 2003). The institutional controls for these areas include community awareness outreach programs, educational media, and coordinated construction support. This UXO cleanup project is addressed in Chapter 9, under Cumulative Impacts.

## 3.3 VISUAL RESOURCES

The natural beauty of the islands of Hawai'i includes not just lush tropical forests, waterfalls, and sandy beaches framed by turquoise waters, but active and dormant volcanoes and towering mountains. The analysis of visual resources includes examining the impacts on visual resources from the installations and at a distance from the installations._They also include places of cultural importance, such as Mount Ka'ala and Mauna Kea. Places of cultural importance are addressed in Section 3.11, Cultural Resources.

### 3.3.1 Introduction/Region of Influence

Visual resources are usually defined as the visual quality or character of an area, consisting of both the landscape features and the social environment from which they are viewed. The landscape features that define an area of high visual quality may be natural (e.g., mountain views) or manmade (e.g., city skyline). In order to assess the quality of visual resources in the action area, this section describes the overall visual character and distinct visual features on or in the viewshed of each installation or training area, as well as any sensitive viewpoints within these viewsheds. The area of analysis for visual resources covers the installations and observation points up to 1.5 miles from the installations. In general, features beyond a mile are so distant that only forms and outlines are discernable, and visual impacts are negligible.

The installations and training ranges evaluated in this EIS are within the counties of Honolulu and Hawai'i. Although the counties do not have jurisdiction over the use of federal lands, the Army considers the guidance contained in the general plans in its decisions, to the greatest extent practicable, in order to avoid or minimize conflicts with surrounding nonfederal lands. The county general plans provide policies and objectives with respect to scenic resources. Additional regulations pertaining to visual resources are provided in Appendix N.

#### *General Plan for the City and County of Honolulu*

The General Plan for the City and County of Honolulu is a statement of the long-range social, economic, environmental, and design objectives for O'ahu, as well as a statement of broad policies that facilitate attainment of the plan objectives (City and County of Honolulu 1992). Section III of the plan contains the objectives of the City and County of Honolulu with respect to scenic resources, including the following:

> Objective B - To preserve and enhance the natural monuments and scenic views of O'ahu for the benefit of both residents and visitors.
>
>> Policy 2: Protect O'ahu's scenic views, especially those seen from highly developed and heavily traveled areas.

O'ahu is divided into eight planning areas, each of which has a development plan that implements the objectives and policies of the general plan and guides the long-range land use and infrastructure planning for the area. SBCT installations and training areas are within the Central O'ahu, Wai'anae, North Shore, Ko'olau Loa, and Urban Center planning areas. Scenic resources or scenic resource management policies identified in each community plan area are described in the affected environment for each installation or training range.

### *General Plan for the County of Hawai'i*

The General Plan for the County of Hawai'i is a statement of development objectives, standards, and principles with respect to the most desirable use of land within the county (County of Hawai'i 1989).

The long-range goals with respect to the natural beauty of the island of Hawai'i include the following:

- Protect, preserve and enhance the quality of areas endowed with natural beauty, including the quality of coastal scenic resources;
- Protect scenic vistas and view planes from becoming obstructed; and
- Maximize opportunities for present and future generations to appreciate and enjoy natural and scenic beauty.

## 3.3.2 Resource Overview

The visual character of an area is defined in terms of four primary components, including water, landform, vegetation, and cultural modifications. These components are characterized or perceived in terms of the design elements form, line, color, texture, and scale. Visual components also may be described as being distinct (unique or special), average (common or not unique), or minimal (a liability) elements of the visual field and in terms of the degree to which they are visible to surrounding viewers (e.g., foreground, middle ground, and background).

The visual quality of an area is defined in terms of the visual character and the degree to which these features combine to create a landscape that has the following qualities: vividness (memorable quality), intactness (visual integrity of environment), and unity (compositional quality). An area of high visual quality usually possesses all three of these characteristics.

Visual quality of an area also is defined in terms of the visual sensitivity within the viewshed of the proposed action. Locations of visual sensitivity are defined in general terms as areas where high concentrations of people may be present or areas that are readily accessible to large numbers of people. They are further defined in terms of several site-specific factors, including the following:

- Areas of high scenic quality (i.e., designated scenic corridors or locations);
- Recreation areas characterized by high numbers of users with sensitivity to visual quality (i.e., parks, preserves, and private recreation areas); and
- Important historic or archaeological locations.

The visual landscape on SBMR is largely characterized by developed features in the valley, such as buildings in the SBMR and WAAF Historic districts, with the rugged Wai'anae and Ko'olau Mountains dominating the background. The visual landscape of DMR is also largely characterized by developed features, including the airfield and associated structures, fencing, antenna support structures, roads, and various cultural features, such as terraces, walls, and platforms.

Portions of Dillingham Trail are characterized by a broad, rolling valley floor, with pineapple plantations that give the landscape a fine uniform texture. As the proposed Dillingham Trail approaches Thomson Corner and Waialua, urban development begins to dominate the visual field, but agricultural uses continue. Between Thomson Corner and Waialua, the trail would cross Farrington Highway toward the Wai‘anae Mountains and enter into a broad alluvial plain at the base of the mountains. This area is predominantly in agricultural use. As the route continues west, the Pacific Ocean becomes an increasingly dominant middleground to foreground feature in views to the north.

The visual landscape of KTA generally is characterized by panoramic views of the Pacific Ocean and the Ko‘olau Mountains or coastal plain and pali. Human-made features on KTA are limited to roads, antenna support structures and windmills, and a few structures dispersed throughout the area. Cultural sites contributing to the visual character include a heiau, listed in the NRHP, and historic terraces. Drum Road is in an area generally characterized by the irregular form of the Ko‘olau Mountains ridges and valleys, with few human-made features.

The landscape of PTA is characterized by panoramic views of the broad open area between Mauna Kea and Mauna Loa. There are few human features in the area, except roads and support facilities within the training area and structures, roads, and an airfield within the cantonment area of PTA. Visible cultural features include walls, platforms, and many rock shelters. Terrain in the PTA area is gently sloping and open, periodically interrupted by remnant volcanic cones (pu‘u). Lava flows create dark visually receding areas throughout PTA. Observatories are on Mauna Loa and Mauna Kea to the south and northeast of PTA.

The area through which PTA Trail passes is largely undeveloped, except for the village of Waikoloa and Waikii Ranch. From most viewing locations along major roadways or other population centers, the trail would be a middle or background feature and would be obstructed by topography and vegetation. The proposed route would be most visible where it would parallel the Kawaihae Road and where it would cross the Hawai‘i Belt Road. Terrain along PTA Trail is generally gently sloping, with intermittent pu‘u. Lava flows that create dark, visually receding areas occur throughout the proposed trail alignment.

## 3.4 AIRSPACE

Airspace in Hawai'i is well managed and is principally controlled, wherein air traffic control service is provided to aircraft in accordance with individual airspace classifications. All aircraft operators are subject to certain pilot qualifications, operating rules, and equipment requirements. Flight rules are well understood by both civilian and military pilots, and well-established procedures are in place to manage airspace use.

### 3.4.1 Introduction/Region of Influence

Airspace, which lies above a nation and comes under its jurisdiction, is generally viewed as being unlimited. However, for aviation purposes, it is a finite resource that can be defined vertically and horizontally, as well as chronologically. The scheduling, or time dimension, is a very important factor in airspace management and air traffic control.

For this document, the ROI for airspace is that over and surrounding SBMR, WAAF, DMR, KTA, and KLOA on O'ahu and PTA on the island of Hawai'i (Figures 3-1 and 3-2). The affected airspace environment is described below in terms of its principal attributes, namely controlled and uncontrolled airspace, special use airspace, military training routes, en route airways, airports and airfields, and air traffic control. Jet routes, all above 18,000 feet (5,486 meters), are well above the activities proposed and are thus not considered as part of the ROI.

The Federal Aviation Administration (FAA) regulates military operations in the National Airspace System through the implementation of FAA Handbook 7400.2E and FAA Handbook 7610.4J, Special Military Operations. The latter was jointly developed by the DOD and FAA to establish policy, criteria, and specific procedures for air traffic control planning, coordination, and services during defense activities and special military operations.

Additional regulations and laws pertaining to the use of airspace in the ROI are provided in Appendix F.

### 3.4.2 Resource Overview

There are two categories of airspace or airspace areas: the first category is restricted, prohibited, and regulatory areas (the last consisting of controlled airspace [Class A, B, C, D, and E airspace areas, in descending order of restrictive operating rules]); the second category of airspace is nonregulatory, consisting of military operations areas (MOAs), warning areas, alert areas, and controlled firing areas. Within these two categories, there are four types: controlled, uncontrolled, special use, and other airspace. The categories and types of airspace are dictated by the complexity or density of aircraft movements, the nature of the operations conducted within the airspace, the level of safety required, and the national and public interest.

**Figure 3-1**
O'ahu Airspace Region of Influence (ROI)

**Figure 3-2**
Hawai'i Airspace Region of Influence (ROI)

### *O'ahu*

#### Controlled/Uncontrolled Airspace

The distinction between controlled and uncontrolled airspace is important. Within controlled airspace, air traffic control service is provided to aircraft in accordance with the airspace classification. Aircraft operators are also subject to certain pilot qualification, operating rules, and equipment requirements. Within uncontrolled airspace, no air traffic control service to aircraft is provided, other than possible traffic advisories when the air traffic control workload permits and radio communications can be established (Illman 1993). Most of the airspace above O'ahu is controlled airspace.

The airspace over southern O'ahu is dominated by the Class B airspace that lies above and around Honolulu International Airport. Its "upside-down wedding cake" layers are typical of the Class B airspace that surrounds busy airports. It consists of a core surface area, surrounded by several layers of varying floor altitudes but the same ceiling altitude of the core area. Below the Class B layers is Class E controlled airspace, with a floor 700 feet (213 meters) above the surface (Figure 3-1).

Kalaeloa Airport (John Rodgers Field) to the west of Honolulu and Kāne'ohe Bay Marine Corps Airfield on the east coast of O'ahu are covered by Class D airspace from the surface to 2,500 feet (762 meters) above the airport elevation. WAAF in central O'ahu is also covered with Class D airspace, with a ceiling of 3,300 feet (1,006 meters). Elsewhere, the airspace not designated as Class A, B, C, D, or E airspace is uncontrolled, or Class G, airspace from the surface to a ceiling of either 700 or 1,200 feet (213 or 366 meters). Above this, the rest of the island is covered with either Class E controlled airspace or special use airspace, which is discussed separately below.

Appendix F provides a full definition of the different classes of airspace and an explanatory diagram.

#### Special Use Airspace

O'ahu has several special use airspace areas, including the R-3109 and R-3110 restricted area complex over northwestern O'ahu and the A-311 alert area in northern O'ahu, extending over the western side of the Ko'olau Mountain Range, from east of Mililani Town almost to Kahuku Point. Lying just three nautical miles (a nautical mile is 6,076 feet [1,852 meters]) off the north shore of O'ahu, is the W-189 warning area (Figure 3-1). The effective altitudes, time of use, and controlling agencies are given in Table 3-1.

Restricted areas contain airspace within which aircraft, while not wholly prohibited, are subject to restrictions. They denote the existence of unusual, often invisible, hazards to aircraft, such as artillery firing, aerial gunnery, or guided missiles. Alert areas are depicted on aeronautical charts to inform nonparticipating pilots of areas that may contain a high volume of pilot training or an unusual type of aerial activity. Warning areas, extending from three nautical miles outward from the coast, contain activities that may be hazardous to either nonmilitary aircraft or other aircraft not involved with the training.

**Table 3-1**
**Special Use Airspace in the Oʻahu Airspace ROI**

| Number/Name | Effective Altitude (feet [meters]) | Time Of Use | Controlling Agency |
|---|---|---|---|
| A-311 | To 500 (152) AGL | 0700-2200 | No A/G |
| R-3109A | To 9,000[1] (2,743) | Intermittent[2] | Honolulu ATCT |
| R-3109B | 9,000 to 19,000[1] (2,743 to 5,791) | Intermittent[2] | Honolulu ATCT |
| R-3109C | To 9,000[1] (2,743) | Intermittent[2] | Honolulu ATCT |
| R-3110A | To 9,000[1] (2,743) | Intermittent[2] | Honolulu ATCT |
| R-3110B | 9,000 to 19,000[1] (2,743 to 5,791) | Intermittent[2] | Honolulu ATCT |
| R-3110C | To 9,000[1] (2,743) | Intermittent[2] | Honolulu ATCT |
| W-189 | To unlimited | 0700-2200 M-F<br>0800-1600 Sa-Sun[3] | Honolulu CERAP |

Source: NACO 2002

Notes:
A = Alert area; AGL = Above ground level; ATCT = Air traffic control tower; CERAP = Combined Center Radar Approach Control; No A/G = No air to ground communications; NOTAM = Notice to airmen; R = Restricted; W = Warning area

[1]To, but not including, the indicated altitude
[2]By NOTAM
[3]Other times by NOTAM

### *Military Training Routes and Number of Aircraft*

Although there are no formal, published military training routes on Oʻahu, the A-311 Alert Area identified in Figure 3-1 is used for helicopter training exercises, with an average of 3,500 aircraft movements per month. Movements are defined as arrivals, departures, or overflights. WAAF experiences an average of 6,500 movements per month, 90 percent of which involve helicopters. These movement statistics cover all DOD branches, including the Hawaiʻi Air National Guard (Ahching 2002a, 2002b). Typical training activities include 10 rotary winged aircraft in the air at any one time, although maximum numbers have reached 36 in special circumstances. Deployments currently involve one to two C-130s once or twice a year flying out of Hickam AFB and WAAF.

### *En Route Airways*

There are a number of low altitude en route airways that enter or transect the ROI (Figure 3-1). These airways are referred to as Class E airspace, established in the form of a corridor. The corridor's centerline is defined by radio navigational aids, which form a network serving aircraft up to, but not including, 18,000 feet (5,486 meters) above sea level.

In addition to the commercial traffic that uses the low altitude en route airways, general aviation aircraft use the airspace over Oʻahu. This includes all civil aviation operations, other than scheduled air services and unscheduled air transport operations for remuneration or hire. For example, 27 percent of Honolulu International Airport's 915 average daily operations involve general aviation, along with 98 percent of Ford Island's average of 109 daily operations and 97 percent of DMR's average of 167 daily operations (Table 3-2).

**Table 3-2**
**O'ahu Airport/Airfield or Heliport Operational Statistics**

| Name | Aircraft Operations/ Day (Average ) | Commercial | Transient General Aviation | Local General Aviation | Air Taxi | Military |
|---|---|---|---|---|---|---|
| Honolulu International | 915 | 55% | 23% | 4% | 12% | 7% |
| Ford Island NALF | 109 | | | 98% | | 2% |
| Kāne'ohe Bay Marine Corps Airfield | 301 | | | 5% | | 95% |
| WAAF | 207 | | | | | 100% |
| DMR | 167 | | | 97% | | 3% |

Sources: AirNav.com 2002; Ahching 2002a; Therrien 2002

Note: Ford Island Navy Landing Airfield (NALF) is closed to civil operations.

The area around Dillingham Airfield on the north shore is indicated on aeronautical charts as a glider operating area, and the area just north of Makapu'u Point on the island's far southeastern coast is a hang glider and ultralight activity area (NACO 2002). In addition, Dillingham Airfield is a center for skydiving, vintage airplane, and aerobatic flights.

### *Airports and Airfields*

Honolulu International Airport lies in the southern part of the airspace use ROI. Honolulu International Airport is Hawai'i's principal airport, with approximately 327,000 operations (takeoffs and landings) per year and 20.15 million passengers in 2001 (HDOT 2002).

In addition to the fixed-wing operations at Honolulu International Airport, commercial tour operator helicopters account for approximately 30 operations per day. Their normal flight routes hug the coast of O'ahu, east of the airport toward Makapu'u Point. They typically either circle the entire Ko'olau Mountain Range, returning back to the airport over Kamehameha Highway, down the central part of O'ahu to Pearl Harbor and the airport, or fly over the Pali Pass. Local fire and ambulance helicopters are also based at the airport.

Kalaeloa Airport, formerly Barbers Point Naval Air Station (NAS), just east of Barbers Point on the coast west of Honolulu, had approximately 184,000 operations in 2001 (HDOT 2002). These were primarily "touch and go" training takeoffs and landings by light-plane pilots, the Hawai'i Air National Guard, and others. US Coast Guard flying operations are based at Kalaeloa Airport.

Other airports on O'ahu include WAAF in central O'ahu, Dillingham Airfield east of Ka'ena Point on the north shore of O'ahu, and Kāne'ohe Bay Marine Corps Airfield on the east coast. Dillingham Airfield had 81,000 operations in 2001, down four percent from 2000 (HDOT 2002). Heliports, for which no operational statistics are available, include The Queen's Medical Center, HECO-Waiau, Kuakini Medical Center, Moanalua Medical Center, and the Hon Municipal Building, all in Honolulu, and Kualoa Ranch, south of Kahana on the east coast of O'ahu (AirNav.com 2002).

### *Air Traffic Control*

Air traffic in the ROI within the 12 nautical mile territorial waters limit of the United States is managed by the Honolulu Control Facility.

### *Aviation Safety*

All military aircraft fly in accordance with Federal Aviation Regulations (FAR) Part 91 (Air Traffic and General Operating Rules), Subchapter F (Air Traffic and General Operating Rules), which govern such things as operating near other aircraft, right-of-way rules, aircraft speed, and minimum safe altitudes when flying outside special use airspace. Army Regulation 95-1 (Aviation Flight Regulations) covers Army aircraft operations, crew requirements, and flight rules. These regulations have precise requirements for the use of airports, heliports, and other landing areas, local flying rules, and special use airspace. For example, an installation commander having Army aircraft assigned to, attached to, or tenant to his or her command must prepare and publish local flying rules. These rules include the use of tactical training and maintenance test flight areas, arrival and departure routes, and airspace restrictions as appropriate to help control air operations. Traffic pattern altitudes at Army airfields for airplanes are set at 1,500 feet above ground level. Helicopter traffic pattern altitudes are set at least 700 feet above ground level. Installation commanders may set different altitudes based on noise abatement, fly-neighborly policies, or other safety considerations. These are displayed in flight operations and are published in flight information publications for all pilots.

The Army's aviation safety record on O'ahu and the island of Hawai'i has been excellent. In the last ten years there have been only two serious mishaps. The first was the collision of two UH 60 Blackhawks, the Army's tactical transport helicopter, in bad weather over the tactical flight area on SBMR; the second was the crash of an AH-1Cobra, an attack helicopter, at Leader Field on Schofield Barracks, while returning to WAAF on a maintenance test flight. The fatalities were crew members and passengers. All other aircraft incidents have been limited to precautionary landings, or too-fast descents during sling-load training in which concrete blocks are used to simulate the weight of vehicles or water. There have been no mishaps, accidents, or incidents between military aircraft and civilian aircraft in the last 20 years (Sawyer 2003).

## ***Island of Hawai'i***

### *Controlled/Uncontrolled Airspace*

Most of the airspace above the northern half of the island of Hawai'i is controlled airspace of various classes. Class G (uncontrolled) airspace extends from the surface to 700 feet (213 meters), except around Kona and Hilo International Airports and BAAF, which are surrounded by Class D airspace (Figure 3-2).

## Special Use Airspace

The northern part of the island of Hawai'i has just one special use airspace area, the R-3103 restricted area over PTA in the central part of the island (Figure 3-2). Its effective altitude, time of use, and controlling agency are given in Table 3-3.

**Table 3-3**
**Special Use Airspace in the Hawai'i Airspace ROI**

| Number/Name | Effective Altitude (feet) | Time Of Use | Controlling Agency |
|---|---|---|---|
| R-3103 | To 30,000 (9,144 meters) | Intermittent[1] | Honolulu CERAP |

Source: NACO 2002

Notes:
CERAP = Combined Center Radar Approach Control; NOTAM = Notice to airmen; R = Restricted.
[1]By NOTAM issued 12 hours in advance

## Military Training Routes and Number of Aircraft.

Although there are no formal, published military training routes on the island of Hawai'i, the R-3103 restricted area identified in Figure 3-2 is used for helicopter training exercises, with an average of 900 aircraft movements per month, 99 percent of which involve helicopters. These movement statistics cover all DOD branches, including the Hawai'i Air National Guard (Ahching 2002a, 2002b). Typical training involve the use of 10 rotary winged aircraft at any one time. During deployment training one or two C-130s would be involved about twice a year.

## En Route Airways

In addition to the commercial traffic that use the low altitude en route airways, general aviation aircraft use the airspace over the island of Hawai'i. This includes all civil aviation operations, other than scheduled air services and unscheduled air transport operations for remuneration or hire. For example, 50 percent of Kona International Airport's 281 average daily operations, 28 percent of Hilo International Airport's 316 average daily operations, and 78 percent of 'Upolu Airport's 27 average daily operations involve general aviation (Table 3-4).

## Airports and Airfields

Kona International Airport, just north of Keāhole Point, is on the west coast, and Hilo International Airport is on the east coast of the island. Kona International had 160,000 operations and handled 2.64 million passengers in 2001. While aircraft operations were up 10 percent from 2000, the total number of passengers was down 7 percent from 2000. Hilo International had 96,000 operations and handled 1.5 million passengers in 2001. Hilo International Airport similarly experienced an increase in aircraft operations and a decrease in total number of passengers (+17 percent and –7 percent, respectively) compared to 2000. Waimea-Kohala Airport, in the northern part of the island, had approximately 2,500 passengers in 2001, down 4 percent from 2000. No records are available on the number of aircraft operations (HDOT 2002).

**Table 3-4**
**Island of Hawai‘i**
**Airport/Airfield or Heliport Operational Statistics**

| Name | Aircraft Operations/Day (Average) | Commercial | Transient General Aviation | Local General Aviation | Air Taxi | Military |
|---|---|---|---|---|---|---|
| BAAF | 33 | | | | | 100% |
| Hilo International | 316 | 19% | 13% | 15% | 42% | 10% |
| Ka‘ūpūlehu Heliport | 33 | | 50% | | 50% | |
| Kona International | 281 | 29% | 19% | 31% | 9% | 13% |
| ‘Upolu Airport | 27 | | 78% | | 3% | 19% |
| Waimea-Kohala Airport | 28 | | 10% | 24% | 60% | 5% |

Source: AirNav.com 2002

Other airports/airfields in the ROI include BAAF, serving PTA, ‘Upolu at ‘Upolo Point at the northern tip of the island, and the Pu‘u Wa‘a Wa‘a private airfield off Highway 190, midway between Kona and Waimea. There is a private heliport, Ka‘ūpūlehu, on the west coast north of Makatawena, just north of Kona International Airport (Figure 3-2).

### *Air Traffic Control*

The Honolulu Air Traffic Control Center manages air traffic in the ROI within the 12 nautical mile territorial waters limit of the United States.

### *Aviation Safety*

Airspace safety for the island of Hawai‘i is similar to the airspace safety described above for O‘ahu.

## 3.5 AIR QUALITY

Air pollution levels in Hawai'i generally are low due to the small size and isolated location of the state. This means that upwind areas do not contribute significant background pollution levels. The state's small size means limited opportunities for locally generated air pollutants to accumulate or recirculate before being transported offshore and away from land areas. High concentrations of suspended particulate matter can occur in some areas, mostly due to agricultural burning or fireworks use during holiday celebrations. The entire state is classified as being in compliance with federal ambient air quality standards, or "in attainment."

### 3.5.1 Introduction/Region of Influence

The ROI for air quality issues depends on the pollutant and emission sources that are under consideration. The ROI for a regional secondary pollutant such as ozone generally will be island-wide. Secondary pollutants are not emitted directly but form through chemical reactions in the atmosphere. The directly emitted compounds that react to form secondary pollutants are called precursors. The time required for chemical reactions allows precursor emissions to be mixed over relatively large geographic areas before significant quantities of secondary pollutants are produced. Peak concentrations of secondary pollutants may occur some distance from the major sources of precursor emissions. The ROI for primary pollutants will be the area potentially subject to measurable air quality impacts under unfavorable dispersion conditions. Transport of primary pollutants away from the emission source is accompanied by dispersion and dilution, resulting in lower pollutant concentrations at greater distances from the emission source. In most cases, the ROI for primary pollutants will be an area extending no more than a few miles from the emission source. The ROI for low magnitude emission sources may extend less than one mile from the source. Additional background information on air pollution is provided in Appendix G1.

### 3.5.2 Air Quality Standards

#### *Ambient Air Quality Standards for Criteria Pollutants*

Ambient air quality is the atmospheric concentration of a specific compound experienced at a particular geographic location that may be some distance from the source of the relevant pollutant emissions. The USEPA has established ambient air quality standards for several different pollutants, which often are referred to as criteria pollutants (ozone, nitrogen dioxide, carbon monoxide, sulfur dioxide, suspended particulate matter, and lead). The term criteria pollutants derives from the requirement that the USEPA must describe the characteristics and potential health and welfare effects of these pollutants (USEPA 2002x). Suspended particulate matter is any solid or liquid that can remain suspended in the atmosphere for more than a few minutes. Standards for suspended particulate matter have been set for two size fractions—inhalable particulate matter ($PM_{10}$) and fine particulate matter ($PM_{2.5}$). Federal ambient air quality standards are based primarily on evidence of acute and chronic (or short-term and long-term) health effects. Federal ambient air quality standards apply to outdoor locations to which the general public has access.

Hawai'i, along with other states, has adopted ambient air quality standards that are in some areas more stringent than the comparable federal standards and addresses pollutants that are not covered by federal ambient air quality standards. The state ambient air quality standards are based primarily on health effects data but can reflect other considerations, such as protection of crops, protection of materials, or avoidance of nuisance conditions (such as objectionable odors). Table 3-5 summarizes federal and state ambient air quality standards applicable in Hawai‘i.

### 3.5.3 Hazardous Air Pollutants

Federal air quality management programs for hazardous air pollutants focus on setting emission limits for particular industrial processes rather than setting ambient exposure standards. Some states have established ambient exposure guidelines for various hazardous air pollutants and use those guidelines as part of the permit review process for industrial emission sources.

Hawai‘i has adopted ambient concentration guidelines for hazardous air pollutants. Those guidelines are used as part of the permit review process for emission sources that require state or federal air quality permits. The Hawai‘i ambient exposure guidelines for hazardous air pollutants (Hawai‘i Administrative Rules Title 11 Chapter 60.1, Section 179) include the following:

- For noncarcinogenic compounds, an 8-hour average concentration equal to 1% of the corresponding 8-hour threshold level value (TLV) value adopted by the Occupational Safety and Health Administration (OSHA);
- For noncarcinogenic compounds, an annual average concentration equal to 1/420 (0.238%) of the 8-hour TLV value adopted by OSHA;
- For noncarcinogenic compounds for which there is no OSHA-adopted TLV, the Director of Health is authorized to set ambient air concentration standards on a case-by-case basis so as to avoid unreasonable endangerment of public health with an adequate margin of safety; and
- For carcinogenic compounds, any ambient air concentration that produces an individual lifetime excess cancer risk of more than 10 in 1 million assuming continuous exposure for 70 years.

### 3.5.4 Air Quality Planning Programs

The federal Clean Air Act requires each state to identify areas that have ambient air quality in violation of federal standards. States are required to develop, adopt, and implement a state implementation plan (SIP) to achieve, maintain, and enforce federal ambient air quality standards.

The status of areas with respect to federal ambient air quality standards is categorized as nonattainment, attainment (better than national standards), unclassifiable, or attainment/cannot be classified. Unclassified areas are treated as attainment areas for most regulatory purposes. All of Hawai‘i is categorized as attainment or unclassified for each of the federal ambient air quality standards.

**Table 3-5**
**State and National Ambient Air Quality Standards Applicable in Hawaiʻi**

| | | Standards in Parts Per Million by Volume (ppm) | | Standards in Micrograms Per Cubic Meter | | Violation Criteria | |
|---|---|---|---|---|---|---|---|
| **Pollutant** | **Averaging Time** | **Hawaiʻi** | **National** | **Hawaiʻi** | **National** | **Hawaiʻi** | **National** |
| | | | | | | | |
| Ozone | 8 Hours | 0.08 | 0.08 | 157 | 157 | If exceeded on more than 1 day per year | If exceeded by the mean of annual 4th highest daily values for a 3-year period |
| Carbon Monoxide | 8 Hours | 4.5 | 9 | 5,000 | 10,000 | If exceeded on more than 1 day per year | If exceeded on more than 1 day per year |
| | 1 Hour | 9 | 35 | 10,000 | 40,000 | If exceeded on more than 1 day per year | If exceeded on more than 1 day per year |
| Inhalable Particulate Matter ($PM_{10}$) | Annual Arithmetic Mean | Not applicable | Not applicable | 50 | 50 | If exceeded | If exceeded as a 3-year single station average |
| | 24 Hours | Not applicable | Not applicable | 150 | 150 | If exceeded on more than 1 day per year | If exceeded by the mean of annual 99th percentile values over 3 years |
| Fine Particulate Matter ($PM_{2.5}$) | Annual Arithmetic Mean | Not applicable | not applicable | not applicable | 15.0 | | If exceeded as a 3-year spatial average of data from designated stations |
| | 24 Hours | Not applicable | not applicable | not applicable | 65 | | If exceeded by the mean of annual 98th percentile values over 3 years |

**Table 3.5**
**State and National Ambient Air Quality Standards Applicable in Hawai'i** *(continued)*

| | | Standards in Parts Per Million by Volume (ppm) | | Standards in Micrograms Per Cubic Meter | | Violation Criteria | |
|---|---|---|---|---|---|---|---|
| **Pollutant** | **Averaging Time** | **Hawai'i** | **National** | **Hawai'i** | **National** | **Hawai'i** | **National** |
| Nitrogen Dioxide | Annual Average | 0.037 | 0.053 | 70 | 100 | If exceeded | If exceeded |
| Sulfur Dioxide | Annual Average | 0.03 | 0.03 | 80 | 80 | If exceeded | If exceeded |
| | 24 Hours | 0.14 | 0.14 | 365 | 365 | If exceeded on more than 1 day per year | If exceeded on more than 1 day per year |
| | 3 Hours | 0.5 | 0.5 | 1,300 | 1,300 | If exceeded on more than 1 day per year | If exceeded on more than 1 day per year |
| Lead Particles (TSP sampler) | Calendar Quarter | Not applicable | not applicable | 1.5 | 1.5 | If exceeded | If exceeded |
| Hydrogen Sulfide | 1 Hour | 0.025 | not applicable | 35 | Not applicable | If exceeded on more than 1 day per year | |

Notes:

All standards except the national $PM_{10}$ and $PM_{2.5}$ standards are based on measurements corrected to 25 degrees C and 1 atmosphere pressure.
The national $PM_{10}$ and $PM_{2.5}$ standards are based on direct flow volume data without correction to standard temperature and pressure.
The "10" in $PM_{10}$ and the "2.5" in $PM_{2.5}$ are not particle size limits; these numbers identify the particle size class (aerodynamic diameter in microns) collected with 50% mass efficiency by certified sampling equipment. The maximum particle size collected by $PM_{10}$ samplers is about 50 microns. The maximum particle size collected by $PM_{2.5}$ samplers is about 6 microns.

Data Sources:

40 CFR Parts 50, 53, and 58
Hawai'i Administrative Rules Chapter 11-59 (August 28, 2002)

### 3.5.5 Clean Air Act Conformity

The Clean Air Act requires federal agencies to ensure that actions they undertake in nonattainment and maintenance areas are consistent with federally enforceable air quality management plans for those areas. No portions of Hawai'i are classified as nonattainment or maintenance areas. Consequently, Clean Air Act conformity analysis procedures do not apply to Army actions in Hawai'i.

### 3.5.6 Existing Air Quality Conditions

Hawai'i currently operates nine ambient air quality monitoring stations on O'ahu, one station on Kaua'i, two stations on Maui, and five stations on the island of Hawai'i. All of the monitoring stations are in coastal regions, and many are in or near urban areas. None of the monitoring stations are sited at or near Army training areas. The monitoring stations on Maui are located to monitor the air quality impacts of sugarcane burning. The monitoring stations on the island of Hawai‘i have been located primarily to monitor the impacts of emissions from volcanic eruptions and geothermal development. Based on available monitoring data and the locations of recognized emission sources, the USEPA has concluded that no locations in Hawai‘i exceed federal ambient air quality standards.

Most of the monitoring data collected in recent years show that ambient air quality levels are well below the values of the relevant state and federal ambient air quality standards. Only ozone and $PM_{10}$ have approached or exceeded state or federal air quality standards in recent years. Prior to September 2001, Hawai‘i had a very stringent 1-hour standard for ozone (100 micrograms per cubic meter). That 1-hour standard was typically exceeded on several days each year in the Honolulu area. In September 2001 the state 1-hour ozone standard was replaced with an 8-hour ozone standard numerically identical to the federal 8-hour ozone standard. Available data show that ozone levels in the Honolulu area have not approached or exceeded the state or federal 8-hour ozone standards.

$PM_{10}$ concentrations at some locations have approached or exceeded the state and federal 24-hour standard of 150 micrograms per cubic meter. Maximum 24-hour $PM_{10}$ concentrations often exceed 100 micrograms per cubic meter at one or both monitoring stations on Maui and sometimes exceed 100 micrograms per cubic meter at the Pearl City and Kapolei monitoring stations on O‘ahu. The high $PM_{10}$ concentrations at monitoring stations on Maui are associated with agricultural burning activities. The high $PM_{10}$ concentrations at Pearl City and Kapolei have been attributed to the use of fireworks during New Year's Day celebrations. Two episodes of 24-hour $PM_{10}$ concentrations over 150 micrograms per cubic meter were recorded at Pearl City in 2000, and one episode was recorded at Pearl City in 2001. Those two episodes in 2000 represent a violation of the state 24-hour $PM_{10}$ standard but did not constitute a violation of the federal 24-hour $PM_{10}$ standard. State and national violation criteria are summarized in Table 3-5.

### 3.5.7 Climate and Meteorology Conditions

The most prominent feature of the circulation of air across the tropical Pacific is the persistent trade wind flow in a general east-to-west direction. The trade winds blow across Hawai‘i primarily from the northeast quadrant throughout the year, with the windiest months being from May through September. In addition to the trade winds, wind patterns are influenced by major storm systems and by topographic features that alter or channel prevailing wind directions. Topographic features have additional influences on local wind patterns in coastal areas, with upslope/downslope flow patterns often reinforcing sea breeze/land breeze patterns. Local winds tend to move inland from the coast during mid-morning to early evening periods, then reverse direction and flow off-shore during night and early morning hours. The on-shore sea breeze component tends to be stronger than the off-shore land breeze component. Sea/land breeze patterns are most common on the south and west coasts of the Hawaiian Islands.

The combination of a dominant trade wind pattern and limited seasonal changes in the length of day and night combine to limit seasonal variations in weather conditions in Hawai‘i. Weather conditions in Hawai‘i show a two season pattern, with a winter season of seven months (October through April) and a summer season of five months (May through

September). The summer months generally are warmer and drier than the winter months. Most major storms occur during the winter season. Seasonal variations in temperature conditions are mild at lower elevations, with daytime temperatures commonly between 75 and 85 degrees Fahrenheit (24 to 29 degrees Celsius) and nighttime temperatures between 65 and 75 degrees Fahrenheit (18 to 24 degrees Celsius).

Topographic features exert a strong influence on rainfall amounts and also influence temperature patterns at higher elevations. Rainfall amounts range from less than 20 inches (51 centimeters) per year on the southern and western coastal areas to over 300 inches (762 centimeters) per year on the windward slopes of the high mountains or near the summits of lower mountains on Kaua‘i, O‘ahu, and Maui.

## 3.6 NOISE

Noise conditions vary considerably depending on location and time of day. Noise levels are relatively high in the cantonment area of SBMR and moderate in the cantonment area of PTA. Noise levels on training ranges are high during live-fire training but generally are low when no training is in progress. The Army receives an average of about six noise complaints per month, about half of which concern low-flying helicopters or fixed-wing aircraft. Noise from vehicles, small arms and heavy weapons firing, demolition charges, and simulators account for most of the remaining noise complaints.

### 3.6.1 Region of Influence

The ROI for noise sources depends on the intensity of noise generation. For most common noise sources, the ROI will be limited to areas within one-half mile of the noise source. High intensity noise sources, such as ordnance detonations, may have an ROI extending several miles from the noise source.

### 3.6.2 Resource Overview

Sound is caused by vibrations that generate waves of minute air pressure fluctuations in the surrounding air. Sound levels are typically measured using a logarithmic decibel (dB) scale. Measurements and descriptions of sounds are usually based on various combinations of the following factors:

- The vibration frequency characteristics of the sound, measured as sound wave cycles per second (Hertz [Hz]); this determines the "pitch" of a sound;
- The total sound energy being radiated by a source, usually reported as a sound power level;
- The actual air pressure changes experienced at a particular location, usually measured as a sound pressure level; the frequency characteristics and sound pressure level combine to determine the "loudness" of a sound at a particular location;
- The duration of a sound; and
- The changes in frequency characteristics or pressure levels through time.

Human hearing varies in sensitivity for different sound frequencies. The ear is most sensitive to sound frequencies between 800 and 8,000 Hz and is least sensitive to sound frequencies below 400 Hz or above 12,500 Hz. Consequently, several different frequency weighting schemes have been used to approximate the way the human ear responds to noise levels. The "A-weighted" decibel scale (dBA) is the most widely used for this purpose, with different dB adjustment values specified for each octave or 1/3 octave interval. Table 3-6 summarizes typical dBA levels for various noise sources and noise conditions.

Although the A-weighting scale is the most widely used decibel weighting procedure, other weighting scales have been developed. The C-weighted scale and unweighted decibel values are commonly used for blast noise, sonic booms, or other low frequency sounds capable of inducing vibrations in buildings or other structures. In addition, evaluations of blast noise or

**Table 3-6**
**A-Weighted Decibel Values for Example Noise Sources**

| Characterization | dBA | Example Noise Source or Condition | Other Noise Examples |
|---|---|---|---|
| Threshold of pain | 130 | Surface detonation, 30 pounds (13.6 kilograms) of TNT at 1,000 feet (305 meters) | |
| Possible building damage | 120 | Mach 1.1 sonic boom under aircraft at 12,000 feet (3,658 meters) | Air raid siren at 50 feet (15 meters); B-1 flyover at 200 feet (61 meters) |
| | 115 | F/A-18 aircraft takeoff with afterburner at 1,600 feet (488 meters) | Commercial fireworks (5 pound (2.3 kilogram) charge) at 1,500 feet (457 meters) |
| | 110 | Peak crowd noise, pro football game, open stadium | Peak noise at firing position of rifle range |
| | 100 | F/A-18 aircraft departure climb out at 2,400 feet (732 meters) | Jackhammer at 10 feet (3 meters); B-52 flyover at 1,000 feet (305 meters) |
| Extremely noisy | 95 | Locomotive horn at 100 feet (30 meters); 2-mile range foghorn at 100 feet (30 meters) | Wood chipper processing tree branches at 30 feet (9.1 meters) |
| 8-hour OSHA limit | 90 | Heavy truck, 35 mph (56 kmph) at 20 feet (6 meters); leaf blower at 5 feet (1.5 meters) | Person yelling at 5 feet (1.5 meters); dog barking at 5 feet (1.5 meters) |
| Very noisy | 85 | Power lawn mower at 5 feet (1.5 meters); city bus at 30 feet (9.1 meters) | Pneumatic wrench at 50 feet (15 meters); jet ski at 20 feet (6 meters) |
| Noisy | 75 | Street sweeper at 30 feet (9.1 meters); idling locomotive at 50 feet (15 meters) | Beach with medium wind and surf |
| | 70 | Auto, 35 mph (56 kmph) at 20 feet (6 meters); 300 feet (91 meters) from busy 6-lane freeway | Stream bank 10 feet (3 meters) from small/medium waterfall |
| Moderately noisy | 65 | Typical daytime busy downtown area conditions | Beach with light wind and surf; tree branches, light wind |
| | 55 | Typical daytime urban residential area away from major streets | Leaves, tall grass rustling in light/moderate wind |
| | 50 | Typical daytime suburban conditions | Open field, summer night, insects |
| Quiet | 45 | Typical rural area daytime conditions | |
| | 40 | Quiet suburban area at night | |
| Very quiet | 30 | Quiet rural area, winter night, no wind | Quiet bedroom at night, no air conditioner |
| | 20 | Empty recording studio | Barren area, no wind, water, insects, or animals |
| Barely audible | 10 | Audiometric testing booth | |
| Threshold of hearing | 0 | | |

Source: Data compiled by Tetra Tech staff.
Notes:
Indicated noise levels are average dBA levels for stationary noise sources or peak dBA levels for brief noise events and noise sources moving past a fixed point.
Average and peak dBA levels are not time-weighted 24-hour average Ldn values.
Decibel scales are not linear. Apparent loudness doubles for every 10 dBA increase in noise level, regardless of the dBA values.
Data compiled from various published sources, noise monitoring studies, and noise modeling analyses.

sonic boom events sometimes use a peak overpressure measurement. The peak overpressure normally is an unweighted decibel measurement for the dominant octave band or 1/3 octave band component of a sound. In most cases, the specific octave or 1/3 octave band for the peak overpressure measurement is not reported. The peak overpressure level will be slightly less than the corresponding composite unweighted decibel measurement.

Varying noise levels often are described in terms of the equivalent constant decibel level. Equivalent noise levels (Leq) are not a simple averaging of decibel values but are based on the cumulative acoustical energy associated with the component decibel values. Leq values sometimes are referred to as energy-averaged noise levels. As a consequence of the calculation procedure, high dB events contribute more to the Leq value than do low dB events. Leq values are used to develop single-value descriptions of average noise exposure over various periods of time. Such average noise exposure ratings often include additional weighting factors for potential annoyance due to time of day or other considerations. The Leq data used for these average noise exposure descriptors generally are based on A-weighted sound level measurements.

Average noise exposure over a 24-hour period often is presented as a day-night average sound level (Ldn). Ldn values are calculated from hourly Leq values, with the Leq values for the nighttime period (10 PM - 7 AM) increased by 10 dB to reflect the greater disturbance potential from nighttime noises. Because of the time period weighting, an Ldn value will be 6.4 dB greater than the corresponding 24-hour Leq value for a constant noise level. For most real noise conditions, the corresponding Ldn and 24-hour Leq values will differ by less than this.

Discrete noise events sometimes are characterized using the sound exposure level (SEL) descriptor. The SEL measure represents the cumulative (not average) sound exposure during a particular noise event, integrated with respect to a one-second time frame. SEL measurements are equivalent to the Leq value of a one-second noise event producing the same cumulative acoustic energy as the actual noise event being analyzed. In effect, an SEL measure “spreads” or “compresses” the noise event to fit a fixed one-second time interval. If the actual duration of the noise event is less than one second, the SEL value will be less than the Leq value for the event. If the duration of the noise event exceeds one second, the SEL value will exceed the Leq of the event. SEL values can be computed using any decibel weighting scheme.

Additional information concerning noise analyses is provided in Appendix H.

### 3.6.3 Federal and State Noise Standards and Guidelines

#### *Department of Defense Noise Guidelines*

The Department of Defense began developing noise evaluation programs in the early 1970s. Initial program development involved the Air Installation Compatible Use Zone (AICUZ) program for military airfields. Early application of the AICUZ program emphasized Air Force and Navy airfields. The Army implemented the program as the Installation Compatible Use Zone (ICUZ) program by addressing both airfield noise issues and other major noise sources, such as weapons testing programs and firing ranges. Joint Air Force, Army, and Navy planning guidelines were issued in 1978 (DOD 1978). The 1978 guidelines use annual average Ldn values to categorize noise exposure conditions on military installations. The following three broad noise exposure zones are used as the basis for characterizing various land use compatibility conditions:

- Zone I—areas with Ldn levels below 65 dBA or 62 dBC;
- Zone II—areas with Ldn levels of 65-75 dB or 62-70 dBC; and
- Zone III—areas with Ldn levels above 75 dB or 70 dBC.

The guidelines indicate that all land uses are compatible with Zone I noise levels. Educational, medical, and residential land uses generally are not compatible with Zone II noise levels unless special acoustic treatments and designs are used to ensure acceptable interior noise levels. Acoustical insulation also may be needed for administrative and office facilities located in Zone II areas. Residential, medical, and educational land uses are not compatible with Zone III noise levels. Industrial, manufacturing, and office land uses may be acceptable in Zone III areas if special building designs and other measures are implemented.

The Army has recently supplemented the original 1978 guidelines to develop a more comprehensive Environmental Noise Management Program (ENMP). The ENMP program incorporates ICUZ evaluations as one component of the program. Other components of the ENMP include programs for handling noise complaints and undertaking supplemental noise evaluations when warranted by the nature of discrete noise events. Criteria for evaluation of noise levels have been expanded beyond the normal A-weighted Ldn descriptor to include the use of C-weighted Ldn values to characterize major blast noise sources and the use of peak unweighted decibel values to characterize small arms firing (Table 3-7). While AR 200-1 identifies the peak unweighted dB value as the method for characterizing noise from small arms firing, A-weighted Ldn values often are used instead as the preferred method for assessing land use compatibility issues (US Army 2002c).

USARHAW will use the ENMP to explore the following:

- Improvements in land use compatibility adjacent and proximal to USARHAW facilities;
- The feasibility of increasing acoustical insulation in structures or areas where noise-sensitive receptors reside, specifically in areas that are or may become exposed to Zone III and Zone II noise conditions, giving priority to family and troop housing areas affected by Zone III conditions; and
- Ways to improve notification to surrounding communities about the scheduling and nature of nighttime training exercises, which are possible sources of complaints about noise and vehicle activity. While enhanced public information programs will not reduce actual noise levels, they can help reduce the frequency of noise complaints.

**Table 3-7**
**Noise Zones Defined in Army Regulation 200-1**

| Noise Zone | General Noise Sources, A-Weighted Ldn Range | Impulse Noise Sources, C-Weighted Ldn Range | Small Arms, Peak Unweighted dB Range | Percent of Population Highly Annoyed | Acceptability for Noise-Sensitive Land Uses |
|---|---|---|---|---|---|
| I | Up to 65 dBA Ldn | Up to 62 dBC Ldn | Up to 87 dB Peak | less than 15% | Acceptable |
| II | 65 to 75 dBA Ldn | 62 to 70 dBC Ldn | 87 to 104 dB Peak | 15% to 39% | Normally unacceptable |
| III | Over 75 dBA Ldn | Over 70 dBC Ldn | Over 104 dB Peak | Over 39% | Unacceptable |

Notes:
Noise levels from all sources should be evaluated in terms of annual averages of the identified noise metric.
Noise from transportation sources (aircraft and vehicles) and common industrial sources should be evaluated using A-weighted Ldn values.
Noise from impulsive sources (such as armor, artillery, and demolition activities) should be evaluated using C-weighted Ldn values.
Noise from small arms ranges should be evaluated using peak unweighted dB values until the Z-weighting standard is adopted, at which time peak Z-weighted decibel values should be used.
Noise-sensitive land uses include housing, schools, and medical facilities.
Compatibility determinations for existing conditions and proposed actions should be supplemented by descriptions of projected noise increases and potential public reactions where:
(1) the noise environment is determined by a few infrequent but very high level noise sources (such as blast events over 110 dBC SEL);
(2) single event noise levels from the proposed action are 10 dB or more greater than existing levels;
(3) where the A-weighted Ldn is between 60 and 65 dBA and the proposed action would increase the Ldn by 3 dB or more;
(4) where the A-weighted Ldn is above 65 dBA and the proposed action would increase the Ldn by 1.5 dB or more.

Source:
US Army 1997b.

The Army Center for Health Promotion and Preventive Medicine (CHPPM) assists Army installations in developing environmental noise management plans. CHPPM also undertakes special noise studies to evaluate noise problems associated with various types of noise sources. When investigating noise conditions related to weapons firing or ordnance detonations, CHPPM typically measures peak unweighted decibel levels and/or C-weighted SEL levels. Table 3-8 summarizes the noise criteria most often used by CHPPM when evaluating blast noise issues.

The noise complaint program for Army installations in Hawai'i is managed through the Public Affairs Office, Community Relations Department at Schofield Barracks (phone number 808 655-2919 or access the Internet Web site at http://www.25idl.army.mil/). Noise and other complaints are logged with a brief checklist form to summarize the nature of the complaint and the activity or equipment that appears to be generating the complaint. Complaints regarding aircraft or helicopter operations are referred to the Aviation Division for investigation and follow-up. Complaints related to other noise sources or activities are referred to the appropriate unit or office for investigation and follow-up.

### *State Regulations*

Hawai'i has adopted statewide noise standards that apply to fixed noise sources, construction equipment, and similar sources. The noise standards are phrased as property line noise limits and vary according to the zoning district of the impacted property. Separate noise standards have been established for non-impulse noise and impulse noise. The standards for non-impulse noise are summarized in Table 3-9. The standards for impulse noise are summarized in Table 3-10. All of the noise limits are specified as noise levels that can be exceeded no more than 10 percent of the time in any 20-minute period.

Available information on existing noise conditions at different Army installations is summarized in the appropriate chapter for each installation.

**Table 3-8**
**CHPPM Blast Noise Assessment Criteria**

| Predicted Impulse Sound Level | | Risk of Complaint | Recommended Action |
|---|---|---|---|
| **Peak Unweighted dB Level** | **C-Weighted SEL Value** | | |
| Less than 115 dB | Less than 90 dBC | low risk of complaint | No restrictions |
| 115 to 130 dB | 90 to 105 dBC | moderate risk of complaint | Postpone non-critical tests if possible |
| 130 to 140 dB | 105 to 115 dBC | high risk of complaints; possibility of damage | Postpone all but extremely important tests |
| Over 140 dB | Over 115 dBC | threshold for permanent hearing damage; high risk of physiological and structural damage claims | Postpone all explosive operations |

Notes:
CHPPM normally uses peak unweighted dB measurements to investigate blast noise complaint issues.
For rapid-fire test events with major weapons, noise level criteria should be reduced by 15 dB.
C-weighted SEL values often are used to predict the potential for sleep disturbance.

Source: US Army CHPPM 2001

**Table 3-9**
**Hawai'i Community Noise Standards for Non-Impulse Noise**

| Zoning District Group | Example Zones | Daytime Noise Limit for Non-Impulse Noise (7 AM to 10 PM) | Nighttime Noise Limit for Non-Impulse Noise (10 PM to 7 AM) |
|---|---|---|---|
| CLASS A | Residential<br>Conservation<br>Preservation<br>Open Space<br>Public Space | $L_{10}$ less than or equal to 55 dBA during any 20-minute period | $L_{10}$ less than or equal to 45 dBA during any 20-minute period |
| CLASS B | Multi-family Dwellings<br>Apartments<br>Commercial<br>Hotel<br>Resort | $L_{10}$ less than or equal to 60 dBA during any 20-minute period | $L_{10}$ less than or equal to 50 dBA during any 20-minute period |
| CLASS C | Agriculture<br>Country<br>Industrial | $L_{10}$ less than or equal to 70 dBA during any 20-minute period | $L_{10}$ less than or equal to 70 dBA during any 20-minute period |

Source: Hawai'i Administrative Rules, Title 11, Chapter 46

Notes:
$L_{10}$ = noise level exceeded 10 percent of the time during the specified time interval.
Noise limits are based on the zoning district of the property affected by a noise source.
Class A, Class B, and Class C noise limits apply to any lands having zoning designations equivalent to the listed example zones.
For mixed zoning districts, the primary land use designation shall be used to determine the applicable noise limit.
Noise limits apply to any point at or beyond the property line of the noise source.
Noise sources covered by these noise limits include stationary noise sources and equipment used for agricultural, construction, or industrial activities.
Compliance with the non-impulse noise limits shall be based on A-weighted noise level measurements made with the instrument in the slow response setting (1 second integration).

**Table 3-10**
**Hawai'i Community Noise Standards for Impulse Noise**

| Zoning District Group | Example Zones | Daytime Noise Limit for Impulse Noise (7 AM to 10 PM) | Nighttime Noise Limit for Impulse Noise (10 PM to 7 AM) |
|---|---|---|---|
| CLASS A | Residential<br>Conservation<br>Preservation<br>Open Space<br>Public Space | $L_{10}$ less than or equal to 65 dBA during any 20-minute period | $L_{10}$ less than or equal to 55 dBA during any 20-minute period |
| CLASS B | Multi-family Dwellings<br>Apartments<br>Commercial<br>Hotel<br>Resort | $L_{10}$ less than or equal to 70 dBA during any 20-minute period | $L_{10}$ less than or equal to 60 dBA during any 20-minute period |
| CLASS C | Agriculture<br>Country<br>Industrial | $L_{10}$ less than or equal to 80 dBA during any 20-minute period | $L_{10}$ less than or equal to 80 dBA during any 20-minute period |

Source: Hawai'i Administrative Rules, Title 11, Chapter 46

Notes:

$L_{10}$ = noise level exceeded 10 percent of the time during the specified time interval. Noise limits are based on the zoning district of the property affected by a noise source.

Class A, Class B, and Class C noise limits apply to any lands having zoning designations equivalent to the listed example zones.

For mixed zoning districts, the primary land use designation shall be used to determine the applicable noise limit.

Noise limits apply to any point at or beyond the property line of the noise source.

Noise sources covered by these noise limits include stationary noise sources and equipment used for agricultural, construction, or industrial activities. Compliance with the impulse noise limits shall be based on A-weighted noise level measurements made with the instrument in the fast response setting (125 millisecond integration).

## 3.7 TRAFFIC

Traffic and circulation refers to the movement of vehicles and pedestrians along and adjacent to roads. Freeways and major roads are under the jurisdiction of the state through the Hawai'i Department of Transportation; other streets and roads are under the jurisdiction of the counties. Roadways consist of multilane road networks with asphalt surfaces to unpaved plantation roads. Traffic conditions in Hawai'i vary depending on location but are typically over capacity during peak hours, resulting in significant traffic delays. These traffic delays occur in urban areas with multilane roads as well as less developed areas with only two-lane roads.

The main access routes for the training areas around SBMR are via H-2 from the Ewa/Honolulu area, Kamehameha Highway and Kunia Road from the Ewa District, and Kamananui Road and Wilikina Drive from the North Shore District. Trimble Road, Kolekole Avenue, and Lyman Road are the primary circulation routes through SBMR. Access to and egress from KTA is via Drum Road or Kamehameha Highway. Saddle Road (SR 200) is a two-lane, two-way roadway that connects PTA with Māmalahoa Highway.

### 3.7.1 Introduction/Region of Influence

This section defines traffic terms, describes the regional transportation agencies in the ROI, and provides an overview of adopted transportation goals and policies that guide transportation development in the ROI. The ROI for each component of the Proposed Action is as follows:

- SBMR—The ROI is the area within the SBMR/WAAF perimeter and Kunia Road adjacent to the proposed project;
- Dillingham Trail—The ROI is the corridor between SBMR and DMR. This corridor includes the area from central O'ahu to DMR, which is in the northwest area of the island;
- Drum Road and Helemanō Trail—The ROI is the corridor from SBMR to KTA, which consists of two trail segments, Drum Road and Helemanō Trail. This corridor originates at SBMR, which is located in central O'ahu, and ends at KTA, which is located on the windward side of O'ahu; and
- PTA Trail—The ROI is the corridor between PTA and Kawaihae Harbor. This corridor is approximately 26 miles (42 kilometers) long and is bounded by SR 190 on the east and the coastline on the west.

### 3.7.2 Resource Overview

#### *O'ahu*

On O'ahu, the primary urban development is along the southern coastal areas. This major development extends from Ewa on the west to Hawai'i Kai on the east. The Transportation for O'ahu Plan 2025 provides an overview of traffic conditions, shown below.

> "Congested operating conditions occur regularly during the morning and afternoon peak periods on the major highways and street in many parts of

> the island. Traffic on freeways through the PUC typically operates stop-and-go in the peak periods, and parallel arterials carry high volumes of traffic and operate at low levels-of-service. At signalized intersection along the arterials, motorists typically stop for more than one signal cycle. Similar conditions occur during peak periods in outlying developed areas and on major corridors in and out of the PUC" (Carter-Burgess 2001, 2-7).

There are four freeways on O'ahu that provide approximately 55 miles of state roadway. These freeways and the other major roadways on O'ahu are described below.

H-1 (Lunalilo Freeway) traverses the southern portion of O'ahu. H-1 connects the Ewa areas with Hawai'i Kai. The freeway also provides service to Honolulu International Airport, Pearl Harbor, Hickam Air Force Base, and downtown Honolulu.

H-2 connects the Ewa area with central O'ahu, where SBMR Barracks is located. H-2 ties into H-1 east of Honolulu. Along with a section of H-1, H-2 connects SBMR and Pearl Harbor and Hickam Air Force Base.

H-3 is the newest freeway on O'ahu and connects the Pearl Harbor area with Marine Corps Base Kaneohe, which is on the northeast side of O'ahu.

SR 78, referred to as the Moanalua Road, provides a bypass for H-1 traffic between the Aiea/Pearl City area and downtown Honolulu.

The remaining state highways provide approximately 200 lane-miles of roadway. The City and County of Honolulu maintains approximately 1,200 lane-miles of roads (Carter-Burgess 2001, 2-4).

There are few roadways connecting the southern and northern portions of the island, which are separated by the Ko'olau Mountains. The connecting roadways are the Pali Highway, the Likelike Highway, and H-3. Kalanianaole Highway goes around the east coastline between Hawai'i Kai and Kailua. H-2 and Kamehameha Highway go around the western end of the Ko'olau Range, connecting Honolulu with Mililani, Wahiawa, Schofield Barracks, and Haleiwa.

The City and County of Honolulu also maintains TheBus, which is the public transportation system. TheBus operates 525 buses along 89 routes (Carter-Burgess 2001, 2-6), providing extensive coverage of the island. There are few areas of the island that do not have bus service.

Historical traffic accident data for O'ahu were not available.

### *Hawai'i*

The major urban areas on the island of Hawai'i are Hilo and Kailua-Kona, which are on the east and west sides of the island, respectively. Air service for these centers is provided by Hilo International Airport and Kona International Airport. Generally, major roadways in

Hilo are congested, and major highway improvements are underway to address these problems. There are several congested areas in Kailua-Kona, but the periods of congestion are short.

The most direct roadway link between these population centers is Saddle Road, but most motorists use Queen Kaahumanu Highway (Highway 19) because this road has better design features. Saddle Road is not up to current design standards, and sight distances are limited. Over the years, transportation plans for the island have included recommendations for improving Saddle Road.

Major roadways on the island are under the jurisdiction of the Hawai'i Department of Transportation. Roadways under the jurisdiction of HDOT are Queen Kaahumanu Highway, Mamalahoa Highway, Hawai'i Belt Road, Volcano Highway, and Kawaihae Road. Except for limited sections, these roadways are two-lane highways. Major intersections are signalized. The remaining local roads and streets are under the jurisdiction of the County of Hawai'i Department of Public Works.

### 3.7.3 Traffic Terminology

Traffic and circulation refers to the movement of vehicles on local and regional street networks. The roadway network is a hierarchy of roads and streets classified by function. For example, arterial streets are typically four or more lanes that provide the connection from limited access highways to local collector streets, which collect traffic from local neighborhood-serving streets.

*Signalized intersections*. Level-of-service (LOS) denotes combinations of traffic operating conditions that may occur on a given lane or roadway when it is subjected to traffic volumes. LOS is a qualitative measure of the effect of a number of factors, including space, speed, travel time, traffic interruptions, freedom to maneuver, safety, driving comfort, and convenience.

The six LOSs for signalized intersections, A through F, relate to the driving conditions from best to worst, respectively. The characteristics of traffic operations for each LOS are summarized in Table 3-11. In general, LOS A represents free-flow conditions with no congestion, while LOS F represents severe congestion with stop-and-go conditions. LOS D is typically considered acceptable for peak hour conditions in urban areas.

Corresponding to each LOS shown in the table is a volume/capacity ratio. This is the ratio of either existing or projected traffic volumes to the capacity of the intersection. Capacity is defined as the maximum number of vehicles that can be accommodated by the roadway during a specified period. The capacity of a particular roadway is dependent upon its physical characteristics, such as the number of lanes, the operational characteristics of the roadway (e.g., one-way, two-way, turn prohibitions, bus stops), the type of traffic using the roadway (e.g., trucks, buses), and turning movements.

**Table 3-11**
**Level-of-service Definitions for Signalized Intersections**

| Level-of-service | Interpretation | Volume/Capacity Ratio[1] | Delay (Seconds) |
|---|---|---|---|
| A, B | Uncongested operations; all vehicles clear in a single cycle. | 0.000 – 0.700 | <10.0 |
| C | Light congestion; occasional backups on critical approaches. | 0.701 – 0.800 | 15.1 to 25.0 |
| D | Congestion on critical approaches but intersection functional. Vehicles must wait through more than one cycle during short periods. No long standing lines formed. | 0.801 – 0.900 | 25.1 to 35.0 |
| E | Severe congestion with some standing lines on critical approaches. Blockage of intersection may occur if signal does not provide protected turning movements. | 0.901 – 1.000 | 35.1 to 50.0 |
| F | Total breakdown with stop-and-go operation. | >1.001 | >50.1 |

Source: Transportation Research Board 2000

Note:

[1]When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing, which may cause severe congestion affecting other traffic movements in the intersection. This condition usually warrants improvement of the intersection.

<u>*Unsignalized intersections.*</u> Like signalized intersections, the operating conditions of intersections controlled by stop signs can be classified by LOS A to F. However, the method for determining LOS for unsignalized intersections is based on the use of gaps in traffic on the major street by vehicles crossing or turning through that stream. Specifically, the capacity of the controlled legs of an intersection is based on two factors, the distribution of gaps in the major street traffic stream, and driver judgment in selecting gaps through which to execute a desired maneuver. The criteria for LOS at an unsignalized intersection are therefore based on delay of each turning movement. Table 3-12 summarizes the definitions for LOS and the corresponding delay for unsignalized intersections.

**Table 3-12**
**Level-of-service Definitions for Unsignalized Intersections**

| Level-of-Service | Expected Delay to Minor Street Traffic | Delay (Seconds) |
|---|---|---|
| A | Little or no delay | <10.0 |
| B | Short traffic delays | 10.1 to 15.0 |
| C | Average traffic delays | 15.1 to 25.0 |
| D | Long traffic delays | 25.1 to 35.0 |
| E | Very long traffic delays | 35.1 to 50.0 |
| F | See note below | >50.1 |

Source: Transportation Research Board 2000

Note: When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing, which may cause severe congestion affecting other traffic movements in the intersection. This condition usually warrants improvement of the intersection.

### 3.7.4 Regional Transportation Agencies

Three transportation agencies have authority in the ROI: the Hawai'i Department of Transportation, City and County of Honolulu Department of Transportation Services, and County of Hawai'i Department of Public Works. None of these agencies have specific guidelines or criteria for traffic impact studies; rather, they defer to national standards.

Adopted transportation goals and policies that guide O'ahu's and Hawai'i's transportation development are contained in the *Transportation for O'ahu Plan 2025* and *Hawai'i Long Range Land Transportation Plan.*

#### *Transportation for O'ahu Plan 2025 (TOP 2025)*

The O'ahu Metropolitan Planning Organization (OMPO) is responsible for carrying out the various requirements of the metropolitan transportation planning process. These requirements are mandated by the US Department of Transportation as the means for establishing the eligibility of metropolitan areas for federal funds for ground transportation systems. One of these requirements is that each major urban area develop a multi-modal long-range plan that documents ground transportation projects selected for federal funding for a minimum time horizon of 20 years (Figure 3-3).

The goals and objectives of the TOP 2025 were developed at the outset of the study and reflect the issues and concerns raised by participants in the study. The following system goals were adopted by the OMPO policy committee for the four major issues:

- Transportation Services—Develop and maintain O'ahu's island-wide transportation system to ensure efficient, safe, convenient, and economical movement of people and goods;
- Quality of Life—Develop and maintain O'ahu's transportation system in a manner that maintains environmental quality and community cohesiveness;
- Community Responsibility—Develop and maintain O'ahu's transportation system in a manner that is sensitive to community needs and desires; and
- Demand Management—Develop a travel demand management system for O'ahu that optimizes use of transportation resources.

The TOP 2025 recommendations define a transportation system for O'ahu's future that will help to achieve the four goals adopted for the plan. The projects included in the TOP 2025 achieve these goals within the fiscal constraints of funding that will be available within the 25-year time frame of the plan.

**Figure 3-3**
Major Roadways on Oʻahu

### *Hawai'i Long Range Land Transportation Plan*

The Hawai'i Long Range Land Transportation Plan (LRLTP) identifies the major land transportation improvements needed to support the island of Hawai'i's projected growth to the year 2020 (Figure 3-4). This transportation plan was developed through the Countywide Transportation Planning Process, which is a cooperative, comprehensive, and continuing transportation planning effort involving the Hawai'i DOT and the neighbor island counties. Those agencies that participated in updating the Hawai'i LRLTP include the state DOT, the Hawai'i County Department of Public Works, and the Hawai'i County Department of Planning.

The LRLTP, along with the updated transportation plans for O'ahu, Maui, and Kaua'i, is used in developing a statewide transportation plan that fulfills requirements of the Intermodal Surface Transportation Efficiency Act of 1991.

**Figure 3-4**
Major Roadways on Hawai'i

## 3.8 WATER RESOURCES

The ocean surrounding the Hawaiian islands receives 25 to 30 inches of rainfall per year. The islands receive 10 to 15 times as much in some places. The maximum rainfall occurs at elevations between 2,000 to 3,000 feet (610 to 915 meters). Above this elevation, rainfall decreases rapidly, so that the high elevations are relatively dry. The prevailing winds are northeasterly trade winds, so that for most of the year, the maximum rainfall occurs on the eastern, or windward, sides of the islands. The western, or leeward, sides of the islands, being in the shadow of the higher mountains, receive far less rainfall. Thus, rainfall is very unevenly distributed on the islands.

On O‘ahu, the watersheds are small, with little storage capacity, causing rapid runoff and common flooding. Streams on O‘ahu are generally perennial (year-round) at higher elevations, where there is greater precipitation, and at lower elevations, where the topography intercepts the groundwater table and causes springs. At intermediate elevations, streams tend to be intermittent where the high infiltration rate soils absorb the higher elevation runoff. On the island of Hawai‘i, there are few defined watersheds because the young highly permeable rock and soil deposits generally absorb the precipitation without forming stream channels. The exception is along the island’s northern coast, where at least one perennial stream, and better defined intermittent streams are found.

The groundwater resources on O‘ahu are well developed, yielding over 635 mgd (2.4 billion liters per day) from numerous hydrogeologic units and aquifer basins. Approximately 50 percent of the fresh water used in Hawai‘i, and about 99 percent of the drinking water, is from groundwater, O‘ahu is more dependent on groundwater than the other islands. In 1975, groundwater accounted for about 85 percent of the water used for municipal, industrial, agricultural, and military uses.

### 3.8.1 Introduction/Region of Influence

The ROI for surface water resources includes the watersheds containing SBCT training and deployment areas on O‘ahu and Hawai‘i. The ROI for surface water is not necessarily the same as the ROI for groundwater. Because groundwater often crosses topographic (watershed) boundaries, the ROI for surface water is expanded to include the aquifers underlying these watersheds and any aquifers downgradient (in the direction of groundwater flow) from the training and deployment areas. The ROIs for both surface water and groundwater include the downstream and downgradient nearshore areas along the coast where surface water and groundwater, respectively, discharge to the sea. The ROIs for each of the SBCT training and deployment areas are identified in the following section. Federal, state, and local laws and regulations pertaining to water resources are included in Appendix N.

### 3.8.2 Resource Overview

#### *Climate*

The prevailing winds in the Hawaiian Islands are northeasterly trade winds during the summer and lighter southeasterly winds during the winter. Rainfall in the Hawaiian Islands is highly dependent on elevation. For example, on O‘ahu, the ridge of the Ko‘olau Range receives about three times the rainfall as the ridge of the Wai‘anae Range (Figure 3-5). Coastal areas receive the least rainfall, and the leeward coast receives less than half as much rainfall as the windward coast. The central plateau area receives between 50 and 150 inches (127 and 381 centimeters) per year, with the highest rainfall occurring on the east side.

The highest rainfall is produced by cold fronts and Kona storms, which occur during the wet season, from October through April (Wu 1967). During the summer, tropical storms sometimes produce intense local rainfall.

#### *Watersheds and Drainage Patterns on O‘ahu*

The uneven distribution of rainfall has implications for surface water runoff and groundwater recharge. The upper portion of each watershed can receive significantly more rainfall in a given storm than the lower portion. Many of the watersheds on the islands are small (less than 5 square miles [13 square kilometers]) and there is often little storage capacity in the watershed, so runoff is usually quite rapid. The peak stream discharge from a given high intensity storm event typically occurs within one hour of the onset of the event (Wu 1967). Flash floods are not uncommon, and some streams have flood warning systems to alert hikers and others.

Surface water drainage is defined by watershed boundaries, which need not coincide with groundwater aquifer boundaries (Yuen and Associates 1990). Many of these watersheds are composed of smaller watersheds. The top of Figure 3-6 shows the major topographic division of O‘ahu, which defines the major runoff areas. Figure 3-7 shows the current watershed divisions recognized by the State of Hawai‘i.

Many streams are perennial at high elevations, where precipitation is higher, intermittent at middle elevations, and perennial again near the coast, where the stream intercepts a shallow water table (Nichols et al. 1996). The intermittent reaches may be due to a combination of high infiltration, diversion of the flows, and high evaporation rates at low elevations. Hawaiian clay and silty clay loam soils are reported to have unusually high infiltration rates, perhaps higher than some sandy soils found on the continental US (Wu 1967). This may be due in part to the soil structure and formation of cracks that absorb moisture rapidly.

#### *Watersheds and Drainage Patterns on the Island of Hawai‘i*

The permeability of the young volcanic deposits on the island of Hawai‘i is very high. As a result, little or no runoff occurs and channels are not well defined, except along the northern windward coast of the island. Stearns (1966) reported that there are no perennial streams along the entire 240-mile (386-kilometer) coastline running clockwise from the Wailuku River near Hilo to the north side of Kohala Mountain. Hawai‘i is updating its classification of streams on the island and has produced a preliminary map of the northern half of the island of Hawai‘i that shows only one perennial stream in the ROI of the project. This is Waikoloa Stream, which heads in the Kohala Mountains north of Waimea and runs along the foot of Kohala Mountain, parallel to State Highway 19, and discharges into Kawaihae Bay, south of Kawaihae Harbor, through the Wai‘ula‘ula Gulch (State of Hawai‘i 2002b). The proposed PTA Trail route crosses Waikoloa Stream near the rock wall south of Highway 19, in the upper reach of Wai‘ula‘ula Gulch.

**Figure 3-5**
Average Annual Precipitation on O'ahu

**Figure 3-6**
Major Hydrologic Divisions on O'ahu

**Figure 3-7**
Watershed Units on O'ahu

### *Groundwater on O'ahu*

There are few permanent surface water resources in Hawai'i. Ninety percent of the fresh water used on O'ahu in 1980 was groundwater. Of this, about 81 percent is derived from volcanic rock aquifers. The long-term potential yield of groundwater systems on O'ahu is estimated to be 480 to 635 MGD (1,829 to 2,419 million liters per day) (Nichols et al. 1996). Figure 3-8 shows the division of O'ahu into hydrologic units (groundwater divisions) recognized by Hawai'i and the estimated sustainable (or developable) yield (water that can be withdrawn over the long term without significant effect) of each of the hydrologic units. Figure 3-9 shows a more schematic version of this map and the general direction of groundwater flow within and between the hydrologic units. Local groundwater flow patterns may vary somewhat from the regional pattern due to local pumping influences or other local conditions.

Figure 3-10 is a generalized cross-section illustrating the occurrence of groundwater beneath the island. A "basal lens" of fresh groundwater is present in the permeable rocks beneath the island. This freshwater lens overlies seawater, because the fresh water is less dense than seawater. The top of the basal lens is usually relatively flat and typically rises inland at a rate of about 1 to 2 feet per mile (0.19 to 0.38 meters per kilometer). Thus, the top of the basal lens tends to be within an elevation range of 10 to 40 feet (3 to 12 meters) above sea level (Nichols et al. 1996). The basal freshwater lens also is called the Ghyben-Herzberg lens, after an equation of that name that relates the change in freshwater hydraulic head to the change in saltwater head. According to the Ghyben-Herzberg relation, a decrease of one foot (0.3 meter) in the thickness of the freshwater lens (such as would occur from pumping a well) will result in a corresponding 40-foot (12-meter) increase (intrusion) in the head of the salt water that it is floating on. This means, for example, that if the basal lens is at an elevation of 5 feet (2 meters) above sea level, then it extends to a depth of 200 feet (61 meters) below sea level, and if the top of the basal lens is reduced by one foot (0.3 meter), seawater would rise 40 feet (12 meters) higher beneath it. Except in areas where the fresh water is confined by an overlying impermeable formation, the basal lens thins near the coast, where it discharges to and mixes with seawater. The US Geological Survey, in cooperation with the Honolulu Board of Water Supply, drilled 12 exploratory wells in the north-central O'ahu area in 1993 and 1994 to explore the occurrence of groundwater and to identify the depths of groundwater zones. One of the wells, located about two miles northeast of the town of Hale'iwa in the Kawailoa groundwater area, was drilled to 392 feet (119 meters) below mean sea level (Presley and Oki 1996).

Since the basal lens thickens rapidly inland, it would be preferable to drill wells as far inland as possible. However, in many areas the land surface rises rapidly inland, so that the depth to the basal lens also increases rapidly inland. The cost of drilling a deep well through hard rock can be high. Developers of water supplies on the islands have addressed this problem by excavating a shaft from an accessible location near the coast to the top of the basal lens, then tunneling inland as far as needed just above the basal lens, then sinking a well to tap the basal lens. These tunnels are known as "Maui" or "Lana'i" style wells.

**Figure 3-8**
Groundwater Hydrologic Units and Estimated Sustainable Yields on O'ahu

**Figure 3-9**
Regional Groundwater Flow Patterns on Oʻahu

**Figure 3-10**
Generalized Cross-Section Showing Groundwater Recharge and Flow Patterns on O'ahu

Although most basal groundwater in sedimentary deposits in coastal areas is unconfined and occurs in the upper portion of the coastal aquifers on the north and south coasts, caprock overlying the basal lens maintains confining pressure in the aquifer, increasing the thickness of the basal lens there. Historically, wells in these areas have been artesian (flowing to the surface) because of the confining pressure. The confining pressure is caused by groundwater recharge in inland areas that flows downward to the water table. At the water table, the basal lens is relatively horizontal and flows seaward through permeable strata, such as clinker beds, fractured lava flow surfaces, lava tubes, and near the coast, porous limestone deposits and sand beds. If the rock above these permeable strata is not very permeable, and the groundwater does not discharge fast enough, then pressure builds up in the aquifer. Under these conditions, if a well were drilled in the pressurized strata, the groundwater would rise in the well. In some cases, the pressure is sufficient to cause the groundwater to flow freely at the surface (an artesian, or flowing well).

Fresh water also occurs at higher elevations in perched aquifers and in dike-impounded zones, both of which are classified as "high-level" groundwater. Dike-impounded water is groundwater trapped behind vertical dikes. Dike-impounded groundwater commonly is found at elevations above several hundred feet, especially in rift areas where dikes are concentrated and rainfall tends to be higher. Perched aquifers are saturated permeable layers or fractured zones that occur above the basal lens and are separated from it by unsaturated deposits. The perched water is prevented from flowing downward to the basal aquifer by an impermeable or low-permeability zone.

#### *Groundwater on the Island of Hawai'i*

Because of the younger age of the island of Hawai'i and continuing volcanic activity, and the greater thickness of the volcanic deposits, groundwater occurrence on the island of Hawai'i is not well studied. The rock at depth beneath the island is very hot, and this has enabled the development of geothermal resources. At the Puna Geothermal Site, for example, near the town of Pāhoa, southeast of Hilo, surface water is injected through deep wells to an injection zone approximately 3,900 to 7,300 feet (1,189 to 2,225 meters) below ground surface (bgs) (USEPA 2002a). Fresh groundwater that is used as a drinking water source is reportedly present at depths between approximately 600 to 2,000 feet (183 to 610 meters) bgs. The elevation of the ground surface in this area is about 650 feet (198 meters), so the fresh groundwater zone extends from just above sea level to nearly 1,500 feet (457 meters) below sea level. This is consistent with the occurrence of basal groundwater on O'ahu.

Near the coast, where the ground surface elevation is lower, it is economical to install wells. However, in the central portion of the island, the depth to basal groundwater, if it occurs there, would make the cost of extracting the water prohibitive. West of PTA, on the convergent slopes of Mauna Loa and Hualālai Volcano, is the deepest drinking water supply well on the island. It is possible that high level groundwater occurs in some areas, impounded by vertical intrusions of magma called dikes, that can act as groundwater barriers. Alternatives to groundwater include springs, rainwater collection systems, tunnels and pipelines to convey water from watersheds with adequate water supplies to those without, and trucking of water.

## 3.9 GEOLOGY, SOILS, AND SEISMICITY

The Hawaiian Islands formed as the Pacific Plate moved over a relatively permanent hot spot in the mantle beneath the plate. The long chain of islands that stretch for hundreds of miles are the result of thousands of years of slow movement of the Pacific Plate and sea floor eruptions. Due to the composition of the oceanic crust, which differs from the crust that forms the continents, eruptions of Hawaiian volcanoes are generally not explosive or violent.

The sedimentary rocks of O'ahu include both terrestrial and marine deposits. A wedge of stratified marine sedimentary deposits interbedded with volcanic rocks, known as caprock, overlies the coastal plain at the north and south ends of O'ahu. The caprock is relatively impermeable and confines groundwater in the basal aquifer system below it.

Soil types present in the islands vary greatly because of local climate, slope, drainage and age of island. There are twelve soil "orders" in modern soil classification and eleven of these are present in the Hawaiian islands. _The bountiful arable soils of the islands have allowed the success of both commercial and subsistence agricultural practices.

The Hawaiian Islands are affected by earthquakes. One cause of earthquakes is the movement of molten rock as it rises through fractures in the earth's crust. The other cause of Hawaiian earthquakes is settlement of the upper part of the earth's crust under the weight of accumulated lava. This settlement accumulates over millions of years, but may occur suddenly.

### 3.9.1 Introduction/Region of Influence

The ROI for geologic impacts of the project is all areas in which project-related activities may occur, including the footprint of each training and construction area and the corridors of the military vehicle roads. It also includes adjacent areas that may be affected by geologic processes in the project area. An example would be downslope areas adjacent to a roadcut or embankment that might be affected by slope failure.

### 3.9.2 Resource Overview

#### *Physiography*

<u>*Geologic Origin of the Hawaiian Islands*</u>

The Hawaiian Islands are located near the center of the Pacific Plate, one of many oceanic crustal plates that form the surface of the earth beneath the oceans. The Hawaiian Islands formed as the Pacific Plate moved slowly northwestward over a relatively permanent hot spot in the mantle beneath the Pacific Plate. The hot spot melted the oceanic crust above it, causing the melted rock (magma) to rise through the crust and ooze out slowly onto the ocean floor, eventually piling high enough to emerge above the surface of the ocean and form islands. The hot spot is currently beneath the island of Hawai'i, but four million years ago it was beneath O'ahu (Hazlett and Hyndman 1996). The long chain of islands that stretch for hundreds of miles to the northwest of O'ahu attest to the fact that the Pacific Plate has been moving slowly over the hot spot for many millions of years. The hot spot is relatively small, and as the Pacific Plate passes over it, the once-active volcanoes cool and stop erupting. Over time, the volcanic peaks are worn down to near sea level by erosional processes, leaving shallow platforms on which coral atolls (a ring of coral reefs that form a lagoon) can grow.

Due to the composition of the oceanic crust, which differs from the crust that forms the continents, eruptions of Hawaiian volcanoes are generally not explosive or violent. The vast bulk of Hawaiian lavas tend to be hot and thin, enabling them to flow rapidly in thin layers, and to gradually build up huge, gentle-sloping domes called shield volcanoes. The texture of the lava varies, depending on differences in rate of flow and cooling, on distance from the vent, and on whether it is deposited on land or under water. As a result, the lava may be highly fractured and blocky (called ‘a‘ā lava) or dense, smooth or ropy, and unfractured (pāhoehoe). Sometimes the lava in the center of a flow continues to flow after the outer surfaces have cooled and hardened, leaving a hollow tube. Lava tubes can eventually become conduits of surface water or groundwater.

Over time the composition of the magma changes. More explosive eruptions tend to occur near the end of the eruptive history of an island. More gaseous, explosive lavas result in cinder cones and deposits of cinders and ash. Thus, in a sequence of lava flows deposited over thousands of years, there may be many variations in the texture and permeability of the rock.

Hawaiian volcanoes tend to erupt along rift zones, which are linear zones of fractures through which magma moves upward from a magma chamber deep in the crust where melting occurs. After erupting, some of the magma remains to fill the fractures, creating vertical sheets of rock called dikes that crosscut the horizontal layers. The dikes tend to be denser and harder than the lava that is deposited above the surface, and they are more resistant to erosion later. The dikes also influence groundwater movement.

Eruptive episodes may occur decades or even thousands of years apart from different active vents, and the lava flows may follow different routes over time. These variations allow weathering processes time to break down the lava and form soil. Lava that weathers in place is called saprolite, and sequences of saprolite tens of feet thick can occur.

The sedimentary rocks of O‘ahu include both terrestrial and marine deposits. Sedimentary rocks can be classified as either containing large amounts of calcium carbonate (calcareous deposits) or as noncalcareous. Many calcareous deposits are highly permeable. Reef limestone, coralline rubble, and calcareous sand comprising the upper sedimentary layers in coastal areas tend to make highly productive, permeable aquifers. A wedge of stratified marine sedimentary deposits mixed with and interbedded with volcanic rocks, known as caprock, overlies the coastal plain at the north and south ends of O‘ahu. The caprock is relatively impermeable and confines groundwater in the basal aquifer system below it.

Terrestrial sedimentary deposits consist of alluvium deposited by streams, rock material deposited at the foot of steep slopes, and mixed erosional deposits called colluvium. Alluvium derived from weathering of basalt tends to be clayey and low in permeability, and the rapid deposition of sediments eroded from short steep watersheds tends to prevent sorting and winnowing of sands and the formation of identifiable layers. Instead, the deposits become mixed.

The volcanic deposits contain many fractures and tend to be quite permeable. However, they also tend to weather rapidly and deeply from exposure to rain, groundwater, and vegetation. The weathering may continue long after the deposits have been buried beneath other deposits. As a result, the rock may weather in place without being eroded. The original minerals in the rock become altered to iron-rich clay minerals, while retaining much of the appearance and structure of the original rock. The result is an altered rock with soil-like properties called saprolite.

*Island of Hawai'i*

The island of Hawai'i is the youngest of the Hawaiian Islands and is the only island that is still growing. Therefore, the landscape is younger and less affected by erosion than other islands. Also, the island is larger and higher than the other islands. The bulk of the island of Hawai'i was formed from the eruptions of five shield volcanoes. Kohala, the oldest, is extinct. Mauna Kea last erupted about 3,500 years ago and is considered dormant. Hualālai last erupted in 1801. Mauna Loa and Kīlauea are both active.

*Island of O'ahu*

O'ahu was formed from two eruptive centers, shown on Figure 3-11 as the Ko'olau and Wai'anae calderas. The remnants of the oldest, the Wai'anae Volcano, forms the Wai'anae Range on the eastern side of the island. The highest peak in the Wai'anae Range, Mount Ka'ala, is south of the Mākua Military Reservation and rises to an elevation of 4,025 feet (1,227 meters) above mean sea level (msl). About 3 million years ago, the western and northern flanks of the Wai'anae Volcano slumped into the ocean in two sudden and catastrophic events. The south side of the Wai'anae Volcano eroded rapidly, forming the Lualualei Valley. Erosion also stripped the young deposits from the north and east flanks of the volcano and deposited them in the adjacent valleys.

The oldest basalts, which form the bulk of the Wai'anae Volcano, are thin flows of pāhoehoe lava lying at relatively low angles to horizontal. These are known as the Lualualei member of the Wai'anae formation. Later lavas, which were thicker, contained more silica, and were more restricted to the caldera, belong to the Kamaile'unu member of the Wai'anae formation.

The Wai'anae Volcano contained a large crater, or caldera, about 4.5 miles (7.2 kilometers) across that was crossed by two narrow rifts zones that extended northwest and southeast. The rift zones are filled with vertical dikes representing the locations at which magma moved upward before erupting. The resistant rock of the dikes in these rift zones now forms the ridges of the Wai'anae Range. Additional dikes radiate outward from the volcano (Hazlett and Hyndman 1996). The western slope of the Wai'anae Volcano slumped into the Hawaiian deep in a massive landslide that extended up to 50 miles (80 kilometers) across the ocean

**Figure 3-11**
Generalized Geology on O'ahu

floor. A slump of the north side of the volcano, called the Ka'ena Slide, spread debris about 70 miles (113 kilometers) and created an escarpment parallel to the north shore between Ka'ena Point and Waialua.

A third member, the Kolekole member, represents material erupted from cinder and splatter cones on the southeastern flank of the volcano until about 2.75 million years ago, when the Wai'anae Volcano became extinct.

At about this time, the Ko'olau Volcano, which had been forming to the east of the Wai'anae Volcano, began to emerge above sea level. As with the Wai'anae Volcano, two rift zones developed, trending to the northwest and the southeast, respectively. As the Ko'olau Volcano emerged, the saddle between the two volcanoes was filled mainly with sediments eroded from the Wai'anae Volcano. Later, it was overlain by basalt flows from the Ko'olau Volcano. As the Ko'olau Volcano waned, the saddle area was buried under alluvium from erosion of the Ko'olau Volcano. Thus, the saddle area is underlain by alternating basalt flows and alluvial deposits.

The Ko'olau Volcano accounts for about two-thirds of O'ahu. About 2 million years ago, the eastern slope of the volcano slumped into the Hawaiian Deep in a massive slide that created a swathe 20 miles (32 kilometers) wide and deposited material miles (193 kilometers) to the northeast. The event is known as the Nu'uanu Slide. The eruptive 120 period of the Ko'olau Volcano ended about 1.8 million years ago. It was followed by deep erosion of the volcano's caldera, thousands of feet of subsidence, and beginning about 850,000 years ago, the first eruptions of the Honolulu basalts.

Eruptions of the Honolulu basalts began on the Mōkapu Peninsula near the north side of the Ko'olau caldera, and then continued to the south to Lē'ahi (Diamond Head), and west to Pearl Harbor. About 40 eruptions occurred in the period from 850,000 years to 6,000 years ago.

The last period of active volcanism on O'ahu ended about 6,000 years ago. However, it has been pointed out that the quiet periods between volcanic events during the past 800,000 years have often exceeded 6,000 years, so it is not known for certain that eruptions will not occur again in the future.

### *Seismicity*

The Hawaiian Islands are affected by earthquakes resulting from two causes. One cause of earthquakes is the movement of magma (molten rock) as it rises and intrudes fractures in the crust in volcanic eruptions or in advance of those eruptions. Volcanism on O'ahu is no longer active, but earthquakes of this type could result from activity in the vicinity of the island of Hawai'i.

The other cause of Hawaiian earthquakes is settlement of the lithosphere (the upper part of the earth's crust) under the weight of the accumulated lava that has erupted from the Hawaiian volcanoes. This settlement occurs over millions of years, but it occurs in sudden episodes. O'ahu is one of the most stable in this respect. However, lithospheric settlement of the islands of Hawai‘i, Lana‘i, and Maui has resulted in a number of large earthquakes (greater than magnitude 6) during the past 150 years. An earthquake estimated to have been magnitude 6.8, centered beneath Lana‘i in 1871, caused extensive damage in Honolulu (USARHAW and 25th ID[L] 2001a). O‘ahu is no longer subsiding and now has the most stable elevation in the Hawaiian Island chain.

The US Geological Survey National Seismic Hazard Mapping Project has prepared maps showing the magnitude of ground shaking events for specific probabilities of exceedance in a given period of time throughout the Hawaiian Islands (Klein et al. 2001). These maps indicate that the likely intensity of ground shaking decreases with distance from the south coast of the island of Hawai‘i, which is the area of most current earthquake activity. O‘ahu is in an area in which there is a 10 percent chance that ground accelerations of 10 to 12 percent of the acceleration of gravity will occur in the next 50 years. Earth materials vary in their response to seismic waves; firm rock tends to move the least, while loose unconsolidated materials shake more in a given earthquake. The ground acceleration probability estimates provided by the US Geological Survey apply to firm rock conditions.

## 3.10 BIOLOGICAL RESOURCES

The isolated nature and volcanic origin of the Hawaiian Islands has resulted in a truly unique diversity of habitats and species. Hawai'i's habitats range from alpine deserts to tropical rainforests, to coastal dunes and coral reef systems, to active volcanoes. Over ninety percent of the native (naturally found) species of plants and wildlife are endemic, that is, found only in the Hawaiian Islands. These unique organisms are adapted to Hawai'i's natural habitats and conditions and to sharing habitat with other native species—those that evolved on the islands but that may also be found elsewhere. These species arrived on the islands by wind, waves, and flight.

- The islands' 100 endemic land birds evolved from as few as 20 original colonizers (GORP 2003);
- A thousand kinds of flowering plants evolved from 295 successful colonizers (Wagner et al. 1999);
- 168 ferns and fern allies evolved from about 135 colonizers (Wagner et al. 1999);
- Over 1,000 mollusks evolved from at least 22 colonizers (GORP 2003); and
- About 10,000 insect and spider species evolved from 350 to 400 successful colonizers (GORP 2003).

Mammals, amphibians, reptiles, and freshwater fish were less successful in their colonization of the islands' suitable habitats. Only the monk seal and the hoary bat succeeded for the mammals. Of the millions of attempts at colonization by organisms, few made it to Hawai'i, and fewer survived. Of these surviving colonizers, many gave up their natural defenses because of little threat from predators.

Nonnative species were brought to the Hawaiian Islands by the earliest Polynesian settlers or were introduced after contact with the western world, often as intended or incidental cargo on boats and aircraft, on clothing, and by people themselves. Hawaiian ecosystems are threatened by the introduction of nonnative species, particularly by those classified as "invasive", i.e., nonnative species that compete with and often replace native species and native communities. Increased human presence and activity over the last two centuries, in the form of commercial, residential, and military development, and the agricultural transformation of land, has contributed to the spread of nonnative species and to the loss of native species and habitats. The islands of O'ahu and Hawai'i have lost a great deal of native natural diversity, leaving many of the endemic and native species in peril.

### 3.10.1 Introduction/Region of Influence

This section describes biological resources in the SBCT project areas and surrounding areas. Biological resources include plant and animal species and the habitats or communities in which they occur. Discussion of resources occurring in the SBCT ROI includes general wildlife, vegetation, and habitat types, as well as sensitive wildlife, vegetation, and habitats. The SBCT ROI for biological resources is composed of the direct area where SBCT actions are proposed, and surrounding areas that would likely be affected by these actions (Figures

3-12 and 3-13). The ROIs are based on the extent of fire, erosion, and boat and helicopter activity. All other impacts, including construction and training related impacts, would occur.

Natural resources in the project area were evaluated in accordance with the applicable provisions of numerous statutes, executive orders, permits, and regulations, which are presented in Appendix N. Throughout the document, species listed in the biological resource sections are identified as federally listed, if protected by the ESA, and state listed, if considered threatened or endangered species by the state of Hawai'i.

### 3.10.2 Resource Overview

Information on biological resources within the ROI was collected from numerous sources, including the USFWS, DLNR, Hawai'i Biological Survey (HBS), Hawai'i Natural Heritage Program (HINHP), and various biological surveys and environmental documents. Portions of the ROI are very disturbed and support mostly nonnative species, while other portions contain some of the least disturbed natural communities left in Hawai'i and are home to a large number of unique and imperiled native species and the ecosystems that support them.. Many of the native species have been wiped out or have decreased substantially due to habitat modification and problems associated with exotic and invasive species. For this reason Hawai'i contains a greater number of federally listed endangered and threatened species per square mile than anywhere else in the US. Hawai'i has 381 listed species, including 88 animals and 293 plants. Federal and state special status and rare species have been analyzed to determine the likelihood of their occurrence in the ROI. Those special status and rare species that have been recorded in the ROI or that have the potential to occur, based on documented accounts and/or the presence of suitable habitat, are listed in Appendix I-3.

The Hawaiian Islands are among the most remote groups of islands in the world. The oceanic waters around the main seven-island chain support a variety of marine biological resources, including both marine wildlife (such as marine mammals and sea turtles) and coral reefs. Whales, dolphins, seals, and sea turtles can be found in the Pacific waters of the Hawaiian Islands. Seals and sea turtles may occur on the shores of some of the islands.

Coral reef stands occur throughout the island chain, many of which are in decline from overuse (over-fishing, anchor damage, diver damage/human recreation activities, etc.); decline in water quality (sedimentation, pollution, nutrient loading, coastal construction, urbanization); catastrophic natural events (storm wave impact, lava flows); global warming (bleaching); introduced species; and disease outbreaks.

The Hawaiian environment and the species that have inhabited it have played an important part in Hawaiian culture. Polynesian settlers used the endemic plants and animals in their religious and social lives; for instance, they carved canoes and surfboards out of wood from the native koa *(Acacia koa)* trees and used o'hia *(Metrosideros polymorpha)* trunks for building simple temples. Feathers of native birds moho and 'oo'oo *(Moho* sp. and *Drepanis* sp.*)* were used for cloaks that adorned only the highest status individuals. (Additional cultural resource

**Figure 3-12**
Terrestrial Biological Resources Region of Influence Overview

**Figure 3-13**

Marine Biological Resource Region of Influence and Sanctuary Waters Overview information is provided in Section 3.11). Many of these practices gradually were discontinued after western influences became widespread and native landscapes were changed by development and farming. Though the earliest of these introduced plants were essential to the islander's livelihood, providing food, shelter, and clothing, continued introductions of plants and animals have devastated the fragile communities and habitats of the Hawaiian Islands.

Army stewardship of the land is an essential part of its mission (USARHAW and 25th ID[L] 2001a). Army use of lands for training has reduced native natural habitats and the species on them. The Army recognizes its effects on the land and consistently strives to protect and manage these resources. This has led to innovative strategies for conservation and sustainable management of their land holdings. Such management is absolutely necessary in Hawai'i to preserve the integrity of the natural surroundings while maintaining a high standard of military excellence. The INRMPs (INRMPs for 2002-2006) outline current and proposed management plans and specific actions for natural resources stewardship of Army lands. They use up-to-date scientific information, past achievements, and adaptive management when developing the programs outlined within.

As outlined in the INRMPs, Army resource management includes endangered species management, biodiversity and ecosystem integrity, watershed management, pest management, wildland fire management, recreation, education, and outreach. The number and type of funded programs varies by sub-installation and USARHAW priority.

One important component of Army resource management is the ITAM program. ITAM management in Hawai'i is focused on training lands and is the formal strategy that the Army uses on all installations to achieve sustainable use of these lands. The ITAM program incorporates the land condition trend analysis (LCTA), land rehabilitation and maintenance (LRAM), training requirements integration (TRI), and sustainable range awareness (SRA) components. ITAM incorporation began in Hawai'i in 1989 in PTA and has increased ever since. The number of ITAM projects varies by sub-installation and USARHAW priority. The sub-installations outlined in this EIS include SBMR, WAAF, KLOA, KTA, DMR, and PTA. A more detailed discussion of ITAM can be found in Section 2.1.5.

### *Sensitive Species*

Sensitive species include special status, or regulated, species such as USFWS or state of Hawai'i listed endangered, threatened, candidate species, or proposed species, Marine Mammal Protection Act species, federal and state species of special concern, and locally regulated species. Also considered sensitive species are rare species that have had rapid population decline or whose habitat has markedly decreased in recent years. The location of sensitive species in the SBCT ROI is based on the HINHP database (HINHP 2002), USARHAW INRMPs (USARHAW and 25th ID[L] 2001a, USARHAW and 25th ID[L] 2001b) and yearly natural resources surveys (PCSU 1999, 2000, 2001, 2002). Since the publication of the Draft EIS two additional federally listed endangered plant species (*Lobelia niihauensis* and *Nototrichium humile*) have been identified by USFWS as potentially occurring in the ROI. ESA Section 7 consultation will be reinitiated for these species if they are determined to be present in the ROI.

### *Recovery Plans*

Recovery plans are documents prepared by the USFWS that include summaries of threats to the species, discussions of their needs and recovery strategies, and prescriptions for specific management practices and tasks needed to recover special status species, as required by the ESA. They offer guidelines for private, federal, and state cooperation in conserving threatened and endangered species and areas on which they are presently or historically distributed. Under current law, recovery plans are to be developed for endangered and threatened species, unless the plan would not promote the conservation of the species. Plant and animal species with recovery plans that occur in the SBCT ROI are identified in Appendix I-2.

A recovery plan must include the following components:

- A description of site-specific management actions necessary to achieve the plan's goal;
- Objective measurable criteria that, when met, would result in a determination that the species no longer needs the protection of the ESA and can be removed from the lists; and
- Estimates of the time and costs required to carry out the plan and to achieve intermediate steps toward the goal.

### *Critical Habitat*

Areas of habitat considered essential to the conservation of a listed endangered or threatened species may be designated as critical and are protected under the ESA. These areas may require special management considerations or protection. Although critical habitat may be designated on private or government land, activities on these lands are not restricted, unless there is federal involvement in the activities or direct harm to listed wildlife. Federal agencies are required to conduct Section 7 consultation if a proposed action could affect designated critical habitat, even if the effects are expected to be beneficial. The Army, as a federal agency, is prohibited from adversely modifying critical habitat. The Army has completed Section 7 consultations for proposed SBCT actions on O'ahu and the island of Hawai'i. Reasonable and prudent measures, as determined by the USFWS, will be incorporated into the Proposed Action.

The USFWS has established critical habitat for 101 species of plants on O'ahu (USFWS 2003a) and 46 plants on the island of Hawai'i (USFWS 2003b). Critical habitat is mostly in remote rugged locations of no real development value (USFWS 2002a). Army training areas were excluded from being designated critical habitat because of the essential contribution that Army-led natural resource conservation plays in the recovery of threatened and endangered species. These contributions include ongoing and proposed management actions specified in the INRMPs and other natural resource conservation programs. More than ninety percent of the land is already restricted for development because it is part of the State Conservation District. There are 864 acres of plant critical habitat within the O'ahu ROI and none within the PTA ROI on the island of Hawai'i. There are two bird species, the O'ahu 'elepaio and the palila, that have federally designated critical habitat within the SBCT ROI.

There are a total of 8,629 acres of ‘elepaio critical habitat within the project ROI, all of which occurs on O‘ahu, and 2,569_acres of palila critical habitat in the ROI, occurring exclusively on the island of Hawai‘i. Federally designated critical habitat within the SBCT ROI is shown in Figure 3-14 for O‘ahu, and in Figure 3-15 for the island of Hawai‘i.

#### *Hawaiian Islands Humpback Whale National Marine Sanctuary*

In response to public and agency comments, including NOAA Fisheries, the following information has been added to the EIS. The Hawaiian Islands Humpback Whale National Marine Sanctuary is composed of five separate areas abutting six of the major islands. Designated sanctuary waters encompass the entire western portion of the island of Hawai‘i and include waters just outside of and surrounding Kawaihae Harbor. Designated sanctuary waters also encompass marine waters in north O‘ahu near, but not adjoining, the Dillingham ROI. Also, the waters off KTA are designated sanctuary waters, but they are not part of the KTA ROI. Other relevant designated sanctuary waters occur outside of O‘ahu at Penguin Banks, which would be part of the transit route for crew-transporting vessels (see Figure 3-13). The National Marine Sanctuaries Act ( 16 U.S.C. 1431 et seq., P.L. 106-513) was enacted to designate and manage as National Marine Sanctuaries those areas of the marine environment that have special national significance. The primary objective of this law is to protect marine resources, but it also directs the Secretary of Commerce to facilitate all public and private uses of those resources that are compatible with the primary objective of resource protection. Sanctuaries are managed according to site-specific management plans prepared by the NOAA Fisheries.

### 3.10.3 Biologically Significant Areas

Biologically Significant Areas (BSA) are areas containing varying levels of sensitive plants established as a formal rating system by TNC. The abundance and diversity of sensitive plants within an area is used to classify sensitivity. BSA 1 areas contain a high density of federally listed endangered, proposed endangered, or candidate species. BSA 2 areas contain lower densities of known federally listed endangered, proposed endangered, or candidate taxa, or contain candidate taxa or other species of concern that are expected to be upgraded to federally protected status within the next few years. BSA 3 areas contain stands of intact, relatively common native vegetation types with few or no known occurrences of rare elements.

Important habitat for sensitive snail species also exists in the SBCT ROI. Although this habitat has not been federally designated or proposed as critical habitat, it has been identified as containing the habitat requirements necessary for supporting the federally listed and snail species of concern on O‘ahu. Figure 3-16 shows an overview of sensitive snail habitat and BSAs in the SBCT ROI.

**Figure 3-14**
Overview of Federally Designated ‘Elepaio & Plant Critical Habitat on O‘ahu

**Figure 3-15**
Overview of Federally Designated Palila & Plant Critical Habitat on Island of Hawai'i

**Figure 3-16**
Biologically Significant Areas Found in the Region of Influence

## 3.11 CULTURAL RESOURCES

The Army, through an active cultural resource management program, has identified, evaluated, monitored, and protected numerous cultural resources on all Army lands throughout Hawai'i.

### 3.11.1 Introduction/Region of Influence

Cultural resources are defined as historic properties, cultural items, archaeological resources, sacred sites, or collections subject to protection under the National Historic Preservation Act (NHPA), the Archaeological Resources Protection Act (ARPA), the Native American Graves Protection and Repatriation Act (NAGPRA), EO 13007, and the guidelines on Curation of Federally Owned and Administered Collections (36 CFR Part 79). These and other acts and executive orders pertaining to the protection of cultural resources are presented in Appendix N.

The ROI for cultural resources would include the areas of construction of SBCT facilities, the ranges and training areas to be constructed or used under SBCT, those off-road areas to be used by Strykers, areas adjacent to road alignments affected by SBCT activities (Dillingham Trail, Drum and Helemanō roads, and PTA Trail), and the WPAA and SRAA.

### 3.11.2 Resource Overview

#### *Native Hawaiian Culture and Landscapes*

Archaeological and linguistic evidence indicates that the original settlers of Hawai'i brought with them from the islands of east Polynesia seeds, roots, and cuttings of a variety of plants. These were plants of Southeast Asian and New Guinea origin, which, during the millennia of settlement of the Pacific Islands, had proven capable of surviving long distance voyages and adapting well to the environmental conditions on the volcanic islands of the South Pacific. These included taro (kalo), the staple of the Hawaiian diet, and other plants that were important elements in the Hawaiian diet or useful for medicinal, ceremonial, or utilitarian purposes, such as coconut (niu), breadfruit ('ulu), gourd (ipu), banana (mai'a), sugarcane (kō), kava ('awa), ti (lā'ī), and noni. Sweet potato ('uala), a native of South America, was brought to Hawai'i by later Polynesian voyagers and became the primary crop in dryland areas.

More than a matter of subsistence, agriculture, horticulture, fishing, limited hunting, and other uses of natural resources were an integral and focused part of Native Hawaiian culture and played a large part in their religious system. Native Hawaiian belief states that natural objects such as rocks, plants, and animals are kinolau (body forms) of the gods (Abbott 1992, 15). Kāne, the great life giver, for example, is said to be present in kō (sugarcane) and 'ohe (bamboo); Kanaloa, the master of the sea, is present in mai'a (bananas), and many other sea creatures; Kū, associated with building and war, is present in niu (coconut), some marine animals, and trees; and Lono, the god of peace, planting, and fertility, is present in rain clouds, 'uala, and 'ipu (gourds) (Abbott 1992).

The land was divided into areas called ahupua'a, then into smaller divisions called 'ili 'āina that were worked by individuals or families, with areas set aside and worked for the chiefs and ali'i (Abbott 1992, 11). An ahupua'a included all the resources necessary for subsistence, creating a system that maximized natural resources. In nearly all cases, an ahupuaʻa would have sufficient water to irrigate crops, enough upland (or mauka) resources for building material and hunting, and coastal (or makai) access for marine resource use. It is estimated that for every family that fished and lived along the shore, many more inland families were involved in farming and agriculture (Abbott 1992). Trading between those who farmed the sea and those who farmed the land was developed by the time the Europeans came and ensured that all resources were available to all Hawaiians.

Certain archaeological sites appear to reflect this evolved system of resource use. For example, historic irrigation ditches or auwai would carry water from mountain sources to irrigate the pondfields or loʻi of several families, while stone walls or earthen berms would be built around agricultural plots.

According to tradition, Native Hawaiians feel a spiritual and even genetic connection to plants, specifically kalo or taro, as they play a large role in their creation traditions (the Kumulipo). One version of this story describes how Wākea, the sky god, coupled with his daughter, resulting in a stillborn and misshapen male fetus that was buried in the earth on the east side of their house (Enos 1998, 36). From out of the ground where the baby was buried the kalo grew, nourished by the tears of his mother. When Wākea's daughter became pregnant again, she bore the first male human, named Hāloa. All future Hawaiians would be related to him, and consequently related to the kalo, the plant that grew out of Hāloa's stillborn brother.

Many of the plants had multiple uses and were also used as offerings, again bridging the gap between sustenance and religion. Since nearly all plant species were considered kinolau, their use and consumption were directed by the kapu system, which covered religion, social activities, exchanges, and interactions. It was this system that the Europeans encountered when they first arrived.

With such direct links to plant life, much of Hawaiian religion and ceremony is centered around traditions regarding when to plant, fish, harvest, or process natural resources. This focus, and the belief that "Native Hawaiian" extends beyond the human form, encompassing the natural landscape and the physical forms of their gods held within earth, water, plants, and animals, implies that the definition of "ancestor" to Native Hawaiians includes every water source, geological characteristic, plant, insect, and animal that exists in any given area.

#### *Native Hawaiian Resources Regulatory Framework*

Native Hawaiian resources, which are included in the cultural landscape section discussed above, consist of properties of traditional religious and cultural importance to a Native Hawaiian group: traditional cultural properties (TCPs); prehistoric and historic archaeological sites, which may include heiau (temple complexes) and burial sites, traditional gathering places and traditional use sites, and plants and animals used for subsistence and other cultural purposes.

The National Park Service defines TCPs as places that at a minimum are "eligible for their inclusion in the [National Register of Historic Places] because of [their] association with cultural practices or beliefs of a living community that (a) are rooted in the community's history and (b) are important in maintaining the continuing cultural identity of the community" (Parker and King 1990). TCP studies have been conducted and are ongoing throughout the SBCT ROI. These studies have identified a number of areas of traditional importance (ATIs). The process for determining if identified ATIs are eligible as TCPs includes consultation among the Army, the SHPO, and other interested groups. At this time, the ATIs identified have not yet been evaluated, and as such, there are no formal TCPs within the SBCT project areas.

Executive Order (EO) 13007 protects Indian and Native Alaskan sacred sites on federal lands; AR 200-4 extends these protections to Native Hawaiian sacred sites as follows: "Installation commanders will avoid adversely affecting the physical integrity of sacred sites and shall establish procedures to ensure reasonable notice is provided to… Native Hawaiian organizations when Proposed Actions or land management policies or practices may restrict future access to, ceremonial use of, or adversely affect the physical integrity of sacred sites". These sacred sites may be considered ATIs; they may not necessarily be the same as TCPs and may or may not be eligible for the National Register of Historic Places (NRHP).

As a general rule, access to Army land is restricted to DOD personnel, but Army staff work regularly with Native Hawaiians and Range Control to provide access to specific ATIs at SBMR, DMR, and PTA on request, subject to missions requirements and public safety concerns and via scheduled tours at PTA. KLOA is on Kamehameha Schools lands, and the Kamehameha Schools control access themselves, subject to military scheduling. USARHAW provides Native Hawaiian groups with ties to the training lands copies of cultural resources reports produced for the cultural resource management program.

### *Regulatory Framework for Native Hawaiian Cultural Landscapes*

Federal guidelines recognize four cultural landscape categories, two of which are most relevant for this discussion: historic vernacular landscapes that illustrate peoples' values and attitudes toward the land and reflect patterns of settlement, use, and development over time, and ethnographic landscapes associated with contemporary groups that are typically used or valued in traditional ways (Stoffle, Halmo, and Austin 1997).

National Park Service Cultural Resource Management Guidelines describe cultural landscapes as complex resources that range from rural tracts to formal gardens, further defined by the way the land is organized and divided, settled, and used, including the types of structures that are built on it (Stoffle, Halmo, and Austin 1997). Natural features, such as landforms, soils, and vegetation, provide the framework within which the cultural landscape evolves, and in its broadest sense, a cultural landscape is a reflection of human adaptation to and use of natural resources (Stoffle, Halmo, and Austin 1997).

It is difficult to define in Euro-American terms what cultural landscapes mean to Native Hawaiians, and it has become evident that labeling and evaluating geographic units that are usually loosely defined and based upon interdependent and intermingled cultural traditions presents only a part of the overall picture. Although a number of different terms may be used to describe these cultural areas, the term "cultural landscape" is used because it is widely understood and has official standing in federal cultural resources law and regulation.

To apply federal guidelines to Native Hawaiian cultural landscapes, a culturally specific set of components reflecting Native Hawaiian spiritual, religious, and cultural values have been identified. In "Kalo Kanu o Ka ʻĀina," a report on the cultural landscape for Keʻanae and Wailua Nui, five somewhat overlapping types of sites were identified (McGregor 1998). These categories necessarily reflect the importance of culturally significant natural resources, in addition to human-made resources, such as archaeological sites; they are as follows:

1) Areas of naturally occurring or cultivated resources used for food, shelter, or medicine.
2) Areas that contain resources used for expression and perpetuation of Hawaiian culture, religion and language.
3) Places where known historical and contemporary religious beliefs or customs are practiced.
4) Areas where natural or cultivated endangered terrestrial or marine flora and fauna used in Native Hawaiian ceremonies are located, or where materials for ceremonial art and crafts are found.
5) Areas that provide natural and cultural community resources for the perpetuation of language and culture, including place names and natural, cultural, and community resources for art, crafts, music, and dance.

These specific types of landscapes have not been formally evaluated within SBCT project areas. Considered as ATIs, these are landscapes that have been identified and that may contain culturally significant natural resources or human-made resources that may have been used to cultivate these landscapes.

### *Research Methods*

The Army has used the NEPA scoping process described in Appendix B to begin collecting information from Native Hawaiian groups and individuals that will help identify Native Hawaiian resources in the project areas. During this process, the Army received numerous comments regarding access to and protection of sacred sites and sacred landscapes. In response to these comments and as part of the Army's compliance with Section 106 of the NHPA, Army staff are consulting with the Advisory Council on Historic Preservation (ACHP), Hawaiʻi State Historic Preservation Office (SHPO), OHA, Hui Mālama I Nā Kūpuna O Hawaiʻi Nei, the Royal Order of Kamehameha, Mālama Mākua, Native Hawaiian community organizations and civic clubs, and Native Hawaiian elders to further identify Native Hawaiian resources in SBCT project areas. The public involvement discussion in Appendix B and the Section 106 compliance process both address consultation to identify Native Hawaiian resources.

Archival research and field surveys were conducted to identify Native Hawaiian resources not recorded in the Army's previous cultural resource studies of Hawaiʻi. The information from the previous studies has been categorized by place name, clarifying the extent of the information in each project area section. This place name information is contained in Appendix J. Oral histories collected for projects in areas near or associated with SBCT installations, such as the Saddle Road project (Langlas et al. 1997), the associated Palila mitigation project (Tomonari-Tuggle and Paraso 2002), and the Mauna Kea Science Reserve (Maly 1999), were reviewed for additional information. Sources from the 19th and early 20th century record Hawaiian myths, legends, genealogies, and oral histories and have been re-inspected for references to places and traditional practices on SBCT installations (Kamakau 1961, 1964; Beckwith 1940; Fornander 1880, 1917; Malo 1951, Thrum 1976).

Land grant records collected by previous researchers were inspected for references to traditional uses and practices in the SBCT project areas. Additional archival research has been conducted, and historians and archivists were consulted including consultation with SHPD historian Holly McEldowney, Hawai'i State Archives, Bishop Museum library and archives, Hawai'i State library, University of Hawai'i Hamilton Library Hawaiian and Pacific Collection, the University of Hawai'i Center for Oral History, Hawai'i Mission Children's Society library, and the Hawaiian Historical Society library. Other referenced resources include cultural impact assessments prepared for the state of Hawai'i and filed at the OEQC, as well as numerous oral histories referenced in the catalog of the Oral History Program and the Bishop Museum Archives.

In addition to consultation and archival research, field surveys were conducted to locate previously recorded cultural resources and identify new cultural resources in SBCT project areas. In compliance with the NHPA, more work would be conducted as appropriate for some discovered sites before the project is implemented.

### *Historic Overview*

This section provides a general overview of regional history with an emphasis on military history in Hawai'i. More specific discussions can be found in later sections concerning each project area.

The Hawaiian Islands were settled between 100 and 800 AD, most likely from the Marquesas Islands in the South Pacific. The greatest population expansion in the islands occurred between 1150 and 1400, and archaeologists believe that during the later part of this period Hawaiian culture became quite complex. During this time, powerful lineages of high chiefs of O'ahu and Hawai'i were founded. Additionally, agriculture expanded and intensified during this period. By 1700, the islands had developed the social structure that would greet Europeans on their arrival, with population centers, royal centers, temple complexes, and intensive dryland and irrigated agriculture (Tomonari-Tuggle 2002).

In the 17th and 18th centuries, political strife became common in the islands, as ruling chiefs battled for dominance. Political power became increasingly concentrated, culminating in the development of multi-island chiefdoms in the late 1700s. In 1778 Captain James Cook was the first European to arrive in Hawai'i, followed by European and American traders looking for supplies and trading opportunities. The influx of European and American trade goods, including cannons and other heavy weapons, influenced Hawaiian politics in the end of the

18th century and beginning of the 19th. By the time of his death in 1819, the legendary King Kamehameha was ruler of all the Hawaiian Islands (Tomonari-Tuggle 2002).

American and European missionaries began arriving in 1820, at the same time that the ancient kapu (or taboo) system collapsed. An influx of settlers, traders, and farmers brought about great changes in Hawai'i's social structure, economy, and natural environment. The Great Mahele was a land redistribution system put into place beginning in 1845, redistributing and privatizing land all through the islands. The development of commercial agriculture (ranching, sugar, and pineapple) resulted in waves of new immigrants, including Chinese, Japanese, Portuguese, and Philippinos brought in to work the plantations. A revolution in 1893 replaced the monarchy with a provisional government and then a republic, which was annexed to the United States in 1898 as a territory (Tomonari-Tuggle 2002).

War with Spain was an added incentive for the United States to annex the islands and develop military defenses there. In the last half of the 19th century, construction of multiple military installations began; these included Pearl Harbor, Schofield Barracks, and coastal defenses in southern O'ahu. While many military personnel were relocated to Europe during World War I, after the war, aviation stations were developed in Hawai'i as part of the islands' defenses. During the 1930s the threat of impending war with Germany and Japan reinforced military buildup in the islands; Schofield Barracks alone supported 20,000 people (Tomonari-Tuggle 2002).

After the Japanese attack on Pearl Harbor on December 7, 1941, Hawai'i became even more important for the American war effort. Huge numbers of servicemen and women poured into the islands to support the war in the Pacific. By 1942 135,000 Soldiers were serving on O'ahu, and by 1945 that number had swelled to over 250,000. Hawai'i remained under martial law until the end of the war (Tomonari-Tuggle 2002).

Hawai'i continued to support the military during the Korean War (1950-1953), when additional housing was constructed at Schofield Barracks, and Wheeler Army Air Field was brought back into active duty. Kahuku and Pōhakuloa Training Areas were established in 1956, and nuclear missile sites were constructed in various locations beginning in 1959, the year Hawai'i became a state. Hawai'i became a staging ground for the Vietnam War from 1963 to 1975, and also served as a rest and recreation retreat for battle-weary Soldiers (Tomonari-Tuggle 2002).

### *Prehistoric and Historic Resources*

Prehistoric and historic resources to be found on SBCT project areas include historic and prehistoric archaeological sites, ATIs, historic buildings, structures, and districts, Cold War properties, historic landscapes, and monuments and memorials (Tomonari-Tuggle 2002).

Several hundred archaeological sites have been identified within the SBCT ROI. Recently completed surveys within the project areas have identified a large number of sites that have been recommended for listing on the NRHP. Two sites are already formally determined as NRHP eligible.

Archaeological sites on O'ahu are diverse and may include heiau (religious structures), ko'a (small shrines), fishponds, stone markers, fishing shrines, habitation sites, caves and rock shelters, mounds, burial platforms, earth ovens, stone walls and enclosures, agricultural terraces, canals or ditches, rock art sites, and trails. Sites on PTA include cairns, volcanic glass workshops or quarries, excavated pits, trails, surface platforms or walls, open air shelters, and lava tube sites (Tomonari-Tuggle 2002).

Historic period archaeological sites include gun emplacements, concrete structures and bunkers, concrete walls, wooden structural remains, masonry platforms, concrete revetments, bermed depressions, berms and rock piles, tunnels, miscellaneous feature complexes, road beds, railroad remnants, and trash deposits.

Historic resources within the ROI for SBCT also include military housing, offices, structures, landscapes, and districts, as well as National Historic Landmarks. These historic resources can include properties that are less than 50 years old, such as Cold War properties, if they are found to be of exceptional significance. These historic resources include the Schofield Barracks Historic District, and the WAAF National Historic Landmark.

### *Current Management Efforts*

The cultural resources management program at USARHAW has a staff that includes a Cultural Resources Manager, four Cultural Resource Specialists and an Architectural Historian. The management of the resources includes maintaining a cultural site data base, as well as GIS mapping, field survey, site evaluation, location, verification, and monitoring before, during, and after training activities, site preservation, Native Hawaiian consultation and coordination with other regulatory agencies. The cultural resources team also coordinates and facilitates public outreach actions that include site visits and tours and public education. Present efforts also include the formation of Cultural Advisory Committees on the island of Hawai'i and O'ahu.

Cultural resources on Army property are managed in compliance with all applicable Federal laws and regulations, DOD Directive 4715.3 on Cultural Resources Management, and AR 200-4, the Army regulation on cultural resource management. Department of the Army Pamphlet 200-4 provides more detailed guidance to installation staff on cultural resources compliance. Under these regulations, the installation commander is responsible for compliance with cultural resources laws, and cultural resources management. In 1998 an overall ICRMP was developed for all O'ahu ranges; a historic preservation plan (HPP) was completed for PTA. Because WPAA has not been purchased, a plan has not been done for that area. Compliance with Section 106 of the NHPA requires close coordination between cultural resources staff and project planners to integrate the identification and evaluation of historic properties with the planning of construction or other USARHAW projects. This compliance process includes regular consultation with the SHPO, Native Hawaiian organizations, and other interested parties. Such consultation is initiated by letter but may take place face to face. If a project is determined to have an adverse effect on historic properties, Army staff will develop a memorandum of agreement (MOA) or programmatic agreement (PA) to address these effects and mitigate adverse effects. Such an agreement is usually signed by the Army, the SHPO, the ACHP, and other interested organizations or individuals.

In January 2003, the Army initiated a PA to address Section 106 consultation requirements under the NHPA for the proposed transformation. The Army consulted with the Office of Hawaiian Affairs (OHA), the National Park Service (NPS), Royal Order of Kamehameha I (ROOK), O'ahu Council of Hawaiian Civic Clubs (OCHCC), Hui Malama I Na Kupuna 'O Hawai'i Nei, O'ahu Island Burial Council (OIBC), Hawai'i Island Burial Council (HIBC), Historic Hawai'i Foundation (HHF), and Native Hawaiian organizations, families, and individuals who attach traditional religious and cultural importance to cultural sites within the various project areas. A January 2004 final version of the PA for the SBCT project contains stipulations that satisfy all the Army's Section 106 compliance responsibilities for SBCT. However, the PA does not override any rights Native Hawaiians and Native Hawaiian organizations have under federal law, as described in 36 CFR 800.2(c)(ii)(B). Appendix J contains a copy of the PA.

Army cultural resources staff members conduct regular outreach to Native Hawaiians to facilitate the Section 106 and 110 process and other consultation efforts to fulfill its obligations under the NHPA. This outreach includes offering tours and open houses, speaking to school groups and college students, and providing cultural access.

The Army has identified Native Hawaiian burial sites within the SBCT ROI. The Army completed notification and consultation for these burial sites in accordance with NAGPRA and, for the most part, left these human remains in place. Remains recovered from collections related to previous cultural resources work have been repatriated. It is USARHAW policy to leave burials in place and undisturbed whenever possible. Reburial areas are established as required after consultation with Native Hawaiian families, groups and individuals. The PA addresses inadvertent discoveries of human remains within SBCT areas and stipulates that any remains accidentally uncovered would be protected from additional disturbance, and all Army actions would be treated in accordance with NAGPRA.

## 3.12 HUMAN HEALTH AND SAFETY HAZARDS

Hazards that could threaten human health and safety within the project ROI are generally limited. The primary concerns of military training and operations affecting the environment include unexploded ordnance (UXO) on training ranges, lead and other contaminants from ammunition, the trichloroethylene (TCE) plume at SBMR, other installation restoration program (IRP) sites on military reservations, lead-based paint (LBP) and asbestos exposure, PCB contamination at KTA, and the ongoing threat of wildfires starting during live-fire training. These issues have been considered in all project-planning activities in order to minimize and possibly improve site conditions. Hazardous material and waste management continues to follow Army, federal, and state regulations in order to prevent impacts on human health or the environment.

### 3.12.1 Introduction/Region of Influence

This section provides an overview of the human health and safety hazards in and associated with the project area, such as hazardous materials and wastes that may be used and stored in the project ROI and current regulations that govern the use, transport, and disposal of these hazardous materials and wastes. This section also is a discussion of the electromagnetic fields that exist and threats and sources of wildfires within the project ROI. The TAMC Preventative Medicine Unit handles human health and safety issues affecting military personnel resulting from military operations. Civilian complaints, including human health and safety issues, are handled through the Public Affairs Office (PAO). In addition to the health and safety hazard issues addressed in this section, other issues associated with the proposed action that affect the public's health and safety are addressed in other sections, as follows:

- Aircraft and airspace issues are addressed in Section 3.4, Airspace;
- Air pollution is addressed in Section 3.5, Air Quality;
- Noise pollution is addressed in Section 3.6, Noise;
- Traffic safety issues are addressed in Section 3.7, Traffic;
- Water pollution and flooding are addressed in Section 3.8, Water Resources;
- Soil pollution and seismic and volcanic hazards are addressed in Section 3.9, Geology and Soils; and
- Emergency services are addressed in Section 3.15, Public Services and Utilities.

Sections 5.12 through 8.12 give detailed information about the hazardous materials and wastes used, stored, and generated, electromagnetic fields operating, and wildfire issues located within in the ROI. The ROI for the proposed actions includes the following locations:

- SBMR, SRAA, and WAAF;
- DMR and Dillingham Trail;
- KTA, KLOA, Helemanō Trail, and Drum Road; and

- PTA, BAAF, WPAA, and PTA Trail.

Because fences or mountain ranges cannot always confine or reduce impacts from hazardous materials, waste incidents, or natural hazards, such as wildfires, areas immediately adjacent to these project locations are considered part of the ROI.

### 3.12.2 Resource Overview

*Hazardous Materials*

According to the US Department of Transportation, a hazardous material is defined as a substance or material that the Secretary of Transportation has determined is capable of posing an unreasonable risk to health, safety, and property when transported in commerce and that has been designated as hazardous under section 5103 of the federal hazardous materials transportation law (49 U.S.C. 5103). The term includes hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table (see 49 CFR 172.101), and materials that meet the defining criteria for hazard classes and divisions in part 173 of subchapter C of CFR chapter I (US DOT 2003).

According to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), a hazardous substance can be defined as any substance that, due to its quantity, concentration, or physical and chemical characteristics, poses a potential hazard to human health and safety or to the environment. CERCLA has created national policies and procedures to identify and remediate sites contaminated by hazardous substances.

Typical hazardous materials at Army training sites include the following:

- Battery fluid;
- Aerosols;
- Petroleum, oils, and lubricants (POLs);
- Fluorescent light bulbs;
- Antifreeze/coolants;
- Solvents;
- Fuels (gasoline, diesel, and aviation fuels);
- Chlorine;
- Paint products;
- Pesticides; and
- Munitions.

The Army maintains site-specific spill prevention, control, and countermeasure (SPCC) plans and pollution prevention plans that regulate the storage and use of petroleum products and hazardous materials, respectively. Various Army regulations, pamphlets, training manuals, instructions, and codes address the safe storage, use, and transport of ammunition. Discussions of these materials are included in Appendix N, paragraph N10.

*Hazardous Waste*

The Resource Conservation and Recovery Act (RCRA) specifically defines a hazardous waste as a solid waste (or combination of wastes) that, due to its quantity, concentration, or physical, chemical, or infectious characteristics, can cause or significantly contribute to an increase in mortality. RCRA further defines a hazardous waste as one that can increase serious, irreversible, or incapacitating reversible illness or pose a hazard to human health or the environment when improperly treated, stored, disposed of, or otherwise managed. A solid waste is a hazardous waste if it is not excluded from regulation as a hazardous waste or if it exhibits any ignitable, corrosive, reactive, or toxic characteristics (USEPA 1999).

Under the Hawai'i Hazardous Waste Management Act (HRS Title 19, Health, Chapter 342J), the state hazardous waste management program provides technical assistance to generators of hazardous waste to ensure safe and proper handling. The hazardous waste management program promotes hazardous waste minimization, reduction, recycling, exchange, and treatment as the preferred methods of managing hazardous waste, with disposal used only as a last resort when all other hazardous waste management methods are ineffective or unavailable. The state program is coordinated with Hawai'i's counties, taking into consideration the unique differences and needs of each county.

A detailed USARHAW 2002 hazardous waste report is provided in Appendix K-1 and gives an example of hazardous wastes that are managed by the Directorate of Public Works (DPW) and then disposed of by the Defense Reutilization and Marketing Office (DRMO), as required under 40 CFR 265. The report identifies wastes managed solely at SBMR and WAAF, but similar wastes are generated at the other project installations.

Hazards associated with the proposed action include both wildfires and exposure to radio frequency (RF) electromagnetic fields. The Integrated Wildland Fire Management Plan (IWFMP) addresses fire actions for Army training lands and fits within the larger framework of the 25th ID(L) and USARHAW wildfire management program for all Army lands on Hawai'i. Potential civilian and military personnel exposure to RF electromagnetic fields is managed through DOD Instruction 6055.11 (Protection of DOD Personnel from Exposure to Radio Frequency Radiation). Both of these hazards are discussed in greater detail below.

### 3.12.3 Specific Health and Safety Hazards

The following section provides brief definitions and descriptions of human health and safety hazards and identifies specific hazardous materials and wastes that may be used, stored, or transported within the project ROI. These hazardous materials and wastes could affect the environment and often have specific regulations that govern their use, storage, and disposal. Site-specific information is provided under the discussion of individual installations in chapters 5 through 8.

### *Ammunition*

Live-fire training takes place at SBMR and PTA. The general public is not allowed into areas where ammunition is stored or used. Ammunition to be used for training is drawn from ammunition storage facilities at WAAF, from the naval magazines at Lualualei, or from West Loch, where various types of ammunition are stored in specially designed facilities. The section leader must sign for the exact quantities of ammunition issued. WAAF is just south of SBMR, Lualualei is approximately 35 miles (56 kilometers) northwest of Honolulu, and West Loch is approximately 20 miles (32 kilometers) west of Honolulu and 18 miles (29 kilometers) southeast of Lualualei.

### *Unexploded Ordnance*

DOD 6055.9 Standard defines UXO as "explosive ordnance that has been primed, fused, armed, or otherwise prepared for action, and that has been fired, dropped, launched, projected, or placed in such a manner as to constituted a hazard to operations, installations, personnel, or material and remains unexploded either by malfunction or design or for any other cause." The only weapons used in live-fire training that can produce UXO are grenades, mortars, and artillery; all other ammunition is inert. UXO is an obvious threat to Army personnel working on the range areas, as well as civilians living in the area. The environment is also at risk by the presence of UXO and ammunition, as chemicals such as lead and explosives propellant could leach into the soils and groundwater.

The ammunition is stored at ammunition holding areas in the vicinity of the exercise, is continuously guarded throughout the exercise, and is dispensed as needed. The various live-fire training exercises are described in Chapter 2, Description of Proposed Action and Alternatives. When a live-fire training range is closed, explosive ordnance disposal (EOD) specialists destroy all UXO. Ordnance normally is destroyed where it is found. No known dud rounds are left in place at the conclusion of a training exercise. Any unused ammunition must be returned to the original storage facility at the end of the exercise.

In addition, Soldiers are educated on identifying UXO and proper procedures for handling UXO. Soldiers are given the *Skills Level 2 through 4 Manual* and Field Manual 21-16, *Unexploded Ordnance Procedures* (HQDA 1994), detailing the types of UXO, safety guidelines, and handling procedures. Before they are deployed, Soldiers are provided with additional training regarding specific types of UXO in the deployment location. UXO classes are periodically given to Soldiers for further training on UXO abatement. Finally, Soldiers who are chosen to assist EOD specialists with UXO clearance are given special training prior to range sweeps (Dunn 2003).

### *Live-Fire Training*

The live-fire activities conducted at SBMR and PTA include artillery and mortar (A&M) training, which requires use of bags filled with explosive propellant. Propellant charges are powder that propels or shoots the round of ammunition out of the gun barrel when ignited. Charges are transported to the firing point in the canister they come in. Canisters are transported only with a maximum holding of three charges. If charges are removed from the originally packed canister prior to movement, the canister is resealed to prevent disturbance from moisture or other influences.

The propellant containers are transported by cargo-type vehicles displaying appropriate DOT placards and equipped with two operable 10-lb-BC fire extinguishers. Vehicles used to transport ammunition must pass a rigorous safety inspection before they are allowed to enter any ammunition storage facility. All personnel involved in the transportation of ammunition are trained in accordance with Army, federal, and state standards and are certified to transport munitions and hazardous materials. Artillery and mortar ammunition are packed separately from ignition fuses to preclude accidental detonations. In addition, all ammunition is stored in specialized packing materials designed to withstand an impact 15 times greater than the force of gravity, which further reduces the risk of accidental explosion. All vehicles used in moving ammunition use diesel fuel or JP-8 (kerosene), fuels that are thicker, that are harder to ignite, and that are much less volatile than gasoline. These factors substantially reduce the risk of explosion in a vehicle accident (Onyx 2001, 131-132).

The amount of charges used generally determines how far the round travels. The exact number of bags of propellant required cannot be determined prior to training because acquisition of each target will require adjustments to trajectory and distance. Therefore, extra propellant is maintained on-site during training in order to ensure enough propellant will be available. The charges that are not used for firing missions on SBMR and PTA are burned as a part of training at designated burn pan areas, creating a residue. The constituents of this residue changes, but generally the contents include chemicals such as lead, 2,4- and 2,6-Dinitrotoluene (DNT), benzene, and cyanide. <u>After the propellant has been burned, a hazardous waste technician collects the residue. Burn pan residue does not have to be disposed of, but is a BMP that is instituted to minimize waste quantity and the potential for release to the environment. The technician takes all hazardous waste precautions by wearing a protective Tyvek suit, gloves, and a respirator during collection. Propellants are burned separately according to artillery type.</u> Residues from burned propellant are the only hazardous wastes temporarily stored at these range burn sites in a designated Hazardous Waste Shop Storage Point (HWSSP). When the HWSSP reaches full capacity on SBMR or PTA it is brought to the 90-day transfer accumulation point (TAP) facilities at SBER or PTA pending disposal by the DRMO, Hawai'i, in accordance with federal regulations (Borja 2002a).

Following training, the units remove any target equipment they may have provided, gather brass casings from spent rounds, remove litter, and otherwise make every effort to restore the facility to its condition prior to their use. Units are required to turn in as much of their ammunition residue (i.e. spent shells) as is practical to the ammunition storage point (ASP). For example, on a rifle range where there are established firing points, all of the brass shell casings are cleaned up and turned in as it is practical to retrieve it all. On the other hand, on a squad battle course, where there are no established firing points, units will have to return to where they fought the biggest battles and retrieve what they can. All ASPs require that a certain percentage of weight of brass and links be returned. If the unit is short, they either go back to the training site and find more residue to meet their weight requirement or the commander signs a statement to the effect that it is not practical to try to retrieve any more residue. The disposal of ordnance, such as ammunition, is regulated under RCRA. Specific details related to these regulatory requirements are included in Appendix N<u>10</u>.

The range facility management support system (RFMSS) keeps a consumption report in the Range Scheduling Office, updated daily with data on all ammunition expended at each range, on what date, and by which unit the ammunition was expended (Borja 2002a). The Directorate of Plans, Training, Mobilization, and Security Range Division, Hawai'i Scheduling Office conducts long-term scheduling of range facilities. Units can access the RFMSS to check the schedule of specific ranges and to request facilities at PTA (Sato 1996, 5-7).

### *Materials Not Used in Training*

Due to public concern, certain hazardous chemicals, specifically Agent Orange and depleted uranium, are being addressed. Various Air Force studies document that in 1971, chemical agents stored in Okinawa were transported to Johnston Island for storage at the Chemical Storage Facility. Public Law 91-672, passed in 1972, prohibited the transport of chemical agents from Okinawa to the United States and authorized destruction of Agent Orange outside these areas. In 1972, the 1.4-million gallon (5.3-million-liter) stockpile of Agent Orange amassed during the Vietnam War was transported directly to Johnston Island and also placed in storage there. In 1977, Agent Orange stored at Johnston Island, as well as in Mississippi, were destroyed by high-temperature incineration at sea in the South Pacific (Onyx 2001, 137). There is no record of Agent Orange used, stored, or disposed of on the islands of O'ahu or Hawai'i.

Military installations hosting training with depleted uranium rounds must apply for and be granted a license from the Nuclear Regulatory Commission for possession of depleted uranium cartridge penetrators. To date, of the three installations in the United States that have such licenses, none are in Hawai'i. A memorandum from the Deputy Chief of Staff, Logistics, Munitions (2000) states that a records search for depleted uranium rounds was conducted and determined that these types of munitions were never a part of the Army's inventory in Hawai'i and that the Army did not and does not have any plans to introduce depleted uranium to the State of Hawai'i (Onyx 2001, 127-128).

### *Range Sampling*

Surface soil and water sampling was conducted on SBMR and PTA firing ranges from November 8 through 14, 2002, in order to obtain information about surface soils on these two installations. Sampling focused on where existing ranges overlapped with proposed ranges.

Secondary explosives compounds, primarily trinitrotoluene (TNT) and cyclotrimethylene-trinitramine (RDX), which are the major ingredients in nearly all munitions formulations, were the focus of these investigations. Other organic chemical explosives used in specific munitions formulations were also tested for, including those that are no longer used in munitions but whose residues potentially remain on contaminated sites. Additionally, full characterization for metals was conducted in parallel with explosives at all of the site ranges.

The results of this sampling revealed that metals (aluminum, iron, lead, and antimony), explosives (RDX, TNT, and nitroglycerin), and semivolatile organic compounds (PAHs) were found at levels exceeding EPA Region IX PRGs on both SBMR and PTA. The PRG are not regulatory standards but used as conservative criteria to indicate a potential problem. The PRG levels used for evaluating the sampling results are levels used to evaluate industrial sites, and do not necessarily apply to areas whose current and future uses are for military training. As further discussed in Section 4.8 (Water Resources), aluminum and iron naturally occur above PRGs in the Hawaiian Islands due to minerals found in the volcanic rock, but the concentrations of lead and other metals could be attributable to man-made sources. These results and their potential affect on surface soil and water pollution are further discussed in Sections 4.8 (Water Resources) and 4.9 (Geology, Soils, and Seismology). The investigation report is included in Appendix M1.

### *Trichloroethylene*

TCE is a nonflammable colorless liquid at room temperature, with a sweet odor and sweet burning taste. TCE is mainly used as a solvent to remove grease from metal parts. TCE can also be found in some household products, including paper correction fluid, paint removers, adhesives, and spot removers (ATSDR 2001). Exposure to TCE occurs by breathing, eating, touching, or drinking it. The USEPA has set a drinking water standard for TCE of 5 parts per billion (ppb). OSHA has also set a worker exposure limit for an 8-hour workday, 40-hour work week of 100 ppm in air. The 15-minute average exposure in air should not exceed 300 ppm at any time during a workday (ATSDR 2001).

In 1985 TCE was found in four wells supplying potable water to SBMR at levels exceeding the health advisory level of 2.8 ppb established by DOH and the federal limit of 5.0 ppb (although the 5.0 ppb EPA federal limit was not established until 1987) (Belt Collins 1993, IV-21). Due to the presence of TCE in the groundwater, SBMR was put on the National Priorities List (NPL), and the Directorate of Public Works (DPW) established an IRP for the site in 1990 (Belt Collins 1993, IV-21). The SBMR NPL site was delisted in August 2000. Because potential contamination and the history of this site has been a public concern, the issue is addressed in the discussion of IRP sites in Section 5.12.

### *Installation Restoration Program Sites*

The IRP is an ongoing DOD-administered program for identifying, evaluating, and remediating contaminated sites on federal lands under DOD control. Through its IRP, the Army evaluates and cleans up sites where hazardous materials and wastes have been spilled or released into the environment. The IRP provides a uniform thorough methodology to evaluate past disposal sites, to control the migration of contaminants, to minimize potential hazards to human health and the environment, and to clean up contamination. IRP sites within the proposed action installations are described in sections 5.12 through 9.12 and appendices K-2 and K-3.

### *Lead-Based Paint*

Lead was a major ingredient in house paint used throughout the country for many years. LBP is defined as any paint or surface coating that contains more than 0.5 percent lead by weight. LBP is a hazard because it can slough off as dust or chips that children can easily inhale or ingest. In 1978 the 0.06 percent maximum lead content of newly applied dry paint was set by the Consumer Product Safety Commission. LBP use was discontinued entirely in 1980 (USCG 2002, 3-123). Army policy, like USEPA policy, is to manage LBP in place unless it presents an imminent health threat, as determined by the installation medical officer or unless operational, economic, or regulatory requirements dictate its removal. Army policy also imposes requirements to reduce the release of lead, lead dust, or LBP into the environment from deteriorating paint surfaces, building maintenance, or other sources on Army installations or on Army-controlled property.

Lead management practices are consistent across SBCT installations and DPW has established an installation lead hazard management program to ensure the health and safety of Soldiers and civilians within USAG-HI. The program includes an annually updated lead hazard management plan. The plan implements a management program for identification, risk assessment, worker safety, worker training and certification, community outreach and education, childhood lead poisoning prevention, evaluating, managing, and abating LBP hazards in accordance with Army Regulation 420-70 (USARHAW 2001b). The Army environmental department also maintains a database of lead surveys and results, which is updated as surveys are finalized (Song 2002). The most recent version of the lead survey database for SBMR, WAAF, KTA, PTA, and DMR is available through the Army DPW.

#### *Lead from Ordnance /Ammunition*

Lead is also used in manufacturing ordnance/ammunition, such as that used for small arms training. Lead accumulates in backstops, range floors, and berms and can leach into groundwater, be carried off-site by stormwater, be ingested by wildlife, or become airborne. Erosion can overload streams and rivers with sediments. The type and amount of ammunition used on the range, along with its operational history, will greatly influence the risk of lead migration to groundwater. Different calibers of ammunition contain varying amounts of lead, so when looking at the risk of lead migration, both the total number and type of rounds fired must be taken into consideration. This risk is substantially reduced if regular maintenance has been performed on the backstop and apron areas to remove rounds and fragments from soil (USAEC 1998, 8-10). As discussed previously, The Army implements general cleanup procedures following training events to remove shell casings and other munitions residue from the ranges, and explosive ordnance disposal (EOD) specialists destroy all UXO.

The Army recognizes the threats associated with lead. The Army document, Prevention of Lead Migration and Erosion from Small Arms Ranges (USACE 1998) provides management practices to minimize adverse impacts on human health and the environment from small arms ranges.

#### *Asbestos*

The USEPA and OSHA regulate asbestos-containing material (ACM) removal and clean-up. The Toxic Substances Control Act (TSCA), the Asbestos Hazardous Emergency Response Act (AHERA), and OSHA regulations provide protection for employees who encounter or remove and clean up ACM. The National Emission Standard for Hazardous Air Pollutants (NESHAP) regulates the renovation, demolition, and disposal of ACM. Asbestos is managed uniformly across the installations of the proposed action. An installation asbestos management program has been established by the DPW to ensure the health and safety of

Soldiers and civilians within USARHAW. Specific details of asbestos management program are included in Appendix N10.

### Polychlorinated Biphenyls

Polychlorinated biphenyls (PCBs) are mixtures of synthetic organic chemicals with the same basic chemical structure and similar physical properties, ranging from oily liquids to waxy solids. Due to their nonflammability, chemical stability, high boiling point, and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications, including electrical, heat transfer, and hydraulic equipment (USEPA 2002b). PCBs can be found in the cooling fluid of electrical equipment, including transformers and capacitors, particularly if such equipment was manufactured before the early 1970s. PCBs are also found in other manufactured items and as plasticizers and fire retardants in many solid materials (USCG 2002, 3-122).

The USEPA regulates the removal and disposal of equipment containing PCBs in concentrations of 50 parts per million (ppm) or greater under this act (the USEPA regulations implementing TSCA are found in 40 CFR, Part 761). These regulations classify electric transformers containing PCBs as either PCB-contaminated (containing between 50 and 500 ppm) or PCB (containing greater than 500 ppm). The use and disposal of transformers containing less than 50 ppm are not regulated by the USEPA, but disposal of transformer oils containing PCBs is regulated on a state and local level down to 2 ppm. The use and disposal of capacitors containing PCBs at greater than 2 ppm are also regulated (PRC 1995, 1-4).

The Army is committed to removing or retrofilling all electrical equipment containing regulated amounts of dielectric fluid containing PCBs. Active devices containing regulated levels of PCBs are to be replaced with non-PCB devices or retrofilled and reclassified to non-PCB status, in accordance with reclassification requirements outlined in 40 CFR Part 761.30(a)(2)(v). Inactive devices containing regulated levels of PCB are to be removed from the installation and disposed of (PRC 1995, 4).

### Electromagnetic Fields

DOD Instruction 6055.11, Protection of DOD Personnel from Exposure to Radio Frequency Radiation, applies to all DOD civilian and military personnel who may be exposed to RF electromagnetic fields, except for patients undergoing diagnostic or therapeutic procedures in medical and dental treatment facilities (DOD 1996, 1-3). It also applies to operations during peacetime and, to the maximum extent possible, during wartime, to limit personnel exposure to RF electromagnetic fields. The instruction states that it is DOD policy to limit personnel Radio Frequency exposure to levels that are within the permissible exposure limit; these limits are identified in enclosure 5 of the instruction. In addition, Army Pamphlet 385-64, described above, addresses electrical hazards.

The production of electromagnetic fields (EMF) is associated with the generation, transmission, and use of electrical energy (NIEHS 2002). The frequency of the field describes the number of cycles that occur in one second and is measured in hertz (Hz). Extremely low frequency (ELF) EMF has cycle frequencies of greater than 3 Hz and less than 300 Hz. In the United States, electricity is usually delivered as alternating current that oscillates at 60 Hz (OSHA 2002). Electromagnetic fields get weaker with distance from their source.

In 1992, the US Congress authorized the Electric and Magnetic Fields Research and Public Information Dissemination Program (EMF-RAPID Program) in the Energy Policy Act (NIEHS 2002). The EMF-RAPID Program was funded jointly by federal and matching private funds, with substantial financial support from the utility industry. Congress instructed the National Institute of Environmental Health Sciences (NIEHS) and the Department of Energy (DOE) to direct and manage a program of research and analysis aimed at providing scientific evidence to clarify the potential for health risks from exposure to ELF-EMF. The NIEHS is one of 25 institutes and centers of the National Institutes of Health (NIH). The EMF-RAPID Program had the following three basic components:

- A research program focusing on health effects research;
- Information compilation and public outreach; and
- A health assessment for evaluating any potential hazards arising from exposure to ELF-EMF.

The NIEHS was directed to oversee the health effects research and evaluation (NIEHS 2002), and provide a report outlining the possible human health risks associated with exposure to ELF-EMF. The document that responds to this requirement of the law is the NIEHS Report on *Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields*.

In its report, the NIEHS concludes that ELF-EMF exposure cannot be recognized as entirely safe because of weak scientific evidence that exposure may pose a leukemia hazard. In the opinion of the NIEHS, "this finding is insufficient to warrant aggressive regulatory concern. However, because virtually everyone in the United States uses electricity and therefore is routinely exposed to ELF-EMF, passive regulatory action is warranted such as a continued emphasis on educating both the public and the regulated community on means aimed at reducing exposures. The NIEHS does not believe that other cancers or non-cancer health outcomes provide sufficient evidence of a risk to currently warrant concern" (NIEHS 2002).

Based on the results of the NIEHS report discussed above, ELF-EMF are not addressed in this EIS as a potentially harmful issue of concern, but project activities involving electromagnetic field frequencies higher than ELF-EMF are addressed. This includes radio frequency EMF.

Remote automated weather stations (RAWS) are located on some of the installations, primarily in remote wildland fire areas, and are used to collect weather information to aid in determining the threat of wildfires (Shelley 2002). RAWS use radio frequencies to transmit weather data to a geostationary operational environmental satellite. The RAWS transmit information for approximately 15 seconds each hour, every hour around the clock. Exposure to any RAWS EMF is limited because they are typically located in remote locations, are unmanned, and transmit information for a short duration.

Equipment producing EMF that could pose a serious health risk is operated under strict constraints, in site-approved areas, and by qualified personnel (Moreno 2002). In addition to mobile radar equipment, stationary equipment is located at WAAF and SBMR. Mobile radar equipment is owned by Division Artillery and consists of a radar set designed to detect incoming artillery and projectiles. It is operated and managed by the Forward Area Defense section. Specific stationary equipment producing EMF that could pose a serious health risk is located at SBMR and WAAF and is discussed in Chapter 5.

### *Petroleum, Oils, and Lubricants*

POL products form a major category of hazardous materials used at the project installations and include engine fuels (gasoline, diesel, jet fuel [JP-8]), motor oils and lubricants, and diesel and kerosene heating fuels. More specifically, vehicle and heating fuels include a mixture of aliphatic hydrocarbons and such aromatic organic compounds as benzene, toluene, ethylbenzene and xylene (BTEX) (IMS 1994, 3-20). CERCLA definitions of hazardous substances (42 USC 9601[14]) and pollutants exclude petroleum unless specifically listed. The USEPA interprets petroleum to include hazardous substances found naturally in crude oil and crude oil fractions, such as benzene, and hazardous substances normally added to crude oil during refining. Petroleum additives or contaminants that increase in concentration in petroleum during use are not excluded from CERCLA regulations.

### *USTs/ASTs*

Both underground storage tanks (USTs) and aboveground storage tanks (ASTs) are used to store hazardous substances and petroleum products at locations throughout the project area. USTs are regulated under RCRA and its implementing regulation (40 CFR, Parts 280 and 281 as mandated by the Hazardous and Solid Waste Amendments of 1984, PL 98-616, 98 Stat. 3221); Hawai'i's Department of Health Environmental Management Division (State Statutes Chapter 342-L); and USEPA (Technical Standards and Corrective Action Requirements for Owners and Operators of USTs [40 CFR 280]. See Appendix N10 for details on the Army's UST Program.

### *Oil/Water Separators*

Oil/water separators (OWSs) separate oil, fuel, and grease from water by gravity because these substances have a specific gravity that is less than that of water (i.e. gasoline floats on water). OWSs are often located below ground or housed in a vault constructed flush with the ground surface and therefore they can create environmental issues similar to USTs. A vehicle maintenance area may contain a small self-contained OWS unit with access through trenches and floor drains, whereas a wash rack may contain a larger industrial-sized OWS unit capable of higher flow rates and larger volumes of wastewater. Many larger OWSs are connected to USTs where the oils will then be stored. Each month, the oils are skimmed from the surface of these OWSs or USTs and recycled or disposed of; sediments are removed every six months or more frequently, if needed, by a service contractor. Oils and other hazardous wastes are then disposed of by the service contractor (McGinnis 2002).

*Pesticides/Herbicides*

The USEPA defines a pesticide as any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest (USEPA 2002c). Pests can be insects, mice, and other animals, unwanted plants (weeds), fungi, or microorganisms, such as bacteria and viruses. Though often misunderstood to refer only to insecticides, the term pesticide also applies to herbicides, fungicides, avicides (bird agents), rodenticides, and various other substances used to control pests. A pesticide is also defined as any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant (USEPA 2002c). The inclusive pesticide issue for this project discussion includes the specific herbicide title due to the explicit concern on herbicide use and storage. All pesticides used on federal lands must be applied by a trained and certified pesticide applicator or by a trainee under the direct supervision of a certified pesticide applicator.

*Biomedical Waste*

The Medical Waste Tracking Act (PL 100-582, 42 USC §§6912, 6992, et seq.) under RCRA establishes the standards for tracking and managing medical waste. This act is strictly a demonstration program to track the disposition and transportation of medical wastes.

OSHA regulates occupational exposure to blood, regulated waste, and certain other body fluids that have been shown to transmit bloodborne diseases. OSHA defines regulated waste as liquid or semiliquid blood or other potentially infectious materials, contaminated items that would release blood or other potentially infectious materials in a liquid or semiliquid state if compressed, items that are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling, contaminated sharps, and pathological and microbiological wastes containing blood or other potentially infectious materials (USCG 2002, 3-123).

The Army follows strict guidelines according to AR 200-1 in the handling, use, and disposal of medical, dental, and veterinary supplies; this is discussed in detail in Appendix N10.

Most medical waste within the project vicinity is produced and temporarily stored outside of the project area at Tripler Army Medical Center. The medical clinics on SBMR and PTA produce small amounts of regulated chemical and medical waste. The regulated waste from SBMR is picked up weekly by a private contractor and is sent to Tripler Army Medical Center (Thomas 2002). The regulated waste from PTA is transported on an as-needed basis, generally once per year, and delivered to Hilo Hospital (Hill 2002). The medical waste is combined and temporarily stored before being disposed of at a regulated off-base disposal site. Emergency medical training medics accompany units on deployment at KTA and DMR and biomedical waste is shipped back to SBMR with the units.

*Radon*

Radon is a colorless and odorless gas that is produced by the decay of naturally occurring uranium and is found in high concentrations in rocks containing uranium, granite, shale, phosphate, and pitchblende. Atmospheric radon is diluted to insignificant concentrations. Radon trapped in soil can enter a building through small openings and can accumulate in enclosed areas, such as basements.

Radon is measured in picocuries per liter (pCi/L) of air. The average level of radon is estimated to be 1.3 pCi/L indoors and 0.4 pCi/L outdoors. There are no laws that require testing and remediating radon, but the USEPA has made recommendations for both residential housing and schools. The USEPA-recommended action level for radon is 4 pCi/L.

Radon occurs in low concentrations in the Hawaiian Islands. Hawai'i's low radon concentrations can be attributed to soils low in uranium, and year-round natural ventilation of frequently occupied buildings, such as homes and schools. The Army follows a Radon Reduction Program under AR 200-1 to reduce radon exposure of military personnel and civilians. The Army Radon Reduction Program is discussed in detail in Appendix N10.

As part of the National Radon Database, the USEPA and the USGS have evaluated the radon potential in both Honolulu and Hawai'i counties. This evaluation categorized both Hawai'i and Honolulu counties as Radon Zone 3 areas (EDR 2002a-e). These areas have the lowest average short-term radon measurements (less than 2 pCi/L) that can be expected to be measured in a building without implementing radon control methods. The three USEPA radon zone concentrations are listed below:

- Zone 1, highest potential (greater than 4 pCi/L);
- Zone 2, moderate potential (from 2pCi/L to 4 pCi/L); and
- Zone 3 (Honolulu and Hawai'i counties), lowest potential (less than 2 pCi/L).

Data from several radon surveys in Hawai'i show concentrations much lower than the USEPA's recommended action level of 4 pCi/L of air. For example, a 1993-1996 Radon School Survey of 97 schools in Hawai'i resulted in an average radon level of 0.6 pCi/L (DOH 1998). Additionally, the latest Environmental Compliance Assessment (ECAS) Report (1999) for SBMR WAAF, and PTA, there were no findings for radon (USACE 1999). An ECAS report is an in-house study of the compliance status of military installations. For this reason, radon is not addressed in the individual installation analyses.

### *Wildfires*

Wildland fire management on Army-controlled O'ahu lands is conducted in accordance with the NHPA and the ESA (USARHAW and 25th ID[L] 2001a, 69). See Section 3.11, Cultural Resources, and Section 3.10, Biological Resources, for further details on these acts. The IWFMP for O'ahu and Pōhakuloa Training Areas was developed to establish specific guidance, procedures, and protocols for managing wildfires on Army training lands. The IWFMP acknowledges that most fire history files are incomplete; the files were primarily retained as records, and after five years, following the disposition of records, they were destroyed, in accordance with the Modern Army Recordkeeping System (USARHAW and 25th ID[L] 2003, 1-1 and 3-11). Chapter 1 of the IWFMP is provided in Appendix O.

The IWFMP addresses environmental conditions and fire effects in Hawai'i, fire prevention, fire suppression, post-fire actions, and fire management areas. Fire prevention includes planning, managing fuels, using prescribed fire, planning water resources, and conducting firefighter training. Fire suppression actions include the following issues:

- Responsibilities, procedures, and strategies for fire suppression;
- Special consideration to suppress fires on USARHAW lands in order to minimize impacts on natural and cultural resources;
- Fire detection and reporting procedures;
- Initial and extended attack on fires;
- Communication devices used during fires;
- Air operation protocols;
- UXO concerns and safety during firefighting; and
- Mutual aid support agreements with cooperating agencies.

Records and reports, reviews and formal investigations, and analysis make up post fire actions (USARHAW and 25th ID[L] 2003). These require the Wildland Fire Program Manager to maintain a wildland fire incident report for all wildland fires on Army lands. The fire incident report contains approximately 26 data input categories and includes such information as the date of the fire, its location, and the number of acres burned. Every fire must be reported to Range Control or the Federal Fire Department. The installations addressed in the IWFMP use the same standard wildland fire incident report form. According to *Analysis of Fire Management Concerns at Mākua Military Reservation,* additional information should also be retained in the fire records (Beavers et al. 1999). Chapter 7 of the IWFMP covers eight Army sites on O'ahu and the island of Hawai'i (USARHAW and 25th ID[L] 2003). IWFMP discussion of the eight fire management areas typically describes baseline site characteristics, wildland fire fuel types, previous fires, the protection of biological and cultural resources, and the firebreak system. Access to water resources and the efficient use of water can significantly affect the outcome of efforts to control wildland fires on training lands. The locations of water storage resources and other firefighting resources are described in the fire management areas of the IWFMP. Fire trucks and rotary-winged aircraft with fire buckets primarily use the water storage resources. If a water resource is off Army land, formal agreements between the Army and the owners of the water resource are needed for those resources to be deemed potentially useful. Although water storage resources such as dip ponds are maintained, sea and brackish water are often the most readily available sources of water for wildland firefighting in Hawai'i. The use of seawater to control wildland fires is acceptable in emergency situations and when freshwater is not available (USARHAW and 25th ID[L] 2003, 4-29).

The appendices to the IWFMP address standing operating procedures (USARHAW and 25th ID[L] 2003). The appendices also provide additional details pertaining to interagency cooperative agreements and the wildland fire program budget. The standing operating procedures provide specific requirements that delineate the responsibilities of the Army, Federal Fire Department, Range Control personnel, and military training units in preventing and suppressing fires on Army lands. In addition to addressing the environmental setting in the standing operating procedures, site-specific guidance is provided for fire prevention, fire suppression actions, and post-fire actions.

According to the IWFMP, in the recent past, the entire Hawaiian ecosystem has experienced an increase in wildfire frequency (USARHAW and 25th ID[L] 2003, 3-11). Causes for the increase in fire frequency include the spread and intensification of alien grasses. On Army land, technological advances in ammunition and supporting pyrotechnic devices used for training have contributed to the fire frequency increase. In 1991, the Army began to reduce the frequency of fires on Army land with the application of a fire prevention and prescribed burn program.

On O'ahu, when northeasterly trade winds prevail and flammable fuels are abundant, the threat of fire to natural communities intensifies (USARHAW and 25th ID[L] 2001a, 34, 69). Prior to human settlement, natural fires on O'ahu were rare. Most wildfires are of human origin because lightning is rare on O'ahu. The fires on O'ahu mostly occur at lower elevations and in drier leeward locations, and are fueled by nonnative grasses. Military live-fire activities start many of the fires within ordnance impact areas, but most of the fires that start on training lands on O'ahu are contained within the boundaries of the installation.

To control fires, the Army uses the long-term liquid concentrate fire retardant LCA-R, which consists of ten percent ammonium, attapulgite clay thickener, a corrosion inhibitor, and a coloring agent, diluted with ninety percent water. (LCA-R is manufactured by Fire-Trol Holdings, LLC.) The corrosion inhibitor biodegrades in water and soil into carbon and nitrogen, but the ammonium component of the retardant could harm fish and other aquatic animals if accidentally dropped into a watercourse. LCA-R is primarily used on prescribed fires, while water and nonpotable water are primarily used on wildfires. Salt water is used as a last resort on wildfires. LCA-R is approved for use by the US Forest Service under USDA Forest Service Specifications 5100-00304 and has been determined not hazardous to people (Enriques 2002a, 2002b, and 2002c).

During a typical training exercise, unit leaders receive briefings from Range Division staff on the locations of fire hazards and fire prevention measures and procedures. Before maneuver live-fire training, unit leaders walk the areas to be used in a training scenario, accompanied by Range Division staff members who direct the location and limitations for weapons firing. When the live-fire walk through is completed, the unit leaders use blank ammunition and signaling devices to rehearse the attack scenario. Where necessary, the scenario is modified to reduce the risk of fire or other damage to the environment. The unit leaders then brief every Soldier in the unit on the importance of preventing wildland fires. In the event of fire at any location, the unit takes all appropriate actions to put out the fire.

## 3.13 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

This section describes the social and economic setting for the islands of O'ahu and Hawai'i. As detailed below, the State of Hawai'i has experienced prolonged economic stagnation during the past decade. The terrorist events of September 2001, which significantly damaged the tourism industry, the largest sector in the state's economy, significantly exacerbated Hawai'i's economic problems.

Over all, state economic and population growth for the past decade has lagged the rest of the nation, although there was significant variability in growth rates among the different counties within the state. For example, the population of Honolulu County grew by only 4.8 percent during the 1990s, while the population of Hawaii County increased by 23.6 percent, almost double the national growth and triple the state's growth. Other major trends that occurred in the Hawaiian economy during the 1990s, included continued growth in federal government spending and expansion of private sector technology employment. Other sectors, including agriculture, continued to decline in importance. Finally, while the number of military personnel decreased during the 1990s, the military remained second only to tourism as the largest sector in Hawai'i.

### 3.13.1 Introduction/Region of Influence

The socioeconomic indicators used for this study include regional economic activity (employment and business sales volume), population, housing, and schools. These indicators characterize the ROI. An ROI is a geographic area selected as a basis on which social and economic impacts of project alternatives are analyzed. The ROI includes nearby trade and service centers related both directly and indirectly to the economic activities of each installation, and takes into account the residency distribution of military and civilian personnel, and the schools their children attend. The ROI for socioeconomic impacts includes Honolulu County (Island of O'ahu), on which SBMR, DMR, and KTA are located, and Hawai'i County (the Island of Hawai'i), on which PTA is located. For the purpose of discussing socioeconomic characteristics, the islands can be further defined by political and statistical subdivisions.

One county covers each island. Honolulu County covers O'ahu and parts of the smaller islands, and Hawai'i County covers the Island of Hawai'i. Honolulu County is divided into seven Census County Divisions (CCDs), including 'Ewa, Honolulu, Ko'olauloa, Ko'olaupoko, Wahaiwā, Waialua, and Wai'anae. A CCD represents a relatively permanent statistical area established cooperatively by the US Census Bureau and state and local government authorities. The twelve districts within Hawai'i County are Hilo, Honoka'a-Kukuihaele, Ka'ū, Kea'au-Mountain View, North Hilo, North Kohala, South Kohala, North Kona, South Kona, Pā'auhau-Pa'auilo, Pāhoa-Kalapana, and Pāpa'ikou-Wailea. DMR is within the Waialua CCD, and KTA is within the Ko'olauloa CCD. SBMR is within the Wahiawā CCD. PTA occupies mainly Pā'auhau-Pa'auilo CCD and small portions of the North Kona, South Kohala, and North Hilo CCDs.

The socioeconomic resources of these areas are affected by the land uses and activities within the state and on O'ahu and the Island of Hawai'i in particular. Socioeconomic resources include population, employment, income, earnings, housing, and schools. The population data include the number of residents in the area and the recent changes in population growth. Data on employment, labor force, unemployment trends, income, and industrial earnings describe the economic health of a region. Income information is provided as an annual total by county and per capita. Housing availability and school enrollment and capacity are important considerations in assessing the effects of potential growth. The number and type of housing units, ownership, and vacancy rate also can be indicators of the regional quality of life. Additional demographic data, including race and ethnicity, age, and poverty status, are presented to evaluate potential environmental justice issues.

### 3.13.2 Resource Overview

#### *Population*

The population of the Island of Hawai'i doubled between 1970 and 1990; however, overall population growth rates have declined in the 1990s (USARHAW and 25th ID[L] 2001b). Net internal migration was the primary source of population increase in Hawai'i County between 2000 and 2001, compared with international migration and natural increase, whereas internal migration was the dominant source of decrease in Honolulu County. Natural increase and international migration accounted for major population increases in Honolulu County (Enterprise Honolulu, no date; HDBEDT 2000). Population distribution and growth are primary concerns identified in the general plan for O'ahu. Specific policies are set forth in the plan to control the growth of O'ahu's resident and visitor population by limiting population growth, reducing immigration, and promoting a more even population distribution to relieve development pressures on scarce natural resources and infrastructure (City and County of Honolulu 1992).

As shown in Table 3-13 the population of the state increased by 9.3 percent between 1990 and 2000. This compares to a 13 percent growth rate for the United States as a whole during the same period. While the population increase in Hawai'i County (23.6 percent) was more than twice the percentage increase in the state level, the population increase in Honolulu County (4.8 percent) was approximately half that of the percentage increase at the state level. In 2000 Hawai'i County's population accounted for 12.3 percent of the state population (a slight increase from 1990) and ranked second in the state (which contains four counties). Honolulu County's population (ranked first in the state) made up 72.3 percent of the state population (a 2.2 percent decline from the 1990 level) (US Census Bureau 1990a, 2000a).

Hawai'i has a large military population, albeit one that has decreased from a high of 67,100 military personnel in 1984 to 40,800 in 2000. Nonetheless, military personnel and their dependents still total more than 83,000 and account for almost eight percent of the state's population (HDBEDT 2001c). Because most of the population resides in or near Honolulu, the presence of military personnel and their dependents is most prominent on O'ahu.

Within Hawai'i County, the Kea'au-Mountain View, South Kohala, North Kohala, and Ka'ū CCDs experienced the greatest population growth, and the population of the Pāpa'ikou-Wailea CCD declined by 2.8 percent between 1990 and 2000. In 2000 the populations of the Hilo CCD (which includes the city of Hilo), North Kona CCD (which includes the city of

**Table 3-13**
**Hawaiʻi, Hawaiʻi County, and Honolulu County Population**

| | 1990 | 2000 | % Change 1990-2000 |
|---|---|---|---|
| Hawaiʻi | 1,108,229 | 1,211,537 | 9.3 |
| Hawaiʻi County (Island of Hawaii) | 120,317 | 148,677 | 23.6 |
| Hilo CCD | 39,537 | 42,425 | 7.3 |
| Honokaʻa-Kukuihaele CCD | 3,681 | 3,895 | 5.8 |
| Kaʻū CCD | 4,438 | 5,827 | 31.3 |
| Keaʻau-Mountain View CCD | 14,079 | 22,738 | 61.5 |
| North Hilo CCD | 1,541 | 1,720 | 11.6 |
| North Kohala CCD | 4,291 | 6,038 | 40.7 |
| North Kona CCD | 22,284 | 28,543 | 28.1 |
| Pāʻauhau-Paʻauilo CCD | 1,864 | 2,213 | 18.7 |
| Pāhoa-Kalapana CCD | 6,702 | 8,597 | 28.3 |
| Pāpaʻikou-Wailea CCD | 5,102 | 4,961 | -2.8 |
| South Kohala CCD | 9,140 | 13,131 | 43.7 |
| South Kona CCD | 7,658 | 8,589 | 12.2 |
| Honolulu County (Oʻahu) | 836,231 | 876,156 | 4.8 |
| ʻEwa CCD | 230,189 | 272,328 | 18.3 |
| Honolulu CCD | 377,059 | 372,279 | -1.3 |
| Koʻolauloa CCD | 18,443 | 18,899 | 2.5 |
| Koʻolaupoko CCD | 117,694 | 117,994 | 0.3 |
| Wahiawā CCD | 43,886 | 38,370 | -12.6 |
| Waialua CCD | 11,549 | 14,027 | 21.5 |

Sources: US Census Bureau 1990a, 2000a.

Kailua-Kona), and Keaʻau-Mountain View CCD (south of Hilo) were the largest population centers on the Island of Hawaiʻi, with 28.5 percent, 19.2 percent, and 15.3 percent of the population, respectively. Within Honolulu County, substantial population increases in the ʻEwa (18.3 percent) and Waialua (21.5 percent) CCDs were offset by decreases in the Wahiawā (-12.6 percent) and Honolulu (-1.3 percent) CCDs. The Honolulu CCD (which includes the city of Honolulu) and the ʻEwa CCD (which includes the city of Makakilo, ʻEwa Beach, and the Village of Waipiʻo) were the largest population centers on Oʻahu, with 42.5 and 31.1 percent of the Honolulu County population, respectively, in 2000 (US Census Bureau 1990a, 2000a).

### *Economy, Employment, and Income*

The tourism industry is the state of Hawaiʻi's most important source of economic activity, accounting for more than a quarter of the gross state product. As a result of the September 11, 2001, terrorist attacks in the United States, this industry has experienced a lingering decline, particularly with respect to international visitors (HDBEDT 2001a). Private sector technology has become a productive and rapidly growing aspect of the state's economy. In the mid-1990s, a 17 percent growth in private technology sector jobs offset a 0.1 percent decline in private sector employment to produce positive private sector employment growth (HDBEDT 2001b). Federal government expenditures in Hawaiʻi totaled approximately $9 billion in 2000. This total was 5.2 percent more than in 1999 and 60 percent more than the spending level in 1990. Defense expenditures accounted for 39 percent of federal spending in 2000, down from approximately 54 percent in 1990. Nonetheless, defense spending in Hawaiʻi increased 33 percent between 1990 and 2000 to $3.5 billion (HDBEDT 2001c). In

2002, per capita defense spending in Hawai'i reached $3,045, second only to that of Virginia. The economic impacts of this spending has a ripple effect throughout the Hawaiian economy due to additional spending by military residents for goods and services procured off-post and the increased demand for goods and services generated by vendors and contractors associated with the military installations.

A major decline in sugar production and an increase in tourism on the Island of Hawai'i, particularly along the Kohala and Kona coastlines, significantly influenced the economy during the 1990s (USARHAW and 25th ID[L], 2001b). Tourism replaced sugar as the county's primary economic generator during the mid-1980s, reaching a peak in visitor arrival numbers in 1989. Since 1990, external factors, such as the Asian economic crisis, the Persian Gulf War, and a brief economic downturn in the continental US, have contributed to economic stagnation. The agriculture sector has continued to be an element in the county's economy through the growing of coffee, macadamia nuts, papaya, flowers and nursery products, vegetables, aquaculture, forestry, and several processing plants (County of Hawai'i 2001a). Between 1987 and 1997, the total value of agriculture declined by 17 percent, and the value of crops declined by about 14 percent (HDBEDT, no date [a]). Over the same period annual domestic arrivals to Hawai'i County increased by about 23 percent. Data for international arrivals are available from 1992 to the present, and between 1992 and 2000 annual international arrivals increased by approximately 47 percent (HDBEDT, no date [b]).

Goals expressed in Honolulu County's 1992 general plan reflect concerns for economic and agricultural diversification on O'ahu, as well as for maintaining a strong visitor industry, expanding ocean-related industries, and assisting fisheries. The substantial role of the federal government in O'ahu's economy is evident in the goals and policies set forth to increase the amount of federal spending on O'ahu. These include encouraging the military to purchase local goods and services, leasing new facilities rather than using tax-exempt federal land, and providing a substantial level of federal employment on O'ahu and a high level of military employment in the Hickam-Pearl Harbor, Wahiawā, Kailua-Kāne'ohe, and 'Ewa areas (City and County of Honolulu 1992). Between 1987 and 1997, the total value of agriculture in Honolulu County declined by 15 percent, and the value of crops declined by about 11 percent (HDBEDT, no date [c]). Over the same period annual domestic arrivals to Honolulu County decreased by about a quarter of a percent. Between 1992 and 2001 annual international arrivals declined by almost five percent (HDBEDT, no date [d]).

Table 3-14 presents the distribution of employment among the various industry sectors and the changes experienced in these sectors between 1990 and 2000 for Hawai'i, Hawai'i County, and Honolulu County. The services, government, and retail trade sectors employed the greatest number of workers in the state and in both Hawai'i and Honolulu counties in 2000. Between 1990 and 2000 employment in the state of Hawai'i in the mining, farm services, forestry, and fishing sector and services sector increased by the largest percentages (41.2, 24.4, and 20.0 percent). Within the government sector, state and local government employed the majority of workers. The military experienced a 21.5 percent decline in employment between 1990 and 2000. Of the major sectors shown in Table 3-14, construction, manufacturing, and farm employment experienced the greatest percentage decreases over the decade in the state (BEA 2002a).

**Table 3-14**
**Sector Employment**

| Sector | Hawai'i | | | Hawai'i County | | | Honolulu County | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1990 | 2000 | Percent Change 1990 to 2000 | 1990 | 2000 | Percent Change 1990 to 2000 | 1990 | 2000 | Percent Change 1990 to 2000 |
| Farm employment | 14,610 | 12,890 | -11.8 | 5,948 | 5,581 | -6.2 | 3,429 | 3,009 | -12.2 |
| Farm services, forestry, fishing | 7,572 | 9,423 | 24.4 | 1,672 | NA | NA | 4,189 | 5,096 | 21.7 |
| Mining | 374 | 528 | 41.2 | 75 | NA | NA | 251 | 345 | 37.5 |
| Construction | 40,228 | 32,083 | -20.2 | 4,549 | 4,369 | 5.5 | 29,244 | 21,711 | -25.8 |
| Manufacturing | 24,041 | 20,785 | -13.5 | 2,666 | NA | NA | 17,872 | 15,614 | -12.6 |
| Transportation and public utilities | 45,299 | 47,311 | 4.4 | 2,681 | 3,191 | 4.0 | 36,967 | 37,085 | 0.3 |
| Wholesale trade | 25,887 | 26,233 | 1.3 | 2,384 | NA | NA | 21,096 | 20,796 | -1.4 |
| Retail trade | 131,848 | 138,565 | 5.1 | 12,460 | 14,154 | 17.8 | 98,042 | 98,596 | 0.6 |
| Finance, insurance, and real estate | 61,225 | 63,629 | 3.9 | 4,608 | 5,684 | 7.1 | 48,529 | 48,602 | 0.2 |
| Services | 207,861 | 249,499 | 20.0 | 20,440 | 27,219 | 34.2 | 153,043 | 175,426 | 14.6 |
| Government | 171,742 | 165,686 | -3.5 | 10,130 | 12,182 | 15.3 | 150,286 | 139,596 | -7.1 |
| Federal, civilian | 33,717 | 30,083 | -10.8 | 791 | 1,038 | 1.3 | 32,134 | 28,051 | -12.7 |
| Military | 67,225 | 52,776 | -21.5 | 1,212 | 1,277 | 1.6 | 64,459 | 49,829 | -22.7 |
| State and local | 70,800 | 82,827 | 17.0 | 8,127 | 9,867 | 12.4 | 53,693 | 61,716 | 14.9 |
| Total Employment | 730,687 | 766,632 | 4.9 | 67,613 | 79,628 | 17.8 | 562,948 | 565,876 | 0.5 |

Source: BEA 2002a

The employment growth figures for Hawai'i County contrast substantially with the state averages. In Hawai'i County, on the Island of Hawai'i, employment in the services, finance, insurance, and real estate, and government sectors increased by the greatest percentages between 1990 and 2000 (33.2, 23.4, and 20.3 percent). Within the government sector, both federal civilian and military employment increased over the decade, and farm employment and construction experienced the only employment declines. In Honolulu County (covering O'ahu) employment growth between 1990 and 2000 was similar to the state average, with the mining, farm services, forestry, and fishing, and services sectors experiencing the greatest percentage increases between 1990 and 2000. The construction, manufacturing, farming, and government sectors all experienced decreased employment over this period (-25.8, -12.6, -12.2, and -7.1 percent). The decline in employment in the government sector is attributed to decreases in federal civilian and military employment (-12.7 and -22.7 percent, respectively); state and local employment increased in Honolulu County by 14.9 percent (BEA 2002a).

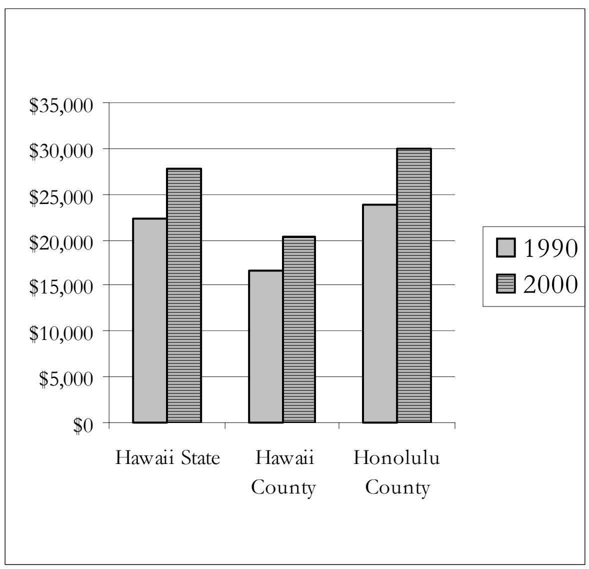
As shown in Table 3-15, both Hawai'i and Honolulu counties experienced higher unemployment increases than the state average between 1990 and 2000. Hawai'i County in particular had substantial growth in its labor force (20.0 percent), employment (16.9 percent), and unemployment (90.7 percent). It also had the highest unemployment rate in 2000 (6.7 percent), which exceeded the state average of 4.3 percent, while Honolulu County's unemployment rate (3.8 percent) was below that of the state (BLS, no date).

**Table 3-15**
**Labor Force, Employment, and Unemployment**

| | Hawai'i | | | Hawai'i County | | | Honolulu County | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1990 | 2000 | Percent Change 1990 to 2000 | 1990 | 2000 | Percent Change 1990 to 2000 | 1990 | 2000 | Percent Change 1990 to 2000 |
| Labor force | 549,506 | 595,432 | 8.4 | 58,330 | 70,001 | 20.0 | 407,735 | 423,675 | 3.9 |
| Employment | 533,521 | 569,915 | 6.8 | 55,883 | 65,335 | 16.9 | 398,183 | 407,782 | 2.4 |
| Unemployment | 15,985 | 25,517 | 59.6 | 2,447 | 4,666 | 90.7 | 9,552 | 15,893 | 66.4 |
| Unemployment rate | 2.9 | 4.3 | | 4.2 | 6.7 | | 2.3 | 3.8 | |

Source: BLS, no date

As shown on the chart below, Honolulu County had the highest per capita personal income in 2000. At $29,960, it exceeded the state average ($27,851) by slightly more than $2,100 and the Hawai'i County level ($20,399) by approximately $9,500. Honolulu County also experienced the greatest growth in per capita personal income between 1990 and 2000. For Hawai'i, Hawai'i County, and Honolulu County per capita personal income increased by 24.5, 22.9, and 26.1 percent, respectively (BEA 2002b).




Source: US Bureau of Economic Analysis 2002a.

Figure 3-17 Per Capita Personal Income

### *Housing*

Table 3-16 shows housing occupancy type and vacancy for the state, and Honolulu and Hawai'i counties in 1990 and 2000. Between 1990 and 2000 the total number of housing units and the number of occupied housing units in Hawai'i County increased by substantially more than the state average, and the total number of housing units and the number of occupied housing units in Honolulu County increased by a lower percentage than the state average. The number of vacant units in Hawai'i County increased by 42.7 percent, and Honolulu County and the state experienced even higher vacancy increases (70.8 and 80.3 percent). In 2000 the state vacancy rate was 12.4 percent (57,302 units), while Hawai'i

**Table 3-16**
**Housing**

| | Hawai'i | | | Hawai'i County | | | Honolulu County | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Percent Change | | | Percent Change | | | Percent Change |
| | 1990 | 2000 | 1990 to 2000 | 1990 | 2000 | 1990 to 2000 | 1990 | 2000 | 1990 to 2000 |
| Total | 389,810 | 460,542 | 18.1 | 48,253 | 62,674 | 29.9 | 281,683 | 315,988 | 12.2 |
| Occupied | 356,267 | 403,240 | 13.2 | 41,461 | 52,985 | 27.8 | 265,304 | 286,450 | 8.0 |
| Owner-occupied | 191,911 | 227,888 | 18.7 | 25,336 | 34,175 | 34.9 | 137,910 | 156,290 | 13.3 |
| Renter-occupied | 164,356 | 175,352 | 6.7 | 16,125 | 18,810 | 16.7 | 127,394 | 130,160 | 2.2 |
| Vacant | 33,543 | 57,302 | 70.8 | 6,792 | 9,689 | 42.7 | 16,379 | 29,538 | 80.3 |
| For rent | 9,451 | 15,699 | 66.1 | 1,859 | 1,556 | -16.3 | 5,748 | 12,203 | 112.3 |
| For sale only | 1,631 | 3,720 | 128.1 | 379 | 678 | 78.9 | 900 | 2,572 | 185.8 |
| Rented or sold, not occupied | 3,735 | 2,683 | -28.2 | 776 | 463 | -40.3 | 2,540 | 1,690 | -33.5 |
| For seasonal, recreational, or occasional use | 12,806 | 25,584 | 99.8 | 2,045 | 5,101 | 149.4 | 4,462 | 6,856 | 53.7 |
| For migrant workers | 82 | 57 | -30.5 | 44 | 21 | -52.3 | 14 | 17 | 21.4 |
| Other vacant | 5,838 | 9,559 | 63.7 | 1,689 | 1,870 | 10.7 | 2,715 | 6,200 | 128.4 |

Source: US Census Bureau 1990a, 2000b

County had the highest vacancy rate of 15.5 percent (9,689 units) and Honolulu County had the lowest vacancy rate of 9.3 percent (29,538 units). Most of the vacant units in Hawai'i County and the state were for seasonal use; whereas, in Honolulu County, the largest number of vacant units were rental units. Within Hawai'i County, the North Kona and Ka'ū CCDs had the highest vacancy rates (24.6 and 23.4 percent), most of which were for seasonal use; and the Pāpa'ikou-Wailea and Pā'auhau-Pa'auilo CCDs had the lowest vacancy rates (6.2 and 7.7 percent) (US Census Bureau 1990a, 2000b).

As shown in Table 3-16, there was a relatively even mix of owner- and renter- occupied housing in the state and in Honolulu County (56.5 percent owned and 43.5 percent rented in the state and 54.6 percent owned and 45.4 percent rented in Honolulu County); whereas a higher percentage of occupied housing was owner-occupied in Hawai'i County (64.5 percent, or 130,160 units). Within Hawai'i County the North Hilo and Pā'auhau-Pa'auilo CCDs had the highest percentage of home ownership (78.7 and 77.1 percent, respectively), and the North Kona and South Kohala CCDs had the lowest levels of home ownership (58.5 and 58.9 percent). The 'Ewa and Ko'olaupoko CCDs had the highest home ownership levels in Honolulu County (with 66.5 and 66.0 percent owned in each CCD), and the Wahiawā and Waialua CCDs had the lowest levels of home ownership in the county (US Census Bureau 1990a, 2000b). The median single-family home resale value for Hawai'i County in 1998 was $159,000, an increase of 38.2 percent from 1988; the median single-family home resale value for Honolulu County was $297,000, up 39.4 percent from 1988 but down 2.6 percent from the previous year (HDBEDT, no date [a] and [c]).

### *Schools*

The Honolulu School District provides public schooling for the state, with 261 schools located throughout the islands (NCES 2002). Within Hawai'i County in 2000 a total of 32,974 students were enrolled in school up to the high school (grade 12 level), of whom 6.7

percent were in preschool, 6.2 percent were in kindergarten, 56.5 percent were in elementary school (grades 1-8), and 30.6 percent were in high school (grades 9-12). Within Honolulu County a total of 168,531 students were enrolled in school up to the high school (grade 12 level), of whom 7.7 percent were in preschool, 7.2 percent were in kindergarten, 56.6 percent were in elementary school (grades 1-8), and 28.5 percent were in high school (grades 9-12) (HDBEDT, no date [b] and [d]). In general, schools that would be affected by the Proposed Action are operating at or below capacity, with the exception of Mililani High School on O'ahu. Details on current enrollment levels and operating capacities for the affected schools are presented in Chapter 4, Section 4.13.3, and in Chapter 5, Section 5.13.2.

### 3.13.3 Environmental Justice

A discussion of environmental justice issues is presented in accordance with EO 12898, and a discussion relating to the protection of children from environmental health risks is presented in accordance with EO 13045.

On February 11, 1994, President Clinton issued EO 12898, entitled Federal Actions to Address Environmental Justice in Minority and Low-Income Populations. This order requires that "each federal agency make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities, on minority populations and low-income populations" (EO 12898, 59 FR 7629 [Section 1-101]). The Army has done the following to comply with the order:

- Gathered economic, racial, and demographic information generated to identify areas of low-income and high minority populations (those who are in the minority of the population of the US as a whole, consisting of Blacks or African Americans, Native Americans, Eskimos, Aleuts, Asians, Pacific Islanders, other, and two or more races) in and around the project area; and
- Assessed the alternatives for disproportionate impacts resulting from on-site activities associated with the Proposed Action.

Racial and ethnic data for the state, Hawai'i County, and Honolulu County for 1990 and 2000 are illustrated in Table 3-17. The dominant ethnic group in 2000 in the state and both Hawai'i and Honolulu counties was the Asian and Pacific Islander group, with 51.0, 38.0, and 54.9 percent of the population, respectively. The population in almost all racial/ethnic categories declined between 1990 and 2000, with the exception of the "other and two or more races" category. This population group expanded exponentially, indicating that many who would have been categorized in another group in 1990 were able to identify themselves as "two or more races" in 2000 (a new designation in the 2000 Census). Between 1990 and 2000 the Hispanic population increased in the state and both project area counties, but Hawai'i County experienced a much higher increase (26.7 percent) than the state average (7.8 percent) or Honolulu County (3.2 percent). The Black or African American population in Hawai'i County experienced a substantial increase (13.5 percent) between 1990 and 2000 (US Census Bureau 1990a, 2000a).

**Table 3-17**
**Population Percentage by Race/Ethnicity**

| | Hawaiʻi | | | Hawaiʻi County | | | Honolulu County | | |
|---|---|---|---|---|---|---|---|---|---|
| **Race/Ethnicity** | **Percent of Total Pop 1990** | **Percent of Total Pop 2000** | **Percent Change in Actual Pop. 1990 to 2000** | **Percent of Total Pop 1990** | **Percent of Total Pop 2000** | **Percent Change 1990 to 2000** | **Percent of Total Pop 1990** | **Percent of Total Pop 2000** | **Percent Change in Actual Population 1990 to 2000** |
| **Race/Ethnicity** | **1990** | **2000** | **Percent Change 1990 to 2000** | **1990** | **2000** | **Percent Change 1990 to 2000** | **1990** | **2000** | **Percent Change 1990 to 2000** |
| White | 33.4 | 24.3 | -20.4 | 39.7 | 31.5 | -1.7 | 31.6 | 21.3 | -29.5 |
| Black or African American | 2.5 | 1.8 | -19.1 | 0.5 | 0.5 | 13.5 | 3.1 | 2.4 | -20.3 |
| Native American, Eskimo, Aleut | 0.5 | 0.3 | -30.7 | 0.7 | 0.4 | -23.3 | 0.4 | 0.2 | -38.3 |
| Asian and Pacific Islander | 61.8 | 51.0 | -9.9 | 57.1 | 38.0 | -17.9 | 63.0 | 54.9 | -8.6 |
| Other, and Two or More Races | 1.9 | 22.7 | 1,201.9 | 2.0 | 29.6 | 1,733.4 | 1.9 | 21.2 | 1,061.9 |
| Hispanic[1] | 7.3 | 7.2 | 7.8 | 9.3 | 9.5 | 26.7 | 6.8 | 6.7 | 3.2 |

Source: US Census Bureau 1990a, 2000a
[1] Persons of Hispanic origin may be of any race.

Within Hawaiʻi County the Hilo and Pāpaʻikou-Wailea CCDs had the highest minority populations (minority includes all categories except White and Hispanic, which is considered an ethnic group rather than a racial category); however, all CCDs were composed of greater than 50 percent minority populations. The North Kohala, Keaʻau-Mountain View, and Pāhoa-Kalapana CCDs had the highest percentage of Hispanic populations in Hawaiʻi County, with 13.5, 13.2, and 12.3 percent. Within Honolulu County the Waiʻanae, ʻEwa, and Honolulu CCDs had the highest minority populations, with 88.8, 82.7, and 80.3 percent of the population. All CCDs in Honolulu County were composed of 67 percent or greater minority populations. The Waiʻanae and Wahiawā CCDs had the highest percentage Hispanic populations in Honolulu County, with 13.9 and 12.8 percent (US Census Bureau 1990a, 2000a).

Potential effects to Native Hawaiian cultural or spiritual resources, or to Hawaiian Homelands, are addressed in the Cultural Resources sections of this report.

The US Census Bureau uses a set of money income thresholds that vary by family size and composition to determine which families are poor. If a family's total income is less than its threshold, then that family, and every individual in it, is considered poor. The poverty thresholds do not vary geographically, but they are updated annually for inflation using the Consumer Price Index. For example, in 2000 the average estimated poverty threshold for an individual was an annual income of $8,787, and for a four-person houshold it was $17,601 (Dalaker and Proctor 2000). Census estimates for 1998 indicate that approximately 10.5 percent of the population of the state, 15.1 percent of Hawaiʻi County, and 9.7 percent of Honolulu County was below the poverty line in 1998 (US Census Bureau 2001). This represents a 27.8 and a 36.9 percent increase, respectively, in the number of individuals below the poverty line in Hawai'i and Honolulu counties from 1990 levels (US Census Bureau 1990b, 2001). Within Hawai'i County, Hilo had the highest total number of families below the poverty line in 1999 (1,128 families), and the areas with the highest percentage of families below the poverty line were Nānāwale Estates (28.9 percent), Laupāhoehoe (28.4 percent), Orchidlands Estates (24.1 percent), Hawaiian Beaches (23.8 percent), Mountain View (23.6 percent), and Hawaiian Acres (22.5 percent). In Honolulu County in 1999, Honolulu had the largest total number of families below the poverty line, and the Mākaha Valley (32.4 percent), Mākaha (22.3 percent), Nānākuli (19.2 percent), Mā'ili (19.3 percent), and Wai'anae (17.2 percent) had the highest percentage of families below the poverty line (HDBEDT, no date [b] and [d]).

### Executive Order 13045

EO 13045, entitled Protection of Children from Environmental Health Risks and Safety Risks (EO 13045, 62 FR 19885), states that each federal agency shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children and ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks. Environmental health risks and safety risks mean risks that are attributable to products or substances that the child is likely to come into contact with or to ingest.

In 2000 approximately 25.6 percent of the state's population was made up of children (under 18 years old), an increase of 10.9 percent from 1990. The percent of the population of Hawai'i County under 18 years in 2000 was 27.4 percent, an increase of 18.1 percent from 1990. In Honolulu County 25.1 percent of the population was under 18 in 2000, a 7.4 percent increase since 1990. Within Hawai'i County, the Pāhoa-Kalapana, South Kohala, and Kea'au-Mountain View CCDs had the highest population percentages below the age of 18 (30.1, 30.1, and 31.0 percent), and the Hilo, North Kona, and Kea'au-Mountain View CCDs had the largest total populations of children (11,175, 7,281, and 7,040). Within Honolulu County, the Wai'anae, Ko'olauloa, and Wahiawā CCDs had the highest population percentages below the age of 18 (36.3, 32.3, and 31.0 percent), and the 'Ewa and Honolulu CCDs had the largest total populations of children (75,526 and 76,231) (US Census Bureau 1990a, 2000c).

## 3.14 PUBLIC SERVICES AND UTILITIES

Police, fire, and emergency medical services and infrastructure for water, wastewater, solid waste management, telephone, and electricity are the public services and utilities provided at SBMR, DMR, KTA, and PTA. SBMR and PTA are the only facilities that have their own fire and medical facilities, and PTA has a police facility as well. In general, regional providers of police, fire, and emergency medical services are available to personnel using Army facilities, and units involved in training at the various facilities may bring military police of their own. Water is supplied to SBMR and DMR through pipelines; whereas water must be trucked in to KTA, KLOA, and PTA. Utility systems at SBMR, DMR, KTA, and PTA have been evaluated for adequacy. Many elements in these systems have been identified as requiring upgrades in order to provide the needed service and accommodate existing staff.

### 3.14.1 Introduction/Region of Influence

Public services and utilities for the installations that are part of the proposed project include police, fire, and emergency medical services and infrastructure for water, wastewater, solid waste management, telephone, and electricity. The ROI for public utilities includes SBMR, WAAF, DMR, KTA, KLOA, and PTA.

The US Army is investigating opportunities for updating the utilities infrastructure and systems on its installations in Hawai‘i. Some of these systems have been in place for approximately 60 years and are deteriorating with age or are outdated. This process is likely to involve partnerships with private companies and other nonmilitary agencies in developing replacements/alternatives to the portions of the infrastructure that are determined to be at risk.

### 3.14.2 Resource Overview

Public and private sectors in Hawai‘i have reduced energy demand in recent decades. Between 1980 and 1995, growth in energy use lagged far behind population growth. Due to use of alternative energy sources and increased conservation, per capita energy demand is decreasing. Demand for water has been growing in the Ewa area of O‘ahu, but the windward side of the island currently has sufficient supplies. Wastewater treatment in Hawai‘i is done by wastewater treatment plants and by underground injection control (Juvik 2002). As discussed in Section 3.13, Socioeconomics, projections for residential population growth, including and excluding armed forces, indicate a decrease in growth rates throughout the forecast period. Trends regarding demand for utilities and public services normally reflect population growth, which is minimal.

Fire services to the installations on O‘ahu are provided by the Federal Fire Department under the supervision of Commander, US Naval Station Pearl Harbor. A one-company fire station is at SBMR, and a two-company fire station is at WAAF. Two commercial pumpers and two military field fire-fighting vehicles are based at the SBMR station, and crash fire rescue and commercial pumper equipment is based at WAAF (Belt Collins 1993). For both fire and police services, there is extensive coordination with Honolulu City and County fire and police departments (Garo 2003). Medical services are provided to SBMR, WAAF, DMR, KTA, and KLOA at Tripler Army Medical Center (TAMC) in Honolulu, which provides a full complement of medical facilities, including medical evacuation by helicopter from outlying training areas and ranges.

Fuel Oil Polishing Company (FOPCO) and Horizon Waste Services collect the solid waste generated at Army installations on O‘ahu and transport it directly to a City and County of Honolulu-owned incinerator at Campbell Industrial Park. This facility, known as HPower, generates electric power that supplies electricity to approximately 80,000 local residents. The plant diverts 90 percent of the waste stream and produces 10 percent ash that is deposited at the Waimānalo Gulch Landfill. Solid refuse is separated into family housing refuse and industrial (all other buildings) refuse. Residents of the family housing areas of Helemanō, Āliamanu, SBMR, WAAF, and Fort Shafter generate approximately 2,600 tons (2,359 metric tons) of solid waste per quarter (Bourke 2002a, 2002b). Based on the waste and recycling streams generated during the third quarter of 2002, Army installations in Hawai‘i generate an estimated 3,442.4 tons (3,123 metric tons) of industrial solid waste in one year (USARHAW 2002a). Waste generated on PTA goes to a landfill (Ching 2002a).

One recycling center processes recyclable items from industrial work areas, barracks, and family housing areas on SBMR, WAAF, and SBER. No recycling pickup services are provided for KTA, DMR, and PTA. The recycling operation at SBMR is at Building 1087B, MacMahon Road, and is operated by Goodwill Industries, with a staff of five workers (Ching 2002a). Recycled items include glass (approximately 290,720 tons [263,737 metric tons] per year), metals (approximately 692,000 tons [627,772 metric tons] per year), oil (approximately 137,032 tons [124,313 metric tons] per year), diesel (approximately 4,000 tons [3,629 metric tons] per year), antifreeze (approximately 53,784 tons [48,792 metric tons] per year), oily water (approximately 615,696 tons [558,550 metric tons] per year), and JP-8 jet fuel (approximately 48,000 tons [43,545 metric tons] per year). About 4,000 pounds (1,814 kilograms) of telephone books, 750,000 pounds (340,194 kilograms) of ammunition/brass, and 25,000 pounds (11,340 kilograms) of lead batteries are processed annually (USARHAW 2002b).

Commercial and official lines are the two types of telecommunications services used at all Army installations. Verizon Hawai‘i provides commercial telephone service to the housing areas, mainly from direct buried lines that are deteriorated. ATT-HITS provides official phone service to the Army in duct lines, which were recently installed by the Army. The Army is responsible for repairing and maintaining the official lines and for providing underground ducts for the commercial phone lines (C. H. Guernsey & Company 2001).

HECO provides electric power to installations on O‘ahu, and Hawai‘i Electric and Light Company (HELCO) serves the island of Hawai‘i.

# CHAPTER 4

# ENVIRONMENTAL AND SOCIOECONOMIC CONSEQUENCES OVERVIEW

# CHAPTER 4
# ENVIRONMENTAL AND SOCIOECONOMIC CONSEQUENCES OVERVIEW

## 4.1 INTRODUCTION

This chapter presents a summary of the overall potential environmental impacts of the Proposed Action when all proposed SBCT projects are considered together. Chapters 5 through 8 address the individual impacts associated with each Army installation. Cumulative impacts and mitigation are presented in Chapter 9.

The alternatives, as discussed in Chapter 2, are Proposed Action, Reduced Land Acquisition and No Action. No Action may best be described as the continuation of existing training activities without the transformation of the 2nd Brigade to an SBCT, as described in detail in Chapter 2 in the Legacy Training Baseline.

The Proposed Action, the transformation of the 2nd Brigade to an SBCT, would assume the continuation of existing training activities in Hawai'i along with the fielding of the Stryker system, new construction, additional land acquisition and easements, and new SBCT-specific training activities. Specific changes are summarized below:

- Personnel Strength – increased to 3,818 Officers and Enlisted, a net increase of 810;
- Vehicles – increased to 1,005 emission-producing vehicles, a net increase of 346 including 296 Strykers;
- Weapons – Current inventory plus use of 105mm MGS on the Stryker, use of the 120mm mortar, and increase use from twelve to eighteen 155mm howitzers (the current inventory includes eighteen 105mm howitzers that will be changed to eighteen 155mm howitzers);
- Land Acquisition – SRAA and WPAA;
- Road Easements and Improvements – Dillingham Trail, Helemanō Trail, and PTA Trail; and

- New Construction – 7 new ranges, 2 airfield upgrades, 13 support facilities, and 25 communication antennas.

Each section in this chapter includes the methodology used for impact analysis and a discussion of factors used to determine the significance of direct and indirect impacts (40 CFR 1508.8) and proposed mitigation, as appropriate. Direct impacts are those that are caused by the Proposed Action and occur at the same time and place. Indirect impacts are those caused by the Proposed Action and that occur later in time or are farther removed in distance from the Proposed Action.

To determine whether an impact is significant, CEQ regulations also require the consideration of context and intensity of potential impacts (40 CFR 1508.27). Context normally refers to the setting, whether local or regional, and intensity in regards to the severity of the impact. Also, an EIS should include a discussion of the possible conflicts between the proposed action and the objectives of federal, regional, state and local land use plans and policies for the area concerned (40 CFR 1502.16 C).

Impacts are defined in the following categories:

- Significant
- Significant but mitigable to less than significant
- Less than significant
- No impact
- Beneficial impact

Impacts in the top two categories (significant or significant but mitigable to less than significant) are assigned an impact number in the text (e.g. *Impact 1: Modification of the existing view)* with a corresponding numbered mitigation. Impacts in the next two categories (less than significant or no impact) are not assigned an impact number (e.g. *Consistency with visual resource policies*). Beneficial impacts are also described when applicable.

Summary tables provide an overview of impacts by resource and by alternative. These "dot" tables show the highest level of impact for each resource by issue area. Text supporting these conclusions is presented and mitigations are listed for all significant impacts, where mitigation is available. There may be both adverse and beneficial impacts within a single resource category; for instance, a project could interfere with a pre-existing land use such as recreation (an adverse impact) while expanding public access to different recreational resources (a beneficial impact). Where there are both adverse and beneficial impacts, both are listed on the tables and in the text.

Mitigation is divided into two categories:

- Regulatory and administrative mitigation, which is required in compliance with federal environmental laws and regulations that are SOPs or BMPs, or that are part of an on-going program; and
- Additional mitigation, which is proposed by the Army, other agencies, or the public and which may be implemented, depending on funding availability. The Army has listed these additional mitigations to provide the public and regulatory agencies with information on all possible mitigations, and to request input on which mitigations the public would like to see implemented. The Army has identified in the Final EIS which of these mitigations are likely and unlikely to be implemented. The final determination on mitigation commitments will be outlined in the record of decision.

### 4.1.1 Cumulative Impacts Summary

CEQ regulations implementing NEPA require that the cumulative impacts of a proposed action be assessed (40 CFR Parts 1500-1508). Army regulation 200-2 (32 CFR 651.51) also requires that cumulative actions, when viewed with other proposed actions that have cumulatively significant impacts, be discussed in the same impact statement. Direct and cumulative impacts should be viewed together to determine the full impacts from each alternative identified in this EIS. Cumulative impacts are discussed separately in Chapter 9 of this EIS, because different analytical methods are used for determining significance and because the cumulative ROI is often larger than that for direct and indirect impacts (CEQ 1997). Also, this EIS may identify significant direct impacts for certain resources while finding that there are no significant cumulative impacts for the same resource. This difference is normally due to the different geographical context needed for measuring direct and cumulative impacts.

This EIS uses a variety of methods, depending on the resource area, to determine cumulative socioeconomic and environmental effects. Methods for gathering and assessing data regarding cumulative impacts include: interviews, use of checklists, trends analysis, and forecasting. In general, past, present, and future foreseeable projects are assessed by resource area. These projects, which are listed in Tables 9-1 and 9-2, are sponsored by the US Army, other federal and state agencies and private entities and include 34 projects on O‘ahu and 9 projects on Hawai‘i.

Cumulative impacts from the Proposed Action and the RLA Alternative, and No Action would occur in all resource areas as described in Chapter 9 of this EIS. Significant cumulative impacts would occur in the following resource areas: land use, and water, biological, cultural and socioeconomic resources.

## 4.2 LAND USE/RECREATION

### 4.2.1 Impact Methodology

Impacts on land use were assessed based on whether project activities were consistent with state and local plans and on whether land uses were compatible with the project area and uses in the surrounding area. Examples of projects conflicting with land uses include converting agricultural land to training land and constructing FTI in a Conservation District. Localized and temporary impacts on land use during construction are also evaluated, as well as training changes to land that is currently used for training. Impacts on natural resources management and recreational resources were assessed by determining these types of uses in and around the project areas then evaluating these uses to determine their sensitivity to the short- and long-term project effects. Also considered was the consistency of project activities with the objectives and policies of state and local recreation plans.

### 4.2.2 Factors Considered for Impact Analysis

The evaluation of potential impacts on land use was based on the project's potential to conflict with existing or planned land uses in and around the project areas. Factors considered in determining impacts on land use included the degree of conflict with:

- Existing or planned land uses on or around the site;
- The objectives, policies and guidance of the Farmland Protection Policy Act of 1981 (FPPA). The FPPA is intended to minimize the impact of Federal programs on the unnecessary and irreversible conversion of farmland to nonagricultural uses; or
- The objectives, policies, or guidance of state and local land use plans.

Factors considered in determining impacts on recreation resources included:

- Disruption of recreational use of the beach, ocean, or land-based resources, such as parks or recreational paths, or interference with the public's right of access to the sea during project construction;
- Prevention of long-term recreational use, prevention of use during peak season, or interference with the public's right of access to the sea;
- The degree of conflict with Hawai'i Coastal Zone Management Program policies;
- The degree of conflict with the objectives, policies, or guidance of state and local plans; or
- The degree of conflict with the Public Access Shoreline Hawai'i vs. County of Hawai'i Planning Commission decision, which assures that Native Hawaiians can exercise traditional and customary practices on undeveloped and underdeveloped land.

Short- or long-term changes in ambient conditions, such as noise, views, dust and odor, may indirectly affect the land use and quality of recreation in the project area. Impacts were identified from noise, air quality, wildfires, and health and safety. These land use compatibility impacts would be associated with 1) noise (a significant and unmitigable impact associated with SBMR and PTA), 2) biological resources (less than significant impact associated with training within and near Honouliuli Preserve), 3) dust (a significant and unmitigable impact associated with all areas), 4) restricted access to land during fires, and 5) restricted access to training lands when SDZs are active. The issues are evaluated in detail, with the impacts and associated mitigations, and are presented in the respective sections of this document.

The Army will coordinate with the State of Hawai'i to meet coastal zone management (CZM) consistency requirements and has submitted a CZM consistency determination to the State Office of Planning.

The Army will coordinate the conversion of agricultural lands at SRAA and PTA with the Natural Resource Conservation Service (NRCS) in light of the objectives and guidelines of the FPPA.

In addition to the factors above, the following public scoping comments were also considered or evaluated: accessing recreational resources and continued ranching; identifying landowners of the affected parcels; considering the applicable Sustainable Communities Plans, the Special Management Area, and TNC's stewardship of Honouliuli Preserve; and completing a Coastal Zone Management determination.

### 4.2.3 Summary of Impacts

Table 4-1 lists the types of land use/recreation impacts associated with the Proposed Action, RLA, and No Action at the relevant installations. General descriptions of the impacts are also provided.

#### *Proposed Action (Preferred Alternative)*

*Significant Impacts*

*Impact 1: Impacts on natural resources management and recreational land use.* Significant impacts on natural resources management and recreational land use are associated with the introduction of a live-fire facility at KTA.

Unauthorized recreational access at KTA may be adversely affected by additional fencing and signs restricting access, which are necessary due to the proposed live-fire use of the area. Construction and operation of the CACTF would convert general maneuver lands to a live-fire facility, using SRTA only. SRTA has a maximum range of approximately 2,300 feet (700 meters) and an effective range of approximately 246 feet (75 meters). When the range is in use, any traffic (on foot or in unprotected vehicles) within the SDZ would be prohibited. Presently, traffic—such as unauthorized public access—is not strictly controlled at KTA. A significant impact would be associated with the introduction of live-fire training in an area used for low-intensity, generally dismounted, training because of additional restrictions on unauthorized recreational access.

**Table 4-1**
**Summary of Potential Land Use/Recreation Impacts**

| | SBMR | | | DMR | | | KTA | | | PTA | | | Project-wide Impact | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Impact Issues** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** |
| Conversion of agricultural land to training land | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | N/A | N/A | N/A | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Impacts on natural resources management and recreational land use | ⦸ | ○ | ○ | ○ | ○ | ○ | ⊗ | ⊗ | ○ | ○+ | ○+ | ○ | ⊗+ | ⊗+ | ○ |
| Construction of FTI in a Conservation District | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | N/A | N/A | N/A | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Impacts on land use during construction activities | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| SBCT training on lands currently used for current force training | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |

This table summarizes project-wide impacts. For installation-specific impacts see Chapters 5 – 8.
In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⦸ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact

N/A = Not applicable
PA = Proposed Action
RLA = Reduced Land Acquisition
NA = No Action

*Regulatory and Administrative Mitigation 1*. There is no regulatory and administrative mitigation designated for this impact. Significant but Mitigable to Less than Significant.

*Impact 2: Impacts on natural resources management and recreational land use.* As initially designed and portrayed in the Draft EIS, training on and operation of the proposed QTR2 on the SRAA would have affected land use within a portion of the Honouliuli Preserve.

*Additional Mitigation 2:* In response to comments received early in the EIS process, the Army reoriented QTR2 so that the SDZ would no longer affect any lands within the Honouliuli Preserve.

The Army will take the following actions:

- Grant TNC personnel and TNC-sponsored personnel daily controlled access to the TNC-managed lands along a route to be determined by the Army in consultation with TNC for as long as they have a legal right to use the affected property for conservation/stewardship purposes;
- Develop and implement access controls to ensure the safety of all personnel;
- Receive TNC notification prior to their entering Army lands;

- Notify TNC of any unusual activities that may present, or appear to present, a danger to TNC personnel in the area; and
- Post signs on the boundary to prevent unauthorized use/trespass.

### *Less than Significant Impacts*

*Conversion of agricultural land to training land.* Agricultural land would be changed to training land at the SRAA and the WPAA, and on the easements for Helemanō Trail, Dillingham Trail, and PTA Trail. The proposed training land use conflicts with the existing and planned agricultural land use for approximately 535 acres (217 hectares) at SRAA and approximately 23,000 acres (9,308 hectares) of grazing land at WPAA. Easements for trails would be on existing agricultural roads or undeveloped areas. In accordance with the Farmland Protection Policy Act, the Army has completed the Farmland Conversion Rating Form in coordination with NRCS. This form assists the federal government in evaluating the impacts of converting farmland to nonagricultural use (see Appendix E).

The proposed training land use of agricultural land at SRAA is not consistent with the Hawai'i State Plan (HDBEDT 1991), the Central O'ahu Sustainable Communities Plan (City and County of Honolulu 2002a), and the City and County of Honolulu Land Use Ordinance zoning (City and County of Honolulu 2001). Under the Proposed Action, approximately 535 acres (217 hectares) of actively cultivated pineapple land within the 1,402-acre (561-hectare) SRAA would not be available for cultivation. The proposed motor pool and QTR2 would convert approximately 220 acres (89 hectares) of agricultural land to permanent structures, which would be an irreversible land use change. The estimated 535 acres (217 hectares) of cultivated pineapple land is approximately 0.67 percent of the total USDA-designated agricultural land on O'ahu and 2.8 percent of the total area in pineapple production in the state (USDA 2004). Under the Proposed Action, military activities, training, and restriction areas would be confined within the SRAA boundaries and would not affect land use outside the SRAA. In addition, this land is adjacent to existing urban areas and support services, will not result in the indirect conversion of any existing farmland or farm support services (i.e. irrigation systems) off-site, and will not jeopardize the farm support services on remaining areas. The acquisition area would serve as an additional buffer to the existing training lands, including the ordnance impact area. Disturbed areas (agricultural fields and roads) would continue to be used for walking and driving between locations. The ITAM program will be used to identify and mitigate potential impacts on the land.

The proposed training land use of agricultural grazing land at the WPAA is not consistent with the County of Hawai'i General Plan (County of Hawai'i 1989) and the County of Hawai'i Zoning Code (County of Hawai'i 2001b). The WPAA is leased by the military approximately four to five times per year for maneuver training, per agreement with the landowner. A change in ownership of the area from private to military is likely to result in an increase in military training use to 40 to 60 times per year. General military training within these areas is not expected to affect off-post land use because these actions will be confined to within the training area boundaries.

The Army is considering establishing cooperative relationships to allow continued agricultural use at the SRAA and continued grazing activities at the WPAA, in conjunction with training on the land, subject to constraints posed by training activities. This results in a less than significant impact.

Helemanō Trail and Dillingham Trail would be constructed along agricultural roads or undeveloped land. Trail construction and use is not expected to significantly affect land use. Therefore, impacts from conversion of agricultural land to training land for the construction and use of military vehicle trails is a less than significant impact.

PTA Trail construction would require approximately 132 acres (53.4 hectares) of land easements. The trail alignment is generally along undeveloped property boundaries, existing roads, and existing utility easements. Hence, use of the trail is not expected to significantly affect land use. Therefore, impacts from conversion of agricultural land to training land for the construction and use of military vehicle trails is a less than significant impact.

*Construction of FTI in a Conservation District*. Of the 25 new antennas proposed under the Proposed Action, five would be constructed within the Conservation District: three on SBMR, one on DMR, and one on PTA. New antenna facilities would reuse existing sites, where possible, and when these are not available, the new antennas would be constructed on relatively small areas (500 square feet [44 square meters]). New facilities would be located, where possible, close to existing access roads or trails. Both existing and new antenna locations would be sited, painted, and landscaped to minimize their impacts on surrounding areas and users. As required in a Conservation District, endemic or indigenous plants will be used to renaturalize project areas where natural vegetation plant cover has been disturbed. Construction would be scheduled, where possible, to minimize conflicts with recreation activities. In addition, the antenna sites would be available for emergency efforts for aiding or rescuing stranded or lost hikers and hunters.

*Impacts on land use during construction activities.* During construction activities, land uses (including hunting) may be temporarily affected. This impact is less than significant because it would be localized and temporary. Impacts associated with construction of PTA Trail would be greater due to the presence of UXO along the alignment. Prior to construction, UXO cleanup would involve identifying the most probable munitions (MPM), a safety radius associated with UXO. Owners and occupants of the areas within the MPM would be notified, and, as needed, road closures and coordination with local law enforcement agencies, fire departments and transportation agencies would occur. In addition, structures within the MPM may be temporarily evacuated (Streck 2003).

*SBCT training on lands currently used for training.* Most of the land area within the installations that would be used for training under the Proposed Action is currently being used for training. Land uses would not significantly change with the Proposed Action. Areas being used for maneuver training would continue to be used in the same manner. Vehicles used during maneuver exercises would be replaced by the Stryker vehicle. The land is expected to be used more frequently and intensively. However, maneuver areas would remain the same; therefore, introducing the Stryker is not considered a land use change.

### Beneficial Impacts

*Impacts on natural resources management and recreational land use.* Hunting activities associated with PTA would not change because the Army would continue its cooperative efforts with the state to provide access to hunting areas. There would be a beneficial impact on recreational land use at WPAA. The WPAA consists of Parker Ranch-managed land, which has hunting restrictions. Acquisition of this land by the Army would have a beneficial impact because the Army would manage it as a hunting area that is open to the public when not in use by the military for training.

### Reduced Land Acquisition Alternative

Impacts from construction and land transaction projects would be the same as the Proposed Action, except that QTR2 would be constructed at PTA on the island of Hawai'i instead of on the SRAA.

### Less Than Significant Impacts

*Conversion of agricultural land to training land.* Agricultural land would be changed to training land at the SRAA and the WPAA, and on the easements for Helemanō Trail, Dillingham Trail, and PTA Trail. The proposed training land use would conflict with the existing and planned agricultural land use for 100 acres (40.5 hectares) at the SRAA and approximately 23,000 acres (9,308 hectares) of grazing land at the WPAA. Impacts from acquisition of the WPAA and easements for the trails would be the same as the Proposed Action.

The proposed acquisition would convert approximately 98 acres (39.7 hectares) of actively cultivated pineapple land to training land. Under the RLA Alternative, the entire 98 acres (39.7 hectares) would be used for construction and use of a motor pool; none of the area would be available for continued agriculture, and conversion of the land would be a permanent and irreversible land use change. The ITAM program would be used to identify and mitigate potential impacts on the land. The estimated 98 acres (39.7 hectares) of cultivated pineapple land is 0.001 percent of the total USDA designated agricultural land on O'ahu and is 0.9 percent of the total area in pineapple production on O'ahu (Statistics of Hawai'i Agriculture 2003). As with the Proposed Action, this land is adjacent to existing urban areas and support services, will not result in the indirect conversion of any existing farmland or farm support services off-site, and will not jeopardize the farm support services on remaining areas. Therefore, the impact of this conversion to overall land use is less than significant.

Potential mitigation measures for this impact include establishing a cooperative relationship with the landowner to allow continued grazing activities in conjunction with training on the land at the WPAA, subject to constraints posed by training activities.

*Construction of FTI in a Conservation District*. Of the 25 new antennas proposed under the Reduced Land Acquisition, five of the antennas would be constructed within the Conservation District. The impacts from construction of these antennas would be the same as the Proposed Action.

*Land use during construction activities.* Impacts on land use during construction activities would be the same as for the Proposed Action, with the addition of construction of QTR2 on an existing training range area.

*SBCT training on lands currently used for training.* These impacts associated with the RLA Alternative are the same as those described for the Proposed Action.

#### *Beneficial Impacts*

*Impacts on natural resources management and recreational land use.* Under the Reduced Land Acquisition Alternative, access to TNC's natural resources management area and recreation resources on O'ahu would not change from the current conditions. Hunting activities associated with PTA would not change, as the Army would continue its cooperative efforts with the state to provide access to hunting areas. The WPAA consists of Parker Ranch-managed land, which has hunting restrictions. Acquisition of this land by the Army would have a beneficial impact, because the Army would manage it as a hunting area that is open to the public when not in use by the military for training.

### ***No Action Alternative***

Under No Action, transformation would not occur, so no major changes to training areas would take place in Hawai'i. The Army would continue to operate and maintain its range, training areas, and support facilities in order to meet its training mission requirement. However, the level of training would change occasionally in response to this requirement and, as a result, the land uses of these areas may change. If future changes could affect the environment, NEPA documentation would be prepared.

# 4.3. VISUAL RESOURCES

## 4.3.1 Impact Methodology

This section identifies the methodology used to assess potential visual resources impacts resulting from implementing any of the transformation alternatives. The visual impact assessment methodology was based in part on the *Visual Resources Assessment Procedure for US Army Corps of Engineers* (USACE 1988). Visual impacts were assessed by estimating the amount of visual change to the basic visual resource components of water, landform, vegetation, and human-made elements as a result of the project. Visual resource components typically are measured in terms of the amount of change in design elements, such as form, line, color, texture, and scale in the landscape. Within this context, the visual changes were evaluated in terms of the degree to which they may be visible to the viewer—foreground, middle ground, and background views—and the general sensitivity of the view to landscape alterations.

To accurately assess the potential impacts on the visual resources at the proposed project sites, a standard methodology was established for evaluating existing conditions and potential visual impacts and for formulating proposed mitigation measures. This methodology, composed of a five-part visual impact assessment process, is outlined below.

*Step one:* Review visual resources-related documentation available for the islands of O'ahu and Hawai'i in general and for the proposed project sites in particular. Visual resources-related sections of various general and specific plans were used to identify sensitive viewing areas near SBCT-related project sites. These documents were also used to develop the factors determining significance, as described below. Step one also included examining aerial photography (geo-referenced) of each SBCT project site, and its immediate surrounding area. The proposed boundary of each project was superimposed on the appropriate aerial photograph(s), and critical viewing points were established. These points were selected based on anticipated visual exposure from areas accessible to the general public, such as highways, recreational areas, housing and other public areas, and took into account terrain, vegetative cover, and intervening structures.

*Step two:* Develop a terrain analysis model for each SBCT project location. Digital elevation model (DEM) data were used to generate line-of-site profiles and perspective views from each of the designated viewing points identified in step one. Each line-of-sight diagram and perspective view was examined to determine if any of the proposed project sites were visible from the viewing point. Through a process of elimination, a final set of critical viewing points was established for further investigation. As these viewpoints identified the most likely locations where visual impacts were still possible, they served as reference points in conducting field observations.

*Step three:* Conduct field reconnaissance at each of the designated viewing points identified in step two. At each location, the view was observed and such features as landforms, water resources, land uses and use intensity, and general vegetation/ecosystem patterns were noted. Also noted were any human-made objects considered unique to the surrounding area. Photographs were taken at each of the designated points from the perspective most likely to be experienced by the viewing public. Field observation showed that, in general, this would most likely be from surrounding roadways. A rating was applied to each view based on visual sensitivity, as follows:

- High sensitivity describes views that are rare, unique, or in other ways special, such as in remote or pristine areas. Examples include national and state forests and parks, wilderness areas, wild and scenic rivers, and designated scenic trails and overlooks. Human-made environments with visual value and integrity, such as historic districts, can also be highly sensitive.
- Medium sensitivity describes views that are secondary in importance or are similar to others in the region or locale. The visual character of these areas is likely to have been altered by roadways, vehicles, utility lines, and other structures that contrast with the surroundings. Examples of locations with medium sensitivity include areas that are not designated as scenic but are protected or popular areas of recreational or cultural significance.
- Low sensitivity describes views that the public can be expected to have little or no concern about changing. Little value may be ascribed to the views, or they may be similar to many others in the area. For this EIS, visual sensitivity is considered low for all areas not identified as having medium or high sensitivity.

*Step four:* Analyze photographs to determine what was observable from each viewing point and to verify site features noted in step three. Based on this analysis, a determination was made concerning which of the SBCT project sites were likely to result in potential impacts on visual resources. Photographs were taken to illustrate the view from each critical viewing location. These panoramas were used to identify the foreground (0 to ¼-½ mile [0 to 0.2-0.8 kilometer]), middle ground (¼-½ to 3-5 miles [0.2–0.8 to 5-8 kilometers]) and background (3-5 miles to infinity [5-8 kilometers to infinity]) of each of the views.

*Step five:* Identify specific impacts at each site based on existing and proposed conditions and recommend potential mitigation measures. Each impact was described and a determination of severity was applied based on the degree to which impacts exceeded the significant factors described below. For each of the significant impacts, a mitigation measure was developed. Each mitigation measure is designed to minimize the impact on visual resources during construction or future operation and maintenance phases for each of the SBCT-related projects.

### 4.3.2 Factors Considered for Impact Analysis

The factors considered in assessing potential impacts on visual resources are set largely by the technical procedures used. For this project, these procedures were adapted in part from *Visual Resources Assessment Procedure for US Army Corps of Engineers* (USACE 1988). These procedures served to outline the visual impact assessment process as undertaken for this project. The evaluation of potential impacts was based on each project's potential to alter the visual character of the project area.

Factors considered in determining whether an alternative would have a significant impact on visual resources include the extent or degree to which its implementation would result in the following:

- Permanently alter a site so that a sensitive viewing point or vista is obstructed or adversely affected or if the scale or degree of change appears as a substantial, obvious, or disharmonious modification of the overall view;
- Prevent or substantially impair the view from a sensitive viewpoint for the duration of project construction;
- Introduce physical features that are substantially out of character with adjacent developed areas; or
- Be inconsistent with the visual resource policies of the Honolulu and Hawai'i County General Plans, the O'ahu Development/Sustainable Community Plans or Hawai'i Coastal Zone Management Program policies.

In addition to these factors, public concerns expressed during the scoping process were also considered in the impact analysis. These concerns included the general visual impact of the Proposed Action, as well as the specific visual impact of military convoys on public roadways.

### 4.3.3 Summary of Impacts

Table 4-2 lists the types of visual resources impacts associated with the Proposed Action, Reduced Land Acquisition, and No Action Alternative. General descriptions of the impacts are also provided.

#### *Proposed Action (Preferred Alternative)*

Visual impacts from implementing the Proposed Action vary at each of the installations depending on the location and the nature of the activity proposed. No significant impacts with regard to consistency with relevant planning documents or guidance are expected to occur at any of the installations under the Proposed Action.

*Significant Impacts*

There are no significant impacts on visual resources under the Proposed Action or alternatives that cannot be mitigated to less than significant.

*Significant Impacts Mitigable to Less than Significant*

*Impact 1: Impairment of view during the construction phase.* The Proposed Action at SBMR would result in significant but mitigable impacts on views at McCarthy Flats and the SRAA during the construction phase. This impairment would result from a change in the general appearance of each of these areas by using earth-moving equipment, transporting and storing materials on-site, erecting temporary fencing and implementing erosion-control measures, and constructing buildings and target systems at project sites. Less than significant impacts of this type would occur at DMR, KTA, and PTA.

**Table 4-2**
**Summary of Potential Visual Impacts**

| Impact Issues | SBMR | | | DMR | | | KTA/KLOA | | | PTA | | | Project-wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA |
| Impairment of view during the construction phase | ⦸ | ⦸ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ○ | ⦸ | ⦸ | ○ |
| Modification of existing view | ⦸ | ⦸ | ○ | ⦸ | ⦸ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⦸ | ⦸ | ○ | ⦸ | ⦸ | ⊙ |
| Alteration of the landscape character | ⦸ | ⦸ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ○ | ⦸ | ⦸ | ○ |
| Consistency with visual resource policies | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Impairment of view from visible fugitive dust | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Alter nighttime light and glare | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |

This table summarizes project-wide impacts. For installation-specific impacts see Chapters 5 – 8.
In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | | |
|---|---|---|---|---|
| ⊗ | = Significant | N/A | = | Not applicable |
| ⦸ | = Significant but mitigable to less than significant | PA | = | Proposed Action |
| ⊙ | = Less than significant | RLA | = | Reduced Land Acquisition |
| ○ | = No impact | NA | = | No Action |
| + | = Beneficial impact | | | |

*Regulatory and Administrative Mitigation 1.* Existing natural features, including terrain and vegetative cover, will be conserved where practicable to screen the proposed project sites. Where practicable, permanent screening will be achieved with native tree and shrub plantings that complement existing natural and ornamental plantings, earthen berms that mimic the color and texture of the surrounding area, fencing designed to fit in with the surrounding area, or some combination of these measures in accordance with the Installation Exterior Architectural Plan.

*Impact 2: Modification of the existing view.* Potential significant but mitigable impacts on existing views are expected to occur at SBMR, DMR, and PTA as a result of trail construction at each installation. Each of these trails would be constructed through areas of agricultural land or open space and would be visible from major roadways or areas otherwise determined to be visually sensitive. Use of the trails for military convoys would reduce the number of military vehicles on public roadways and would beneficially affect views from major highways and other nearby visually sensitive areas, such as coastal parks and beaches.

Installing antenna support structures at PTA would also result in potential significant and mitigable impacts on existing views. Less than significant impacts on existing views would occur at KTA. Construction of the antennas and sheds would also modify the views at DMR and PTA.

*Regulatory and Administrative Mitigation 2.* Existing site conditions will be enhanced where practicable to help screen SBCT-related projects from the surrounding area. Where practicable, mitigation measures will be designed to complement the existing view. Existing natural features, including terrain and vegetative cover, will be conserved where practicable. Screening will be constructed of materials that mimic the color and/or texture of the surrounding area where practicable. Where practicable, the Army will use tree and shrub plantings that complement existing natural and ornamental plantings, earthen berms that mimic the color and texture of the surrounding area, and fencing materials designed to fit in with the surrounding area, or some combination of these measures in accordance with the Installation Exterior Architectural Plan.

*Additional Mitigation 2.* The Army proposes to construct the proposed military vehicle trails to conserve existing natural features, including terrain and vegetative cover, to the extent practicable. Use of roadbed materials that contrast sharply with existing conditions will be avoided to the extent practicable. To avoid creation of a discordant linear feature, the road alignment would, where possible, follow the natural contours of the land. Cut slopes would be minimized or avoided, where practicable. Cut slopes would be blended into the landscape by rounding the edges of the slope, differential orientation of the slope, and the road bed alignments where practicable. Use of these techniques would be varied based on the specific conditions, including depth of the cut, orientation of the slope, and type of material (e.g., dirt slope and rock slope).

Where practicable, the Army proposes to enhance existing site conditions to help screen the proposed tower and support shed from the surrounding area. The tower site will be developed to conserve existing natural features, including terrain and vegetative cover, to the extent practicable. The equipment shed would be located to maximize use of natural screening if possible. If necessary, additional screening will be installed by either planting vegetation or the screening will be constructed of materials that mimic the color and/or texture of the surrounding area where practicable. If possible, materials used for construction of the tower and equipment shed will be nonreflective, weathered, or otherwise painted to blend with the natural surroundings.

*Impact 3: Alteration of landscape character.* Potential significant and mitigable impacts on the landscape character would occur at SBMR under the Proposed Action as a result of development in the SRAA. Current agricultural and open space land uses would be replaced in part by the proposed facilities and would be visible from certain foreground and middleground views from the Lyman Road corridor, the Kalākaua Golf Course, and adjacent housing areas. Less than significant impacts of this type would occur at DMR, KTA, and PTA.

*Regulatory and Administrative Mitigation 3.* Mitigation measures identified in Impacts 2 and 3 would also mitigate impacts to the alteration of landscape character. Impacts on the landscape character would be mitigated by maintaining terrain and vegetative cover. Permanent vegetative screening would be established to obscure operations.

### Reduced Land Acquisition Alternative

Impacts under the RLA Alternative would be similar to those described above for the Proposed Action. Although less acreage would be acquired at SBMR, the disturbance during construction and the alteration of the landscape from development in the SRAA would still represent a significant and mitigable impact on visual resources. Mitigation would be as described above for the Proposed Action. Constructing QTR2 on existing training ranges at PTA would not result in any different overall impacts on visual resources at PTA from those described above under the Proposed Action. This is because the QTR2 would be constructed on existing ranges that already affect visual resources.

### No Action Alternative

The baseline of current conditions and training exercises at all of the facilities would continue under No Action. The Army would continue to operate and maintain its range and training area facilities in order to meet its training mission requirement. Invariably, the level of training would change occasionally in response to this requirement, and, consequently, the visual impact as a result of these changes might be altered as well. The level of use of the installation's training assets is not anticipated to alter the physical character of the landscape itself, and no impacts are expected to the six visual resources impact issues.

## 4.4 AIRSPACE

### 4.4.1 Impact Methodology

Impacts on airspace are assessed by evaluating the potential effects of both project construction and operations activities on the principal attributes of airspace, namely controlled and uncontrolled or navigable airspace, special use airspace, military training routes, en route airways and jet routes, and airports/airfields. Impacts on controlled and uncontrolled airspace are assessed by determining if the project would reduce the amount of navigable airspace by creating new or expanding existing special use airspace by introducing temporary flight restrictions or by constituting an obstruction to air navigation. Impacts on special use airspace are assessed by determining the project's requirement for modifications to existing special use airspace. Impacts on military training routes are assessed by determining if the project would require a change to an existing or planned military training route. Impacts on en route airways are assessed by determining if the project would lead to a change in a regular flight course or altitude or instrument procedures. Impacts on airports and airfields are assessed by determining if the project restricts access to or affects the use of airports or airfields available for public use, or if it affects airfield or airport arrival and departure traffic flows.

### 4.4.2 Factors Considered for Impact Analysis

Factors considered in determining whether an alternative would have a significant impact on airspace, based in part on FAA Order 7400.2E, Procedures for Handling Airspace Matters (FAA 2001), include the extent or degree to which its implementation would result in the following:

- Reduce the amount of navigable airspace;
- Lead to the assignment of new special use airspace (including prohibited areas, restricted areas, warning areas, and military operations areas) or require the modification of special use airspace;
- Change an existing or planned military training route or slow route;
- Change an existing or planned instrument flight rules (IFR) minimum flight altitude, a published or special instrument procedure, or an IFR departure procedure, or require a visual flight rules operation change from a regular flight course or altitude;
- Restrict access to or affect the use of airports or airfields available for public use, or if it would affect commercial or private airfield or airport arrival and departure traffic flows; or
- Create an obstruction to air navigation.

In addition to these factors, public concerns expressed during the scoping process were also considered in the impact analysis. These concerns included aircraft traffic impacts, the numbers and types of aircraft used, altitudes flown, preferred flight patterns, risks to the community from the use of helicopters, and air and aviation safety. These comments are addressed in Chapter 2, the following airspace sections, or the noise sections.

### 4.4.3 Summary of Impacts

Table 4-3 summarizes airspace impacts for the project areas based on the factors considered in determining whether an alternative would have a significant impact.

**Table 4-3**
**Summary of Potential Airspace Use Impacts**

| Impact Issues | SBMR | | | DMR | | | KTA/KLOA | | | PTA | | | Project-wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA |
| Reduction in navigable airspace | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| New or modified special use airspace | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Change to a military training route | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Change in en route airways or IFR procedure | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Restrict access to airport/airfield | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Obstruct air navigation | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Aviation Safety | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

This table summarizes project-wide impacts. For installation-specific impacts see Chapters 5 – 8.
In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | | |
|---|---|---|---|---|
| ⊗ | = Significant | N/A | = | Not applicable |
| ⊘ | = Significant but mitigable to less than significant | PA | = | Proposed Action |
| ⊙ | = Less than significant | RLA | = | Reduced Land Acquisition |
| ○ | = No impact | NA | = | No Action |
| + | = Beneficial impact | | | |

#### *Proposed Action (Preferred Alternative)*

*Significant Impacts*

There would be no significant and unmitigable impacts to airspace under the Proposed Action.

*Less Than Significant Impacts*

*Change in En Route Airways or IFR Procedures.* There would be no direct impacts on airspace at any of the SBCT installations except for one less than significant impact at PTA due to the potential for effects on current instrument approach procedures. This would occur because the proposed new reoriented runway at BAAF would change the heading (the compass direction in which the aircraft points) of aircraft approaching the airfield, shift the initial approach fix location, and change the missed approach point and track. This change in heading, AIF location, and missed approach point, can interfere with the instrument approach pattern of other airports or airfields in the vicinity. However, prior notice and consultation with the FAA and the subsequent review process would ensure that any impacts on airspace use would not be significant.

The runway change would also shift and reorient the runway's clear zone and accident potential zones that extend beyond each end of the runway. This would not have any direct impact on airspace use, but, because the clear zones must be cleared, graded, and free of objects, there is the potential for indirect impacts on land use or biological and cultural resources.

The potential for indirect impacts on land use, biological and cultural resources, and the noise environment from the changes resulting from the proposed extension and reorientation of the runway at BAAF, as well as the increase in number of C-17 and C-130 aircraft operations, are addressed in Sections 8.2, 8.6, 8.10, and 8.11.

No adverse impacts on public health and safety are anticipated from the small increase in Army training flights as a result of SBCT training. The strict procedures and rules in place governing flight operations in controlled and uncontrolled navigable airspace and special use airspace, coupled with the Army's exemplary aviation safety record in Hawai'i make future adverse impacts on public health and safety extremely unlikely.

### *Reduced Land Acquisition Alternative*

Airspace impacts would be the same under Reduced Land Acquisition as those under the Proposed Action.

### *No Action Alternative*

The current baseline of existing conditions would continue under No Action. There would be no direct impacts on airspace at any of the locations because none of the factors considered in determining impacts apply. The potential for indirect impacts on land use, the noise environment, and biological and cultural resources from ongoing, continuing airspace use related to current force training is addressed in Sections 4.2, 4.6, 4.10, and 4.11, respectively.

## 4.5 AIR QUALITY

### 4.5.1 Impact Methodology

Air quality impacts from the proposed alternatives have been evaluated in terms of emissions associated with the project alternatives. Emission sources associated with the Proposed Action include emissions from construction activities, ordnance use, engine emissions from military vehicle use, fugitive dust from vehicle travel on unpaved roads, wind erosion from areas disturbed by off-road vehicle maneuvers, and engine emissions from personal vehicle use associated with added personnel.

Construction emissions analyses used USEPA emissions data for off-road engines and vehicles (USEPA 1991), and generalized data for fugitive dust emissions from construction activity (USEPA 1995; California Air Resources Board 1997). Engine emissions from military vehicles have been estimated from USEPA data for off-road vehicles and engines (USEPA 1991). Fugitive dust emissions associated with tactical vehicle use have been based on USEPA methodologies for vehicle travel on unpaved roads (USEPA 1998). Fugitive dust emissions are those that do not pass through a confining pipe or stack. Emissions of wind-blown fugitive dust from areas disturbed by off-road vehicle maneuvers have been estimated using a proprietary wind erosion rate model and wind speed data from on-post meteorological stations. Emissions from personal vehicles have been estimated using an USEPA vehicle emission rate model. Because the number, size, duration, and intensity of accidental wildfires cannot be predicted with any accuracy, generalized estimates of emissions from wildfires are provided using USEPA data (USEPA 1995). Sections 5.5, 6.5, 7.5, and 8.5 provide more detailed emissions analyses that the summaries presented in this section. Further details are presented in Appendix G.

Particulate matter emissions analyses prepared for this EIS are presented as $PM_{10}$ estimates because that is the most appropriate size fraction to address for fugitive dust issues. $PM_{10}$ estimates presented for military and private vehicle engine emissions can be interpreted as also being a conservative estimate of $PM_{2.5}$ emissions. Visible dust is a clear indication of airborne $PM_{10}$ concentrations that are typically in the range of several thousand micrograms per cubic meter. It takes only a few hours of such concentrations to produce a 24-hour average that exceeds the state and federal 24-hour average $PM_{10}$ standard of 150 micrograms per cubic meter. $PM_{10}$ emissions are important because the $PM_{10}$ size fraction represents airborne particles small enough to be inhaled into the lower respiratory tract, where they can have adverse health effects.

In response to USEPA and public comments, the Army conducted a more detailed modeling and analysis of fugitive dust issues.[1] The intent of the modeling was to better

[1]Dispersion modeling analyses have been performed to better evaluate the potential for violations of the federal $PM_{10}$ standard due to fugitive dust emissions associated with military vehicle use. The modeling analyses used the CALINE4 line source model was used (Benson 1984) as an area source model. Five particle size categories were used to account for particle settling and deposition. The particle size categories used in the analysis are equivalent to the conventional soil survey categories of clay, very fine silt, fine silt, medium silt, and coarse silt. Meteorological conditions assumed in the modeling analysis included Class D (neutral) and Class E (mild temperature inversion) conditions. Given the minimal

determine the potential degree of impact and the geographic extent of the impact. The model the Army used is a widely used standard dispersion model (see Appendix G for further detail). Emission rate, traffic activity, and weather condition factors considered in the modeling included the following:

- Soil type;
- Particle settling and deposition based on particle size and density;
- Soil moisture;
- Climatic conditions including wind speed, wind direction, rainfall frequencies, and atmospheric stability;
- Vegetation cover;
- Vehicle traffic conditions, including the types of vehicles, their weight, number of wheels, and hourly traffic volumes; and,
- Geographic size of the disturbed area.

The dispersion modeling results obtained for evaluating a brigade level vehicle maneuver exercise on a 10,000-acre portion of WPAA were used to extrapolate potential $PM_{10}$ concentrations from wind erosion conditions. The extrapolation procedure adjusted the maneuver exercise modeling results to account for wind erosion emission rates at different wind speeds and the effect of variable wind speeds on dispersion and dilution of the resulting emissions. The extrapolated modeling results were evaluated in the context of wind speed frequency data from the Army's West PTA automated weather station.

### 4.5.2 Factors Considered for Impact Analysis

Major factors considered in determining whether a project alternative would have a significant impact on air quality include the following:

- The amount of net increase in annual emissions of criteria pollutants on a given Island. The 100 tons per year Clean Air Act conformity de minimis threshold does not apply to Hawai'i because it is an attainment area but was used as a basis of comparison in analyzing air quality impacts;
- Whether or not dispersion modeling analyses indicated a potential for violation of federal and state $PM_{10}$ standards at off-post locations;
- Whether or not relatively high emissions would occur on a continuing basis for periods longer than the time frame of relevant ambient air quality standards (e.g., 8-hour periods for ozone precursors, 3-hour and 24-hour periods for sulfur oxides, 24-hour periods for $PM_{10}$);

diurnal and seasonal variations in air temperature and the predominance of high humidity levels, these atmospheric stability assumptions provide a conservative analysis. Wind speed assumptions used in the modeling analyses were based on site-specific estimates of the wind speed exceeded 75 percent of the time. Emission estimates used in the dispersion modeling assumed a dry surface. Additional details regarding the modeling procedures are presented in Appendix G-7.

- Whether or not emissions of precursors to ozone or other secondary pollutants would occur in such quantities and at such locations as to have a reasonable potential to cause or contribute to a violation of federal or state ambient air quality standards; or
- Whether or not emissions of hazardous air pollutants could exceed state standards or other hazardous air pollutant exposure guidelines at locations accessible to the general public.

During the scoping process for this EIS, the public expressed general concerns regarding the potential for hazardous air pollutant emissions (primarily in connection with ordnance use), fugitive dust from vehicles traveling on unpaved roads and in maneuver areas, and the potential for wind erosion from areas disturbed by vehicle maneuvers.

### 4.5.3 Summary of Impacts

Table 4-4 lists the types of air quality impacts associated with the Proposed Action, Reduced Land Acquisition, and No Action at the relevant installations.

#### *Proposed Action (Preferred Alternative)*

The Army identified in the EIS a potential significant impact from fugitive dust. The EIS separated the fugitive dust impacts into two components: dust generated directly by vehicle travel on unpaved roads or off-road maneuver areas, and dust generated by wind erosion from areas disturbed by off-road vehicle activity. In response to agency and public comments the Army conducted additional modeling which provided a better understanding of the onsite conditions and potential adverse impacts from fugitive dust. The Army developed additional mitigation programs that are known to be effective for controlling fugitive dust, reducing the severity of the potential impacts. We believe that implementation of these measures will avoid exceeding the $PM_{10}$ standards and will avoid unacceptable impacts to human health and visual resources. The Army acknowledges and has considered the public's concern that annoying dust will be intermittently produced by training and convoy activities at PTA. The Army also recognizes that the potential magnitude of fugitive dust impacts from wind erosion at WPAA are sensitive to the amount of vegetation cover that can be maintained on the area. There is significant uncertainty about the extent to which vegetation cover will be reduced by vehicle maneuver activity at WPAA. Consequently, the Army has retained the significant impact designation for this impact in this Final EIS, even though the Army believes that wind erosion will not result in violations of state or federal air quality standards at off-post locations. Based on the additional modeling and mitigation measures, the impact of fugitive dust from vehicle activity on unpaved areas has been changed from a significant impact to significant but mitigable to less than significant.

#### *Significant Impacts*

*Impact 1: Wind erosion from areas disturbed by military vehicle use.* Off-road vehicle activity can reduce or eliminate vegetation cover in affected areas, resulting in increased susceptibility to wind erosion. The amount of project-wide off-road vehicle activity would increase

**Table 4-4**
**Summary of Potential Air Quality Impacts**

| Impact Issues | SBMR | | | DMR | | | KTA | | | PTA | | | Project-wide Impact | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA |
| Emissions from construction activities | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Emissions from ordnance use | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Engine emissions from military vehicle use | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Fugitive dust from military vehicle use | ⊘ | ⊘ | ⊙ | ⊘ | ⊘ | ⊙ | ⊘ | ⊘ | ⊙ | ⊘ | ⊘ | ⊙ | ⊘ | ⊘ | ⊙ |
| Wind erosion from areas disturbed by military vehicle use | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊘ | ⊙ | ⊗ | ⊗ | ⊙ | ⊗ | ⊗ | ⊙ |
| Emissions from increased aircraft operations | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Emissions from wildfires | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Other emissions from personnel increases | ⊙ | ⊙ | ⊙ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ⊙ | ⊙ | ⊙ |

This table summarizes project-wide impacts. For installation-specific impacts see Chapters 5– 8.
In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact
N/A = Not applicable
PA = Proposed Action
RLA = Reduced Land Acquisition
NA = No Action

substantially under the Proposed Action. In addition, the area available for off-road vehicle maneuvers would increase from 8,843 acres (3,579 hectares) to 31,518 acres (12,755 hectares) at PTA. Most of the additional land that would become available for off-road vehicle maneuvers has a very high potential for wind erosion if vegetation cover is reduced. The introduction of off-road vehicle maneuver activity into areas currently used for cattle grazing would be expected to reduce vegetation cover and increase the extent of ground disturbance. Wind speed patterns at KTA and PTA provide considerable opportunity for wind erosion to occur at these installations. The project-wide net increase in $PM_{10}$ emissions from wind erosion would average 1,796 tons (1,629 metric tons) per year. Net increases in wind erosion would be small at SBMR and DMR, and most of the increase would occur at KTA and PTA. Wind erosion issues are of particular concern near the WPAA because soils in that area are derived from very low-density volcanic ash. In July 1999, a severe dust storm resulted from wind blowing over areas denuded of vegetation by a recent fire. The result was fugitive dust emissions at high enough levels to require temporary evacuation of residences at Waiki'i Ranch.

The potential magnitude of wind erosion is strongly dependent on the extent of vegetation cover that can be maintained on areas subject to vehicle maneuver activity. Vegetation cover would be the major factor controlling potential wind erosion at WPAA. An equally important consideration at KTA is the moisture content of exposed soils. High soil moisture levels effectively prevent wind erosion even in the absence of significant vegetation cover. Rainfall frequency is too low at WPAA for soil moisture conditions to be a major control on wind erosion conditions at that location.

Vehicle maneuver activity at WPAA is expected to be widely dispersed over large portions of the area, and thus would minimize the extent of vegetation damage resulting from the maneuver exercises. The specific $PM_{10}$ increments generated by wind erosion would vary with distance from the WPAA and with the number of hours per day when average hourly wind speeds exceed 12 mph (5.4 meters per second). Wind erosion emission rates increase rapidly when the average hourly wind speed reaches or exceeds 20 mph (8.9 meters per second). Based on three years of meteorological data from the Army's West PTA automated weather station, wind speeds at WPAA would be expected to reach or exceed 20 mph (8.9 meters per second) for 216 hours in a typical year. Wind speeds above 30 mph (13.4 meters per second) occur at WPAA about 24 hours per year. Wind speed frequency distributions for the west side of PTA indicate that days with persistent wind speeds above 20 mph (8.9 meters per second) are uncommon.

As long as high levels of vegetation cover are maintained on the WPAA, only extreme periods of very strong winds would have the potential to generate off-post $PM_{10}$ levels above the value of the state and federal 24-hour $PM_{10}$ standards. If hourly average wind speeds stayed above 25 mph (11.2 meters per second) and blew in the same direction for an entire calendar day, then the federal 24-hour $PM_{10}$ standard could be exceeded at distances of up to 3,200 feet (975 meters) from the WPAA. However, it is very unlikely that a day of such extreme high wind speed would occur. Historically, a more realistic but still unlikely high wind speed scenario would be a day with 12 hours of wind speeds above 25 mph (11.2 meters per second) and 12 hours with wind speeds of 20 to 25 mph (8.9 to 11.2 meters per second). This would limit the occurrence of dust levels above the value of the state and federal 24-hour $PM_{10}$ standards to locations within about 500 feet of the wind erosion source area. The low probability of such extreme high wind conditions indicates that wind erosion at WPAA would be unlikely to generate off-post $PM_{10}$ levels above the value of the state and federal 24-hour $PM_{10}$ standards.

The evaluation of $PM_{10}$ levels associated with wind erosion suggests that state and federal 24-hour $PM_{10}$ standards would not be violated at off-post locations. That conclusion, however, depends in part on maintenance of a high level of vegetation cover at WPAA. The Army's DuSMMoP and ITAM program would substantially mitigate potential wind erosion problems by providing a management tool that would help limit damage to vegetation from off-road vehicle maneuver activity. Although violation of air quality standards is not likely, the overall level of $PM_{10}$ generated by wind erosion would increase as a result of the Proposed Action. Given the resulting increase in overall $PM_{10}$ levels, the uncertainties associated with any estimate of potential wind erosion conditions, and public perceptions of the potential magnitude of this impact, the Army considers wind erosion from the WPAA to be a significant air quality impact under the Proposed Action.

*Regulatory and Administrative Mitigation 1.* The Army will develop and implement a Dust and Soils Management and Monitoring Plan (DuSMMoP) for the training area. The plan will address measures such as, but not limited to, restrictions on the timing or type of training during high risk conditions, vegetation monitoring, dust monitoring, soil monitoring, and buffer zones to minimize dust emissions in populated areas. The plan will determine how training will occur in order to keep fugitive dust emissions below CAA standards for $PM_{10}$ and soil erosion and compaction to a minimum. The Army will monitor the impacts of training activities to ensure that emissions stay within the acceptable ranges as predicted and environmental problems do not result from excessive soil erosion or compaction. The plan will also define contingency measures to mitigate the impacts of training activities which exceed the acceptable ranges for dust emissions or soil compaction.

The Army will continue to implement land restoration measures identified in the INRMP. Mitigation measures include, but are not limited to, implementation of the ITAM program to identify and inventory land condition using a GIS database; coordination between training planners and natural resource managers; implementation of land rehabilitation measures identified in the INRMP; monitoring of the effectiveness of the land rehabilitation measures; evaluation of erosion modeling data to identify areas in need of improved management; and implementation of education and outreach programs to increase user awareness of the value of good land stewardship.

### *Significant Impacts Mitigable to Less Than Significant*

*Impact 2: Fugitive dust from military vehicle use.* The $PM_{10}$ emissions in fugitive dust generated by the increased vehicle traffic would be about 1,736 tons (1,575 metric tons) per year, representing an 81 percent increase over No Action conditions. Net increases in fugitive dust from vehicle use would be 780 tons (708 metric tons) per year at SBMR, 211 tons (191 metric tons) per year at DMR, 315 tons (286 metric tons) per year at KTA, and 429 tons (390 metric tons) per year at PTA. Sources of fugitive dust associated with military vehicle traffic include vehicle convoys on military vehicle trails, vehicle maneuver training on gravel or dirt roads inside military installations, and off-road military vehicle maneuvers inside military installations.

Without mitigation, if unpaved road surfaces are dry and winds are light, even relatively modest numbers of vehicles can create sufficient dust to cause downwind $PM_{10}$ concentrations that exceed the federal 24-hour standard of 150 micrograms per cubic meter. In the absence of any dust control measures, daily traffic volumes of about 100 vehicles per day have the potential for causing $PM_{10}$ problems at locations within 2,000 feet (610 meters) of the roadway. Lower daily traffic volumes could cause $PM_{10}$ problems over shorter distances, and higher daily traffic volumes could cause $PM_{10}$ problems over longer distances. Maximum traffic volumes on proposed military vehicle trails would be slightly over 100 vehicles per day on the DMR Trail, about 300 vehicles per day on the Helemanō Trail, and about 500 vehicles per day on the PTA Trail. Potential $PM_{10}$ problems from vehicle traffic on military vehicle trails can be reduced substantially by a combination of feasible mitigation measures, including the use of washed gravel for surfacing the trails and implementing a dust management program that may include road paving or periodic application of chemical dust suppressants. Alternative chemical dust suppressants include hygroscopic salts (such as calcium chloride or magnesium chloride solutions) and synthetic polymer compounds (such as polyvinyl acetate and vinyl acrylic). If properly applied, dust control measures for unpaved roads would achieve at least 90 percent control of fugitive dust under the weather conditions and roadway use levels prevalent at USARHAW installations. Although fugitive dust from vehicle travel on unpaved roads would be a significant impact in the absence of mitigation, the Army will implement mitigation programs sufficient to avoid violating the federal $PM_{10}$ standard or substantial adverse health consequences for the public.

Because soil conditions, precipitation patterns, and the geographic distribution of areas suitable for off-road vehicle maneuver activity vary widely among USARHAW installations, potential fugitive dust concentrations downwind of vehicle maneuver training areas also show substantial variation among the different installations. Available vehicle maneuver areas are limited at SBER, DMR, and KTA, placing practical limitations on the size and type of vehicle maneuver training that can occur at these installations. DMR is used primarily for logistics activity training, rather than tactical maneuver training. Consequently, dispersion modeling analyses were not performed for DMR. SBER would support small unit and company level maneuver exercises, while KTA would support small unit, company, and battalion level exercises. PTA would support small unit, company, battalion, and brigade level maneuver exercises. Small unit exercises were not modeled because those exercises involve too few vehicles to create significant fugitive dust problems.

If a full company level exercise were conducted at SBER when ground surface conditions were dry, there would be a strong probability that $PM_{10}$ concentrations would exceed the level of the state and federal $PM_{10}$ standards in nearby off-post residential areas. The Army will mitigate this potential impact by developing a Dust and Soil Management and Monitoring Plan (DuSMMoP) in coordination with appropriate state and federal agencies. The DuSMMoP will include a program for monitoring $PM_{10}$ levels at representative locations near installation boundaries. Based on monitoring results, the Army will implement one or more of the following measures:

- Applying dust control agents to unpaved trails and roads;
- Developing management programs that adjust the size and design of vehicle maneuver training at SBER based on prevailing soil moisture conditions;
- Applying the ITAM program to accommodate continued training; and
- Deferring or moving full company level training exercises to other installations.

Implementing such mitigation measures would reduce fugitive dust impacts from vehicle maneuver training exercises to a less than significant level.

High $PM_{10}$ concentrations from a company level exercise at KTA would be limited to on-post locations even if such an exercise were conducted when ground surface conditions were dry. Battalion level exercises at KTA, on the other hand, have the potential for creating $PM_{10}$ concentrations that would exceed the level of the state and federal $PM_{10}$ standards at off-post locations. For exercises that include a total of six hours of significant vehicle activity in a single day, $PM_{10}$ concentrations might exceed the federal 24-hour standard at locations within 1.2 miles (1.9 kilometers) of the maneuver area. However, high $PM_{10}$ concentrations from battalion -level exercises at KTA would occur only if the ground surface were dry. The impact of fugitive dust emissions from vehicle maneuver exercises would be reduced to a less than significant level through application of the mitigation measures described above.

Most vehicle maneuver exercises at PTA would occur on WPAA, which provides a much larger area for maneuvers than is available at SBER or KTA. While company and battalion exercises at SBER or KTA are severely constrained by available area, that would not be the case at WPAA; consequently, vehicle activity during maneuver exercises at WPAA would be widely dispersed rather than concentrated in small areas. The dispersed pattern of vehicle activity would result in much less intense ground disturbance at WPAA than at SBER or KTA. Company level vehicle maneuver exercises at WPAA would typically be spread over 2,000 to 5,000 acres (809 to 2,023 hectares). A 2,500-acre (1,012-hectares) activity area was assumed for modeling company level exercises. Because vehicle activity and resulting fugitive dust emissions would be widely dispersed, individual downwind locations would experience only low concentrations of $PM_{10}$. The federal and state 24-hour $PM_{10}$ standards would not be exceeded at either on-post or off-post locations during company level exercises at WPAA.

Battalion level exercises at WPAA normally would be spread over a large portion of the WPAA. To provide a conservative analysis, the modeling evaluation assumed that a battalion level exercise would be concentrated on a 6,000-acre (2,428-hectare) area. Even with the conservative modeling assumptions, vehicle activity and resulting fugitive dust emissions would be well dispersed. Although moderate $PM_{10}$ concentrations could occur within a few hundred feet of the exercise area, the federal and state 24-hour $PM_{10}$ standards would not be exceeded at either on-post or off-post locations during battalion level exercises at WPAA.

Brigade level exercises normally would make use of the entire 23,000-acre (9,308-hectare) WPAA. To provide a conservative analysis, the modeling evaluation assumed that a brigade level exercise would be concentrated on a 10,000-acre (4,047-hectare) area. Without mitigation, for a concentrated activity scenario such as the one analyzed, vehicle activity and resulting fugitive dust emissions would produce relatively high $PM_{10}$ concentrations at downwind distances that would be likely to reach off-post locations. The geographic extent of high $PM_{10}$ concentrations would depend partly on weather conditions and partly on the duration of periods with significant vehicle activity. Events with only four hours of significant vehicle activity in a day could create high $PM_{10}$ concentrations as far as 3,000 feet (914 meters) from the edge of the activity area. Events with six hours of significant vehicle activity in a day could create high $PM_{10}$ concentrations as far as 1.5 miles (2.4 kilometers) from the edge of the activity area. Events with eight hours of significant vehicle activity in a day could create high $PM_{10}$ concentrations at distances of more than two miles (3.2 kilometers) from the edge of the activity area. $PM_{10}$ impacts from brigade level vehicle maneuver exercises could be significant but could be reduced to a less than significant level through the proposed mitigation program.

Each of these levels of exercise use aviation support with varying amounts of low altitude helicopter and aircraft flight activity. The Army received comments expressing concerns over dust from helicopter flight activity. The Army reviewed this issue and determined that typical helicopter flight activity would not result in noticeable dust generation because the aircraft would be too high above the ground. Helicopter landings will generate dust, however, landings will be brief and limited in number and the dust effects would be very localized (limited to 200 feet or less).

The Army will mitigate potential fugitive dust problems from brigade level vehicle maneuver exercises with measures discussed above under SBER and with the development and implementation of the DuSMMoP. Through the development of DuSMMoP, brigade level maneuver exercises may be dispersed over most of the available maneuver area to avoid concentrating sources of fugitive dust emissions. Spreading a brigade level exercise over 20,000 acres (8,094 hectares) would reduce the expected downwind concentrations by 50 percent, compared to the scenario with activity concentrated on 10,000 acres (4,047 hectares). The Army prefers to train over large areas, so this requirement would have minimal effect on the planning for most brigade level exercise events. Implementing such a management program would reduce fugitive dust impacts from vehicle maneuver training exercises to a less than significant level.

The Army is considering several measures to control dust on vehicle trails. Following is a discussion of some of the measures the Army will consider. Providing a gravel cover to dirt roads and other open dirt areas reduces fugitive dust generation. Gravel produced by crushing local lava-derived rocks would have a moderate dust content unless washed sufficiently to reduce the amount of fine material in the gravel. In addition, lava-derived gravel weathers relatively rapidly and is likely to fragment and crumble more readily than gravel produced from harder rocks. Thus, the resulting gravel surface would be expected to generate noticeable quantities of fugitive dust. Dust generation could be reduced by washing gravel after it is produced by rock crushing operations. The extent of washing for dust reduction would need to be balanced against the engineering requirement to have sufficient fine material to provide a stable gravel surface. Either fresh water or seawater would be appropriate for such gravel washing operations, with the water being recycled for repeated washing operations. Gravel washing treatments by themselves are unlikely to reduce dust generation to less than significant levels, but could nevertheless be an important part of an overall dust control strategy.

Water application whenever road surface materials become dry would be expected to reduce fugitive dust emissions by 75 to 90 percent while the road surface retains moderate moisture levels, but dust control levels would drop rapidly as the road surface dries. Frequent water spray applications (often at least once per day) are required to maintain a high level of dust control. The use of seawater rather than potable water would reduce concerns over the use of limited water supplies. However, water evaporates too rapidly to provide effective dust control for any extended period of time. The necessity for frequent repeat treatments often makes water application for on-going dust control an impractical option in warm climates.

Thus, simple water sprays are not recommended for dust control on unpaved roads at USARHAW installations.

Synthetic dust control chemicals are widely used for on-going dust control on unpaved roads. When properly matched to road surface, traffic, and weather conditions, synthetic dust control products can achieve high levels of dust control. EPA estimates an 80 percent emission reduction as being typical for properly used synthetic dust control products (U.S. EPA 1998). Major categories of dust control products include hygroscopic salts (primarily calcium chloride and magnesium chloride solutions), various synthetic polymers (polyvinyl acetate and vinyl acrylic), lignosulfonate compounds (derived from pulp and paper processing), vegetable oil products, and petroleum products (various asphalt emulsions and mineral oils). Bolander and Yamada (1999) and USAEC (1999) provide summaries of dust control product characteristics and suitability under various conditions.

Bolander and Yamada (1999) provide a summary of environmental risks for various types of dust control products. Petroleum products used for dust control pose the greatest risk of producing environmental impacts due to toxicity and water quality effects. Vegetable oil products also can cause water quality problems, and may not work well on graveled surfaces. Lignosulfonate compounds have low direct toxicity, but can cause water quality problems due to oxygen depletion from biochemical oxygen demand. Lignosulfonate compounds may not work well on graveled surfaces. Synthetic polymers have very low toxicity and pose no water quality concerns under normal circumstances of use, but may not perform well on graveled surfaces. Hygroscopic salts have very low toxicity and pose no water quality concerns under normal circumstances of use. Synthetic polymers and hygroscopic salts pose the fewest potential environmental concerns, with no significant toxicity, water quality, vegetation, or soils impacts except in the case of large volume spills. Both lignosulfonate compounds and hygroscopic salt solutions are corrosive to metals, particularly aluminum. Thus, range management, security, logistical, and tactical vehicles would need to use vehicle wash facilities if roadways are treated with these groups of dust control agents.

Selection of the appropriate dust control products would be based on testing alternative products on dirt and gravel road segments. Based on general characteristics and performance elsewhere, environmentally friendly synthetic polymers and hygroscopic salt solutions appear to be the most promising groups of dust control agents. Hygroscopic salt solutions have a proven record of effectiveness and are ideally suited to use in areas with high humidity. Although chloride salts increase metal corrosion rates, the vehicle wash facilities included in the Proposed Action and the RLA Alternative would effectively address that issue. Calcium and magnesium chloride are considered non-hazardous, and thus there are no restrictions on the transportation of these products. Calcium chloride generally is provided in dry form (powders, flakes, or pellets), and can be mixed with either fresh water or seawater to create the solution used in dust control applications. The typical application rate for a 35 percent solution is about 0.5 gallons per square yard. Given the naturally high chloride exposure from sea salt aerosols in marine air, the use of hygroscopic salts for dust control at USARHAW installations would pose no significant environmental risks.

Army tests at Fort Hood, Texas and Fort Sill, Oklahoma indicated that calcium chloride solutions were more effective and longer lasting than various synthetic polymers or calcium lignosulfonate (USAEC 1996). The calcium chloride solutions provided emission reductions of 60 to 83 percent 30 days after the initial application. These dust control levels were achieved during extended drought conditions on unpaved roadways carrying high traffic volumes. Traffic volumes on test road segments at Fort Hood were approximately 3,000 to 10,000 vehicles per day. Traffic volumes at Fort Sill were about 1,200 to 8,000 vehicles per day. Test road segments at Fort Hood had much higher volumes of tank and other tracked vehicles than did test road segments at Fort Sill. Given the absence of tracked vehicles, significantly lower traffic volumes, and persistent high humidity levels, emission reductions provided by calcium chloride solutions at USARHAW installations should be significantly higher than the levels measured at Fort Hood and Fort Sill. The dispersion modeling results presented in the installation chapters assume a 90 percent control effectiveness factor.

The Army has committed to mitigating dust from vehicle traffic on unpaved roads through a combination of road paving, dust control chemical applications, and/or the use of washed gravel for surfacing military vehicle trails. As noted above, the extent of gravel washing would have to balance dust reduction goals with engineering requirements for achieving a stable roadway surface. Monitoring road surface moisture conditions and dust generation levels would be important components of an adaptive management program that seeks to optimize the proper timing of dust suppressant applications. To the extent possible, planned dust suppressant applications should be scheduled to immediately precede periods of significant convoy traffic.

*Regulatory and Administrative Mitigation 2.* The Army will develop and implement the DuSMMoP as discussed above under "Regulatory and Administrative Mitigation 1."

To reduce fugitive dust associated with the use of military vehicle trails, the Army will implement dust control measures such as dust control chemical applications, the use of washed gravel for surfacing, spraying water, or paving sections of trails. The extent of gravel washing would have to balance dust reduction goals with engineering requirements for achieving a stable roadway surface. Selection of the appropriate dust control products would be based on testing alternative products on dirt and gravel road segments. Based on general characteristics and performance elsewhere, environmentally friendly synthetic polymers (such as polyvinyl acetate and vinyl acrylic) and hygroscopic salt solutions (such as calcium chloride or magnesium chloride) appear to be the most promising groups of dust control agents. The Army will monitor road surface conditions and will apply palliatives as necessary. If moisture levels are adequate to suppress dust, than application of dust palliatives would not be necessary. To the extent possible, the Army would plan dust suppressant applications to be scheduled to immediately precede periods of significant convoy traffic.

### *Less than Significant Impacts*

*Emissions from construction activities.* The Proposed Action would include numerous construction projects at various installations, with construction activities occurring from 2004 into 2009. Nitrogen oxide emissions from construction equipment at SBMR would be

100 tons (91 metric tons) in 2004, 149 tons (135 metric tons) in 2005, and less than 58 tons (53 metric tons) per year from 2006 through the end of the construction period in 2009. Nitrogen oxide emissions from construction equipment at PTA would be 192 tons (174 metric tons) in 2005 and 184 tons (167 metric tons) in 2006. Construction emissions at DMR would be less than 57 tons (51 metric tons) per year for any pollutant. Construction emissions at KTA would be less than 22 tons (20 metric tons) per year for any pollutant. As noted in Section 3.5, federal ozone standards have not been exceeded in Hawai'i, and maximum ozone levels in recent years have been well below the current state and federal standard. Emissions of ozone precursors associated with construction projects under the Proposed Action would create too small a net increased in ozone precursor emissions to have a measurable effect on ozone levels and would not affect the attainment status of the area. Consequently, construction activities would have a temporary and less than significant air quality impact at any installation under the Proposed Action. In order to reduce impacts on air quality during construction, each phase of construction would be scheduled to minimize the dust generating activities and materials, and construction contractors will comply with the provisions of Hawai'i Administrative Rules, Sec. 11-60.1-33 on Fugitive Dust and recommendations from the State on it's Coastal Zone Management Act concurrence letter as part of the requirements of construction contracts.

*Emissions from ordnance use.* Overall project-wide ordnance use by the 25th ID(L) would increase by about 25 percent under the Proposed Action. Approximately 96 percent of the annual ordnance use would consist of small arms ammunition (pistol, rifle, shotgun, and machine gun ammunition), each item of which has only a very small propellant charge. Ordnance items with explosive or pyrotechnic components (such as mortars, artillery, mines, demolition charges, smoke devices, flares, or blast simulators) would represent about four percent of the annual ordnance use. Emissions from ordnance use have not been quantified. However, the literature on emissions from ordnance firing and detonations clearly establishes that the detonation process is fundamentally different from normal combustion processes in terms of generating air pollutant emissions. As noted in a recent USEPA publication (Mitchell and Suggs 1998), unconfined detonations are essentially a decomposition process in which molecular constituents are broken down into simpler byproducts, and molecules more complex than the starting molecules are not formed. Instead, most of the energetic material is converted into simple gaseous products such as carbon dioxide, carbon monoxide, water vapor, nitrogen gas, nitric oxide, and nitrogen dioxide. Based on the general nature of detonation processes and the very low emission rates that have been published in studies of munitions firing and open detonations, emission quantities from ordnance use are very small and include only trace quantities of hazardous components. Emissions associated with ordnance use pose very little risk of creating adverse air quality impacts. Consequently, air quality impacts from munitions use under the Proposed Action are considered less than significant.

*Engine emissions from military vehicle use.* Project-wide military vehicle use would increase by over 50 percent under the Proposed Action. Based on the estimated mix of vehicle types and the estimated frequency of vehicle use, annual project-wide emissions from military vehicle use would increase by about 98 percent compared to No Action conditions. Nevertheless, the net increase in annual emissions would be too small to affect the attainment status of any installations. The pollutant with the highest estimated annual net increase in emissions would be nitrogen oxides, which would increase by 82 tons (75 metric tons) per year for all installations combined. Consequently, emissions from military vehicle use would be a less than significant impact under the Proposed Action.

*Emissions from increased aircraft operations.* The Proposed Action would not result in any meaningful change to existing Army helicopter flight operations in Hawai'i. Airfield improvements at WAAF and BAAF would accommodate increased use of fixed wing cargo aircraft (C-130 and C-17 aircraft) for transporting troops and equipment to PTA. The Shadow 200 UAV would be used during many training exercises at various installations under the Proposed Action. However, current patterns of helicopter flight activity would continue to be the dominant Army flight activity. The project-wide net increase in emissions resulting from added cargo aircraft and UAV flight activity would be small. Consequently, the increase in aircraft emissions under the Proposed Action would be a less than significant impact.

*Emissions from wildfires.* Tracers, flares, and pyrotechnics have the potential for starting wildfires on training range areas. The use of such munitions would increase somewhat under the Proposed Action, with a corresponding increase in the potential for wildfires. The relatively low frequency of wildfires and their typically small size result in only small quantities of emissions. Consequently, emissions from wildfires on range areas would be a less than significant impact under the Proposed Action.

*Other emissions from personnel increases.* The Proposed Action would increase the overall number of military personnel at SBMR by 810. This represents a 5.5 percent increase in combined military and civilian personnel compared to No Action. Estimated emissions associated with the net increase in commute vehicle traffic would be approximately 8.2 tons (7 metric tons) per year of reactive organic compounds; 67 tons (61 metric tons) per year of carbon monoxide; 7.5 tons (7 metric tons) per year of nitrogen oxides; 0.05 ton (0.05 metric ton) per year of sulfur oxides; and 11.3 tons (10.3 metric tons) per year of $PM_{10}$. These emission quantities would be too small to affect the attainment status of the area. Consequently, emissions from increased commute traffic at SBMR would be a less than significant impact under the Proposed Action. Personnel would not increase at other installations.

### ***Reduced Land Acquisition Alternative***

#### Significant Impacts

*Impact 1: Wind erosion from areas disturbed by military vehicle use.* Air quality impacts would be the same under Reduced Land Acquisition as those under the Proposed Action.

*Regulatory and Administrative Mitigation 1.* The mitigation measures for wind erosion from areas disturbed by military vehicle use would be the same as discussed for the Proposed Action.

#### Significant Impacts Mitigable to Less Than Significant

*Impact 2: Fugitive dust from military vehicle use.* Vehicle numbers and estimated annual VMT by military vehicles would be essentially the same under Reduced Land Acquisition as discussed for the Proposed Action. Fugitive dust impacts are significant but mitigable to less than significant with the mitigation measures described below.

*Regulatory and Administrative Mitigation 2.* The mitigation measures for fugitive dust from off-road vehicle maneuver activity would be the same as discussed for the Proposed Action.

### Less than Significant Impacts

*Emissions from construction activities.* Reduced Land Acquisition would require most of the same construction projects as discussed under the Proposed Action. QTR2 would be constructed at PTA instead of at SBMR. Nitrogen oxide emissions from construction equipment at SBMR would be 100 tons (91 metric tons) in 2004 and 126 tons (114 metric tons) in 2005. Nitrogen oxide emissions from construction equipment would be 213 tons (193 metric tons) in 2005 and 186 tons (169 metric tons) in 2006. Construction emissions at DMR would be less than 57 tons (51 metric tons) per year for any pollutant. Construction emissions at KTA would be less than 22 tons (20 metric tons) per year for any pollutant. . Emissions of ozone precursors associated with construction projects under the Proposed Action would create too small a net increased in ozone precursor emissions to have a measurable effect on ozone levels and would not affect the attainment status of the area. Consequently, construction activities would have a temporary and less than significant air quality impact at any installation under the RLA Alternative.

*Emissions from Ordnance Use.* Ordnance use under Reduced Land Acquisition would be essentially the same as ordnance use under the Proposed Action. As discussed for the Proposed Action, emissions associated with ordnance use would pose very little risk of creating adverse air quality impacts, so air quality impacts from munitions under Reduced Land Acquisition are considered less than significant.

*Engine Emissions from Military Vehicle Use.* Military vehicle use under Reduced Land Acquisition would be essentially the same as that discussed for the Proposed Action. Because the project-wide net emissions increase would be too small to affect the attainment status of any installation, emissions from military vehicles would be a less than significant impact under Reduced Land Acquisition.

*Emissions from Increased Aircraft Operations.* Reduced Land Acquisition would have the same small effect on emissions from aircraft operations as that discussed for the Proposed Action, so the increase in aircraft emissions under Reduced Land Acquisition would be a less than significant impact.

*Emissions from Wildfires.* Reduced Land Acquisition would have essentially the same potential for wildfires as that discussed for the Proposed Action. As noted for the Proposed Action, emissions from wildfires would be a less than significant impact under Reduced Land Acquisition.

*Other Emissions from Personnel Increases.* Reduced Land Acquisition would have the same personnel increase as that discussed for the Proposed Action. Emissions from added commute traffic would be the same as that discussed under the Proposed Action. Because these emission quantities would be too small to affect the attainment status of the area, emissions from increased commute traffic at SBMR would be a less than significant impact under Reduced Land Acquisition.

### No Action Alternative

#### Less than Significant Impacts

*Emissions from ordnance use.* Overall project-wide ordnance use under No Action would be about 21 percent less than under the Proposed Action. Based on the general nature of detonation processes and the very low emission rates that have been published in studies of munitions firing and open detonations, emissions associated with ordnance use pose very little risk of creating adverse air quality impacts. Consequently, air quality impacts from munitions use under No Action are considered less than significant.

*Engine emissions from military vehicle use.* The military vehicle fleet would remain at the current 659 vehicles under No Action. Estimated annual emissions from vehicle engine operations would be well too small to affect the attainment status of any installations. Consequently, military vehicle engine emissions would have a less than significant impact under No Action.

*Fugitive dust from military vehicle use.* Vehicle numbers and estimated annual use levels would remain at current conditions under No Action. Because existing conditions have not led to any known violations of state or federal ambient air quality standards, the fugitive dust from military vehicle use would have a less than significant impact under No Action.

*Wind erosion from areas disturbed by tactical vehicle use.* Vehicle maneuver activity would remain the same as current conditions under No Action. Because existing conditions have not led to any known violations of state or federal ambient air quality standards, wind erosion from disturbed areas would be a less than significant impact under No Action.

*Emissions from increased aircraft operations.* There would be no change in aircraft operations at WAAF or BAAF under No Action. Consequently, there would be no increase in aircraft emissions under No Action. Because there would be no change from current conditions and because current conditions have not created any known violations of state or federal ambient air quality standards, emissions from aircraft operations under No Action would have a less than significant impact on air quality.

*Emissions from wildfires.* There would be no change in the use of tracer rounds or pyrotechnics under No Action. The risk of wildfires on training ranges would remain the same as present conditions. Emissions from wildfires under No Action are unlikely to produce substantial air quality impacts in off-base areas. Consequently, emissions from wildfires on range areas are considered a less than significant impact under No Action.

*Other emissions from personnel increases.* There would be no changes in personnel numbers at SBMR under No Action. Emissions from commute traffic under No Action would remain the same as under current conditions. Because there would be no change from current conditions and because current conditions have not created any known violations of state or federal ambient air quality standards, emissions from these sources would have a less than significant impact under No Action.

### *No Impact*

*Emissions from Construction Activities.* No construction projects are associated with No Action, so there would be no air quality impacts from construction under No Action.

# 4.6 NOISE

## 4.6.1 Impact Methodology

Noise impacts associated with project alternatives have been evaluated using available noise data for various weapons types, available monitoring data for actual live fire training exercises, and modeling analyses for various types of noise sources. The major noise sources associated with project alternatives include construction activity, ordnance firing and detonations, military vehicle use, aircraft and helicopter operations, and personal vehicle use.

Noise modeling for construction activities used generalized equipment numbers, estimated daily operating hours per item, and generalized equipment noise generation data. Noise modeling for major ordnance firing and detonation noise employed the Army's blast noise model. Modeling of heavy weapons and demolition charges was based on 24-hour Ldn conditions, which includes a 10 dB penalty factor for nighttime (10 PM to 7 AM) noise. Noise modeling for small arms firing employed data and equations published by the Army Environmental Hygiene Agency (now CHPPM) plus information from various other sources to produce a spreadsheet model for instantaneous peak dB and 1/8 second maximum dB from small arms firing. Noise modeling for military vehicle traffic employed generalized noise data for medium and heavy trucks, tractors and related construction equipment items, and various tactical vehicle types. Noise modeling for aircraft operations employed a proprietary flyover event simulation model using aircraft noise data from the US Air Force OMEGA108R program.

## 4.6.2 Factors Considered for Impact Analysis

Results from noise monitoring and noise source modeling have been compared to various standards and guidelines in order to evaluate the significance of predicted noise levels. The noise criteria considered include the State of Hawai'i community noise standards (Hawai'i Administrative Rules, Title 11, Chapter 46), Army land use compatibility guidelines (US Army 1997; US Departments of the Air Force, the Army, and the Navy 1978), and CHPPM guidelines for evaluating the significance of short-term blast noise events (CHPPM 2001). The noise evaluations have considered both longer-term average noise level conditions and short-term noise levels associated with discrete noise events. Other relevant noise exposure conditions (time-of-day, background noise levels, the repetition pattern of brief noise events, and the duration of individual noise events, etc.) also have been considered in the evaluation of noise impacts. Specific considerations used in evaluating noise impact significance include the following:

- Whether noise levels would exceed the State of Hawai'i community noise standards at the boundaries of Army installations;
- Whether land use compatibility problems would be created in terms of DOD guidelines (AR 200-1 and DA PAM 200-1); or
- Whether impulse or other short-term event noise levels would be likely to cause significant annoyance to more than 15% of exposed individuals at locations accessible to the general public (the underlying context for DOD noise guidelines and CHPPM evaluations of blast noise complaints).

In addition to these factors, public concerns expressed during the scoping process were also considered in the impact analysis. These concerns included noise from ordnance use, aircraft and helicopter flight operations, and vehicle traffic on paved roads, unpaved roads, and off-road maneuver areas.

### 4.6.3 Summary of Impacts

Table 4-5 lists the types of noise impacts associated with the Proposed Action, Reduced Land Acquisition, and No Action Alternative at the relevant installations.

**Table 4-5**
**Summary of Potential Noise Impacts**

| | SBMR | | | DMR | | | KTA/KLOA | | | PTA | | | Project-wide Impact | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Impact Issues** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** |
| Noise from construction activities | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Noise from ordnance use | ⊗* | ⊗* | ⊗ | ⊙ | ⊙ | ⊙ | ⊙/○ | ⊙/○ | ⊙/○ | ⊘ | ⊘ | ⊙ | ⊗ | ⊗ | ⊗ |
| Noise from military vehicle use | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Noise from aircraft operations | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Noise from added personal vehicle traffic | ⊙ | ⊙ | ○ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ○ | ○ | ○ | ⊙ | ⊙ | ○ |

This table summarizes project-wide impacts. For installation-specific impacts see Chapters 5 – 8.
In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

* The PA and RLA would have a minor increase in noise impacts over No Action. The determination of significance is based on existing No Action noise levels.

LEGEND:

| | | | |
|---|---|---|---|
| ⊗ = Significant | | N/A = | Not applicable |
| ⊘ = Significant but mitigable to less than significant | | PA = | Proposed Action |
| ⊙ = Less than significant | | RLA = | Reduced Land Acquisition |
| ○ = No impact | | NA = | No Action |
| + = Beneficial impact | | | |

#### *Proposed Action*

The Army was concerned about the accuracy of significant adverse noise impacts that had been identified in the Draft EIS. As such, the noise model input parameters that were used for the Draft EIS were more closely evaluated, and it was found that certain incorrect assumptions had been made. Namely, it was found that two noise model input parameters were incorrect:

- For the SBMR blast noise model input parameters used in the Draft EIS, it was assumed that approximately 33 percent of the overall volume of large-caliber weapons fire would occur between the hours of 10:00 PM and 7:00 AM. Under closer evaluation, it was determined that a more accurate estimate of weapons firing volumes for the 10:00 PM to 7:00 AM time period was approximately 10 percent of the overall firing volume.

- The blast noise modeling efforts were found to reference a slightly outdated and inaccurate equipment package; the input parameters were corrected to include the correct SBCT equipment package.

Correction of these blast noise model input parameters reduced the lateral noise contours slightly but did not change the overall conclusion of a significant adverse impact to the local noise environment at SBMR. For PTA, the correction of these input parameters resulted in a modification of the environmental impact determination to significant but mitigable to less than significant.

### *Significant Impacts*

*Impact 1: Noise From Ordnance Use.* Large caliber weapons firing and explosives use under the Proposed Action would cause noise levels to exceed the Army's acceptable noise level criteria (as provided in Section 3.6) in the cantonment area of SBMR. At SBMR, the Proposed Action would result in expansion of Zone II and Zone III noise contours. The Zone III noise contour would not change much from existing conditions, but would expand eastward by about 650 to 820 feet (200 to 250 meters) in the southwestern portion of the cantonment area. The Zone II noise contour would expand eastward by about 985 to 1,300 feet (300 to 400 meters). Some additional on-post housing would be encompassed by the expanded Zone III and Zone II noise contours. Two on-post schools (Solomon Elementary School and Hale Kula Elementary School) would remain exposed to Zone II noise conditions. The primary cause for increased Zone III and Zone II noise exposure would be due to increased training and munitions use under the Proposed Action, with increases in both daytime and nighttime training. The increase in nighttime training would probably result in an increase in noise complaints from surrounding communities.

*Additional Mitigation 1.* Although there are likely no mitigation measures that are available to reduce the identified significant impacts to a level *below* significance thresholds, certain mitigation measures may be available to reduce these identified impacts. Potential mitigation measures for identified impacts to the local noise environment include the following:

- The Army proposes to evaluate training techniques, scheduling and locationto reduce overall noise impacts at SBMR. In this evaluation, the Army would consider, as feasible, the benefit of timing restrictions on training and moving certain training activities to PTA, and
- The Army proposes to provide noise-insulating measures whenever new buildings are constructed or existing buildings are renovated, such as modifications to window materials and cooling systems to noise-sensitive land uses that are or that may become exposed to Zone II and Zone III noise conditions.

### *Significant Impacts Mitigable to Less Than Significant*

*Impact 2: Noise from Ordnance Use.* At PTA, large caliber weapons firing and explosives use would result in Zone II noise contours that extend slightly beyond the installation boundaries. Zone II noise conditions would affect BAAF and the western portion of the cantonment area, but most of the on-post temporary troop housing would remain outside the Zone II contour. The Zone II noise contour at Mauna Kea State Park would expand slightly to include a small amount of land on the west side of Saddle Road, but there would be very little change in the location of the Zone II noise contour near the picnic area and rental cabins that are east of Saddle Road.

The use of blanks and other training munitions on the WPAA would produce peak noise levels exceeding Army Zone II criteria when blank ammunition firing occurs within about 3,500 feet (1,067 meters) of the WPAA boundary. Thus, noise from small arms firing with blank ammunition could potentially cause significant noise impacts at Waiki'i Ranch and the Kilohana Girl Scout Camp when training activities occur within a few thousand feet of these locations.

*Additional Mitigation 2.* The Army proposes to establish a minimum 1,000-foot (305-meter) noise buffer around the Waiki'i Ranch property and the Kilohana Girl Scout Camp. In addition, the Army will consider training guidelines that minimize nighttime training activities that involve weapons fire or aviation activity within a minimum of 2,000 feet (610 meters) of those properties. The Army will continue to work with affected communities on noise buffers and may adjust the buffer size dependent upon these discussions.

### *Less than Significant Impacts*

*Noise from Construction Activities.* Numerous construction projects would occur at various installations under the Proposed Action. Individual items of construction equipment typically generate noise levels of 80 to 90 dBA at a distance of 50 feet (15 meters). With multiple items of equipment operating concurrently, noise levels can be relatively high during daytime periods at locations within several hundred feet of active construction sites. The zone of relatively high construction noise levels typically extends to distances of 400 to 800 feet (122 to 244 meters) from the site of major equipment operations. Locations more than 1,000 feet (305 meters) from construction sites seldom experience significant levels of construction noise. Except for a few housing areas at the SBMR and PTA cantonment areas, no noise-sensitive land uses are close enough to proposed construction sites to result in significant noise impacts. A limited amount of family housing at SBMR is close to a small portion of the proposed motor pool facility, and would experience a brief period of high construction noise. But most of the motor pool facility site is far enough from the family housing area to avoid significant noise impacts. Housing facilities at the PTA cantonment are used on a temporary basis by troops visiting PTA for training exercises. Since no personnel are housed at PTA for long durations, limited exposure to daytime construction noise is considered a less than significant impact.

*Noise from Military Vehicle Use.* Military vehicles use a mixture of public roads, on-post roads, military vehicle trails, and on-post off-road maneuver areas. Vehicle convoys using public roads on O'ahu are limited to no more than 24 vehicles in a group. Vehicles within a convoy group (also called convoy serials) typically are spaced about 165 to 330 feet (50 to 101 meters) apart. Convoy serials generally are spaced at least 15 to 30 minutes apart. These convoy procedures prevent situations where convoy vehicles dominate local traffic flow for significant periods of time. Instead of creating conditions where military vehicle traffic dominates traffic noise conditions for a noticeable amount of time, existing convoy procedures result in noise from convoy traffic occurring as a sequence of multiple individual vehicle pass-by events within a background of normal traffic noise conditions. Consequently, noise from vehicle convoy activity is a less than significant impact.

Training activities include vehicle travel along military vehicle trails, on-post unpaved roadways, and in off-road vehicle maneuver areas. Noise generated by this vehicle activity is a combination of individual vehicle pass-by events and periods of more sustained vehicle traffic. Noise levels from individual vehicle pass-bys vary with vehicle type and speed. Vehicle speeds would be relatively low on unpaved roads and during off-road vehicle maneuvers. Noise levels generated by HMMWVs and two-axle military trucks would be comparable to noise from medium trucks (about 65 to 70 dBA at 50 feet [15 meters]). Multi-axle heavy trucks would generate noise levels comparable to other heavy duty trucks (about 78 to 80 dBA at 50 feet [15 meters]). The Stryker vehicle is expected to produce peak pass-by noise levels a few decibels higher than the noise generated by multi-axle heavy trucks (about 85 dBA at 50 feet [15 meters]). Peak pass-by noise levels would drop by 15 dBA at a distance of 500 feet (152 meters) from the travel path.

The maximum number of vehicles employed in any training exercise would be at PTA where approximately 800 vehicles could be used during a single brigade level exercise. Military vehicle convoys between Kawaihae Harbor and PTA would involve groups of up to 24 vehicles spaced at least 15 minutes apart to minimize traffic problems where the proposed PTA Trail crosses public roadways. Consequently, convoy traffic generally would involve no more than 100 vehicles per hour. Predicted military convoy traffic on the proposed PTA Trail would produce hourly average noise levels of about 65 dBA at a distance of 100 feet (30 meters) from the trail, about 55 dBA at 500 feet (152 meters) from the trail, and about 50 dBA at 1,000 feet (305 meters). If the duration of convoy traffic were not to exceed five hours during the daytime, the resulting Ldn level (a 24-hour weighted average noise level) would be about 58.5 dBA at a distance of 1,000 feet (305 meters) from the trail. Even in areas such as Kawaihae, where residential development is close to PTA Trail, predicted convoy traffic would not have a significant noise impact. The closest segment of PTA Trail is about 1.25 miles (2 kilometers) from Waikiʻi Ranch and about 1.8 miles (3 kilometers) from the Kilohana Girl Scout Camp. Noise from predicted convoy traffic on PTA Trail would be about 37 dBA at a distance of 1 mile (1.6 kilometers) and about 31 dBA at a distance of 2 miles (3.1 kilometers). Predicted military convoy traffic on PTA Trail would not produce any significant noise impacts at Waikiʻi Ranch or the Kilohana Girl Scout Camp. Noise levels along military vehicle trails on Oʻahu would be no greater than noise levels along PTA Trail. Consequently, noise from military vehicle traffic on established trails would be a less than significant impact.

Troops training at WPAA would use PTA Trail as a major access corridor from the cantonment area. Vehicle traffic between the cantonment area at PTA and WPAA might not be limited to 100 vehicles per hour, but as a practical matter, it is unlikely that traffic volumes would exceed 400 vehicles per hour on the PTA Trail segment in WPAA. If 400 vehicles traveled along PTA Trail in a single hour, the resulting hourly average noise level would be about 71 dBA at a distance of 100 feet (30 meters) from the vehicle trail, about 65 dBA at 300 feet (91 meters) from the vehicle trail, about 61 dBA at 500 feet (152 meters) from the trail, and about 56 dBA at 1,000 feet (305 meters) from the trail. This noise level would drop to about 43 dBA at a distance of 1 mile (1.6 kilometers) and to less than 37 dBA at a distance of 2 miles (3.1 kilometers). Training exercise traffic on PTA Trail would not generate noise levels above typical daytime background conditions at Waikiʻi Ranch or the Kilohana Girl Scout Camp. Consequently, vehicle traffic on PTA Trail would have a less than significant noise impact.

Vehicle maneuver activity would include use of unpaved roads and use of off-road maneuver areas at various installations. Because vehicle speeds are low during most maneuver activities and because vehicles tend to be relatively dispersed during off-road maneuvers, maneuver activities would be expected to produce hourly average noise levels of less than 55 dBA at a distance of about 500 feet (152 meters), with brief peaks of 65 to 70 dBA. Such noise levels would not cause significant noise impacts at off-post noise-sensitive land uses during daytime hours. These noise levels would be more disturbing during nighttime hours. As long as nighttime vehicle maneuver activity is minimized within 1,000 feet (305 meters) of noise-sensitive areas near SBMR and PTA, vehicle noise from training and maneuver activities would be a less than significant impact under the Proposed Action. The Army has established a 1,000-foot (305-meter) noise buffer along those portions of SBER that border residential areas of Wahiawā. As long as nighttime vehicle maneuver activity is minimized in this buffer area, vehicle noise from training and maneuver activities at SBMR would be a less than significant impact under the Proposed Action.

The Army will establish a minimum 1,000-foot (305-meter) noise buffer around the Waiki'i Ranch property and the Kilohana Girl Scout Camp. In addition, the Army will consider training guidelines that minimize nighttime training activities that involve weapons fire or aviation activity within a minimum of 2,000 feet (610 meters) of those properties. The Army will continue to work with affected communities on noise buffers and may adjust the buffer size dependent upon these discussions.

*Noise from Aircraft Operations.* The Proposed Action would not result in any meaningful changes in flight operations at WAAF. Improvements to WAAF and BAAF under the Proposed Action would allow increased use by C-17 cargo aircraft. Increased use of these airfields by fixed wing aircraft would cause a minor increase in airfield vicinity noise levels. However, noise conditions in the vicinity of WAAF and BAAF would continue to be dominated by helicopter flight operations. Overall changes in airfield vicinity noise levels would be less than significant under the Proposed Action.

Introduction of the Shadow 200 UAV would add an additional aircraft type to those currently using airspace over Army installations. Because the UAV has relatively low noise generation and normally would be flown at altitudes above those used by helicopters and other aircraft, the use of UAVs would not have significant noise impacts.

While overall USARHAW helicopter flight activity would not change under the Proposed Action, there would be changes in the geographic distribution of flight operations due to changes in the locations and types of training conducted by the 25th ID(L). A portion of helicopter flight operations at PTA would be shifted into WPAA to support maneuver training exercises. Current estimates are that helicopter flight operations over WPAA would average 426 flight operations (totaling about 1,000 flight hours) per month. Less than half of the flight activity would occur at night (US Army CHPPM 2004). Helicopter noise modeling indicates that Ldn noise levels from helicopter activity over WPAA would result in Zone I noise exposure conditions at surrounding off-post locations such as Waiki'i Ranch and the Kilohana Girl Scout Camp. Smaller helicopters, such as the OH-58 and UH-60, produce maximum noise levels of 75 dBA at distances of 500 to 700 feet (152 to 213 meters) from the flight path. Large helicopters, such as the CH-47, produce peak noise levels of 75 dBA at distances of about 1,300 feet (400 meters) from the flight path. About 15 percent of people are highly annoyed by individual aircraft or helicopter flyovers when the peak noise level reaches 75 dBA. Most helicopter flight activity over WPAA would be well over 1,000 feet (305 meters) from the boundaries of Waiki'i Ranch and the Kilohana Girl Scout Camp. Noise from increased aircraft operations would be a less than significant impact under the Proposed Action.

*Noise from Added Personal Vehicle Traffic.* The Proposed Action would result in a 5.5 percent increase in combined military and civilian personnel based at SBMR. (No additional personnel would be stationed at the other installations.) A 5.5 percent increase in traffic volumes would produce a change in traffic noise levels of only 0.23 dBA. Most people cannot detect a noise level change of less than 1.5 dBA. Consequently, noise from added personal vehicle traffic would be a less than significant impact under the Proposed Action.

### Reduced Land Acquisition

#### Significant Impacts

*Impact 1: Noise From Ordnance Use.* Noise levels from weapons firing and ordnance detonations under Reduced Land Acquisition would be essentially the same as under the Proposed Action.

*Additional Mitigation 1.* Mitigation measures would be the same as those described above for noise impacts of the Proposed Action.

#### Less than Significant Impacts

*Noise from Construction Activities.* Reduced Land Acquisition would require the same new facilities as the Proposed Action. As noted in the discussion for the Proposed Action, noise-sensitive land uses would be far enough from construction sites to avoid significant noise impacts. Consequently, construction activities would have a less than significant noise impact under Reduced Land Acquisition.

*Noise from Military Vehicle Use.* Military vehicle use would be the same under Reduced Land Acquisition as under the Proposed Action. As would be the case for the Proposed Action, military vehicle use would have a less than significant noise impact under Reduced Land Acquisition.

*Noise from Aircraft Operations.* Aircraft, helicopter, and UAV use would be the same under Reduced Land Acquisition as previously discussed under the Proposed Action. Although residents of areas near SBMR and PTA would continue to file occasional complaints about low flying aircraft and helicopters, the complaints generally would be about discrete flyover events rather than overall average noise levels. As noted in the discussion of the Proposed Action, aircraft operations would have a less than significant noise impact under Reduced Land Acquisition.

*Noise from Added Personal Vehicle Traffic.* Personnel increases under Reduced Land Acquisition would be the same as for the Proposed Action. As would be the case for the Proposed Action, added personal vehicle traffic would have a less than significant noise impact under Reduced Land Acquisition.

### *No Action*

#### Significant Impacts

*Noise from Ordnance Use.* Existing live-fire training would continue under No Action. Much of the cantonment area at SBMR would remain impacted by Zone III and Zone II noise conditions. A large portion of the family and troop housing and two elementary schools on the Main Post are exposed to undesirable noise levels. Continued exposure of troop housing and family housing areas at SBMR to Zone III and Zone II noise conditions would be a significant and unavoidable impact under No Action.

Noise conditions at PTA would remain essentially the same as present conditions. The WPAA acquisition would not occur, so there would be no added small arms firing near Waiki'i Ranch or the Kilohana Girl Scout Camp. While individual detonation events would continue to produce occasional events of high noise levels in the cantonment area and at off-post noise-sensitive areas, overall noise conditions would remain acceptable for current land use patterns. Consequently, noise from ordnance use under No Action would be a less than significant impact at PTA.

*Additional Mitigation 1.* No additional mitigation measures have been identified.

#### Less than Significant Impacts

*Noise from Military Vehicle Use.* Military vehicle use would be less under No Action than under the Proposed Action or Reduced Land Acquisition. No Stryker vehicles would be used under No Action. Noise levels produced by a continuation of existing vehicle use patterns would have a less than significant noise impact under No Action.

*Noise from Aircraft Operations.* Existing patterns of aircraft and helicopter use would continue under No Action. Although residents of areas near SBMR and PTA would continue to file occasional complaints about low flying aircraft and helicopters, the complaints generally would be about discrete flyover events rather than overall average noise levels. Noise levels produced by a continuation of existing aircraft operations would have a less than significant noise impact under No Action.

#### No Impact

*Emissions From Construction Activities.* No construction projects are associated with No Action. Consequently, there would be no noise impact from construction under No Action.

*Noise from Added Personal Vehicle Traffic.* There would be no added personnel based at SBMR under No Action. Consequently, there would be no noise impact from added personal vehicle traffic.

## 4.7 TRAFFIC

Traffic conditions are currently operating at acceptable levels, but during times of heightened security, traffic tends to back up on roads to WAAF and SBMR.

### 4.7.1 Impact Methodology

The traffic impact analysis describes the potential impacts from construction traffic, from transporting troops on roads to training ranges, and from increased traffic due to the increased activity and number of military personnel and their families stationed at SBMR. Convoys would be restricted to non-peak hours. The analysis includes long-term traffic volumes and impacts on local intersections and evaluates the impacts of construction traffic on the local circulation network. Impacts on local circulation, parking, access, and traffic safety also were evaluated.

The objectives of the traffic impact analysis are to quantify the impacts of the Proposed Action on traffic LOS and circulation, and to identify and evaluate potential roadway improvements and traffic demand management strategies to mitigate the traffic impacts of the proposed project. To accomplish these objectives, the following tasks are performed:

*Task 1: Collect data*. Traffic volumes along the major streets and roadways within the study area were determined from traffic counts performed by Hawai'i Department of Transportation and from traffic data contained in traffic studies for other area projects. Because intersections are typically the capacity constraints along a street or roadway, emphasis is on obtaining traffic data at key intersections within the study area. Other data collected included intersection configurations, traffic control devices, speed limits, and right-of-way controls. Adjacent land use constraints were also noted.

*Task 2: Quantify project generated traffic.* The number of peak hour trips that each project will generate was estimated using standard trip generation procedures described in the *Trip Generation Handbook* (Institute of Transportation Engineers 1998). The purpose of this task was to determine the level of analysis required. If the generation analysis determined an insignificant increase or resulted in fewer peak hour trips than for existing conditions, a traffic impact analysis is not required.

*Task 3: Analyze existing LOS.* Using the data collected for Task 1, traffic operating conditions in the project vicinity were determined. The methodology for signalized and unsignalized intersections described in the 2000 Highway Capacity Manual (HCM) was used to determine the LOS at the study intersections (Institute of Transportation Engineers 1998).

*Task 4: Determine future background traffic projections.* Future background traffic conditions are determined by estimating what traffic conditions would be during the design year without the proposed project. The ITE provides guidelines for determining the design year for a traffic impact analysis. A project that generates less than 500 peak hour trips is designated a "small development." For a small development, the suggested study horizon, or design year, is the opening year. Since this project is a small development, the design year would be 2005 (Institute of Transportation Engineers 1991, 8).

*Task 5: Distribute and assign project generated trips.* Project generated trips were distributed based on the available approach and departure routes. The project-related traffic was then superimposed on 2005 background traffic projections to estimate 2005 background plus project traffic projections.

*Task 6: Quantify traffic impacts of the proposed project.* The HCM methodology was used to conduct an LOS analysis for background plus project conditions. The results of this analysis were compared to 2005 background (without project) conditions to determine the incremental impacts.

*Task 7: Identify and evaluate potential mitigation measures.* The impact analysis identifies locations where the project has a significant traffic impact. Improvements that will mitigate these impacts are identified and assessed. Improvements that are most effective in mitigating the project's impacts and are feasible are recommended.

### 4.7.2 Factors Considered for Impacts Analysis

Since there are no local standards, criteria established by the Federal Highway Administration (FHWA), Institute of Transportation Engineers (ITE), and the American Association of State Highway and Transportation Officials (AASHTO) were used to prepare this analysis.

Factors considered in determining whether an alternative would have a significant impact include the extent or degree to which its implementation would result in:

- Increases in vehicle trips on local roads that would disrupt or alter local circulation patterns;
- Lane closures or impediments that would disrupt or alter local circulation patterns;
- Activities that would create potential traffic safety hazards;
- Increased conflicts with pedestrian and bicycle routes or fixed-route transit;
- Exceed the capacity of on- and off-ramps, cause LOS at intersections and freeway mainline segments to deteriorate from LOS A through D to LOS E or F, cause LOS to deteriorate from LOS E to LOS F, or increase congestion (to greater than 0.01 as shown in Table 4-6) at intersections currently operating at (or anticipated to operate at) LOS F;
- Increase demand on public transportation in excess of planned or anticipated capacity at time of increase;
- Increase demand for bicycle and pedestrian facilities in excess of planned or anticipated capacity at time of increase;
- Result in parking demand exceeding the supply; or
- Impede emergency access on or off the site.

The Institute of Transportation Engineers recommends that a traffic impact study should be performed if, in lieu of another locally preferred criterion, development generates an additional 100 vehicle trips in the peak direction during the site's peak hour (Institute of Transportation Engineers 1991, 5). There are no local criteria for determining whether a traffic impact study is needed. This determination is performed on a case-by-case basis considering the level of congestion in the study area and other local factors such as anticipated development in the area.

If a traffic impact study is required, the three categories shown in Table 4-6 are used to define a significant impact for a signalized intersection.

**Table 4-6**
**Definition of a Significant Traffic Impact**

| Final V/C Ratio | Project Related Increase in V/C Ratio |
|---|---|
| 0.700 – 0.800 | Equal to or greater than 0.040 |
| 0.801 – 0.900 | Equal to or greater than 0.020 |
| > 0.900 | Equal to or greater than 0.010 |

Source: LADOT 1993, 10
Note: V = volume
C = capacity

There are no similar criteria for unsignalized intersections. The Traffic Study Policies and Procedures suggest that unsignalized intersections be analyzed assuming signalized conditions so that intersections are evaluated using comparable criteria, and that the V/C ratio for the overall intersection, rather than each traffic movement, be used to evaluate the intersection.

In addition to these factors, public concerns expressed during the scoping process were also considered in the impact analysis. They included traffic impacts from convoys on roadway segments and intersections, the cumulative effects of traffic, and traffic safety issues. In addition, the public was concerned about the potential impacts from the construction of new military vehicle trails, their use for public emergencies, and increased access to private lands.

### 4.7.3 Summary of Impacts

Table 4-7 lists the types of traffic impacts associated with the Proposed Action, Reduced Land Acquisition Alternative, and No Action Alternative at the relevant installations. General descriptions of the impacts are also provided.

#### *Proposed Action (Preferred Alternative)*

*Significant Impacts*

There would be no significant impacts on traffic under the Proposed Action.

*Significant Impacts Mitigable to Less than Significant*

There would be no significant and mitigable impacts on traffic under the Proposed Action.

**Table 4-7**
**Summary of Potential Traffic Impacts**

| Impact Issues | SBMR | | | DMR | | | KTA/KLOA | | | PTA | | | Project-wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA |
| Intersection operations | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/⊙ | ⊙/⊙ | ○/○ | ⊙ | ⊙ | ○ | ⊙+ | ⊙+ | ○ |
| Roadway segment operations | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/⊙ | ⊙/⊙ | ○/○ | ⊙ | ⊙ | ○ | ⊙+ | ⊙+ | ⊙ |
| Construction traffic | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Parking | ⊙ | ⊙ | ○ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ○ | ○ | ○ | ⊙ | ⊙ | ○ |

This table summarizes project-wide impacts. For installation-specific impacts see Chapters 5 through 8.
In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | | |
|---|---|---|---|---|
| ⊗ | = Significant | N/A | = | Not applicable |
| ⃠ | = Significant but mitigable to less than significant | PA | = | Proposed Action |
| ⊙ | = Less than significant | RLA | = | Reduced Land Acquisition |
| ○ | = No impact | NA | = | No Action |
| + | = Beneficial impact | | | |

### *Less than Significant Impacts*

*Intersection Operations.* Convoy traffic would yield to public traffic at crossings to minimize impacts on traffic operations. The LOS for convoy traffic would be C or better (light congestion; occasional backups on critical approaches), assuming worst case conditions, so impacts would be less than significant, and no mitigation is necessary. Helemanō Trail would cross state highways at three locations: Wilikina Drive west of Kamananui Road, Kaukonahua Road west of Kamananui Road, and Kamehameha Highway north of Pa‘ala‘a Uka Pupukea Road. Within SBMR and WAAF, potential impacts on intersections resulting from the VFTF, motor pool maintenance shops, tactical vehicle wash facility, SRAA, QTR1, QTR2, and Multiple Deployment Facility are expected to be less than significant. Dillingham Trail would cross state highways at two locations. The first crossing would be at Kaukonahua Road north of Farrington Highway. The second crossing would be at Farrington Highway, west of Kaukonahua Road. PTA Trail would cross state highways at three locations: Kawaihae Road north of Queen Kaahumanu Highway, at Kawaihae Road east of Queen Kaahumanu Highway, and at Mamalahoa Highway south of Saddle Road.

The LOS for the trail crossings of public roadways is applicable as long as they are two-way roadways. Widening to four lanes or more would affect the LOSs because convoy traffic would have to cross a wider roadway and contend with faster traffic. Plans to widen the roadways at any of the proposed trail crossings are not known.

All trail crossings would be signed in compliance with federal, state, and local standards. All signs and the installation of these signs would have to be approved by the appropriate agency. Additional warning signs and safety measures may be required by the local agencies during periods of intensified trail use. The trails would be signed and gated to prohibit public access, to prevent conflicts between military traffic and public traffic, and to avoid safety problems. The trail crossings would have no impact on public traffic flows because convoy traffic would yield to traffic along the public roadways. Additional traffic associated with the Proposed Action would use the trails. Military traffic that currently uses public roadways may be rerouted to the trails when not being used for activities under the Proposed Action. Thus, current military traffic volumes along public roadways would not increase and could be less during certain periods.

All military vehicle trails would be made available for public use during state and national emergencies.

Vehicle convoys move personnel and equipment between installations. A convoy is normally defined as six or more military vehicles moving simultaneously from one point to another under a single commander, ten or more vehicles per hour going to the same destination over the same route, or any one vehicle requiring a special haul permit. Per command guidance, USARHAW convoys normally maintain a gap of at least 30 minutes between serials (a group of military vehicles moving together), 330 feet (100 meters) between vehicles on highways, and 7.5 to 15 feet (25 to 50 meters) while in town traffic. Per state regulation, military convoys are not authorized movement on state highways between 6:00 AM and 8:30 AM and 3:00 PM and 6:00 PM, Monday through Friday. Movements on Saturday, Sunday, and holidays are by special request only. Convoys traveling from Kawaihae Harbor to PTA must get clearance, and vehicles operating on Saddle Road within the boundaries of PTA must not exceed 25 mph.

The trail between HMR and KTA, also known as Drum Road, is being improved as part of a prior project. The improvements consist of realignment, a hardened surface, and shoulders. These improvements have been addressed in a separate environmental assessment. Increased use of the trail would result from the project, but the LOS would be C or better. Therefore, impacts would be less than significant.

While no mitigation is required for project impacts on traffic congestion, the Army will operate a public Web site that lists a schedule of upcoming USARHAW activities, including training and public involvement projects. Subject to force protection measures and other security measures, the site would contain USARHAW training and convoy schedules, community projects the USARHAW is involved in, public USARHAW activities and functions, general USARHAW news that might be of interest to the public, and USARHAW services available to the public.

*Roadway Segment Operations.* The traffic generated under the Proposed Action would be less than significant. Under the Proposed Action, roadway segment operations would operate at acceptable levels. Minor changes in traffic volumes adjacent to the individual projects at SBMR will result because of changed traffic patterns. However, the traffic changes are generally the result of redistribution of existing traffic within the SBMR property. With the exception of the facilities planned for the SRAA, there would be no changes in traffic patterns or flows outside the property. Therefore, the traffic impacts outside the property would be less than significant, and no mitigation is necessary.

Use of the SRAA requires the closure of an existing unpaved and little used road, Kunia Road. Since only plantation-related traffic uses this road, the closure would not affect traffic flows adjacent to the project and therefore, the impacts would be less than significant, and no mitigation is necessary.

The SRAA is immediately adjacent to the existing property. Traffic between the two properties would not have to use public roadways. Use of the area would not affect traffic along Kunia Road. The trail between SBMR and DMR would cross public roadways at two locations. At both locations, convoy traffic crossing the public roadway would operate at LOS C. There would be no impact on public traffic because convoy traffic would yield to public traffic, and no mitigation is necessary.

Before the DMR and PTA trails are constructed, all SBCT military vehicles would use public roadways to access DMR and PTA. Even with this short-term elevated use the roadways would operate at LOS C under worst-case conditions. While there will be noticeable delays, the impacts would be less than significant, and no mitigation would be necessary.

*Construction traffic*. The construction associated with the Proposed Action would generate additional traffic from worker vehicles and trucks, but construction traffic would be temporary and less than significant.

To minimize traffic impacts on the surrounding community during construction, a construction traffic management program would be implemented. The program would stagger work hours to reduce impacts from construction workers during peak hours, would identify truck routes to limit truck traffic to major streets, and would designate parking for construction workers. Because project traffic would not significantly affect operations at the intersections and street segments in the project vicinity and traffic is generally free flowing, the interim construction worker traffic impacts would not be significant. No mitigation would be required.

*Parking*. The Proposed Action would result in increased parking demand associated with proposed facilities and additional personnel at SBMR. The number of parking spaces would be determined by the proposed uses of the buildings. Therefore, as individual buildings are designed, the number of parking spaces required to accommodate the anticipated number of employees and visitors would be determined. The parking demand is usually based on the square footage of the building or the estimated number of employees and visitors that would use the building. No parking impacts are identified at DMR, KTA, or PTA.

### Reduced Land Acquisition Alternative

#### *Less than Significant Impacts*

Traffic impacts under Reduced Land Acquisition would be similar to those under the Proposed Action, with slightly less traffic impacts at SBMR and slightly greater impacts at PTA as a result of the location of QTR2 to PTA. The traffic-related impacts are comparable because the alignments of the military trails and the amount of traffic generated are the same.

### *No Action Alternative*

Less Than Significant Impacts

Under No Action, there would continue to be traffic impacts pertaining to current force activities. This would include convoy traffic on public roads that could cause traffic congestion. BMPs would continue to be followed. Convoys would only occur during the non-peak hours and advance notification to the public would be provided in the event of large-scale convoy transport. Under No Action, the traffic volumes along the public roadways would remain at current levels, so the levels of service would not change.

# 4.8 WATER RESOURCES

## 4.8.1 Impact Methodology

Identifying project impacts relies heavily on the use of available studies, reports, observations, and engineering judgment to make reasonable inferences about the potential effects of the project, given the interpretation of the hydrologic setting described in the affected environment sections. These available documents include studies and reports of adjacent lands, including those that are being considered for purchase or lease as additional lands. In addition, some water resources impacts may be evaluated in the context relative to regulatory standards or guidelines. Regulatory standards include, but are not limited to, the following:

- Federal and state primary and secondary drinking water standards under the Safe Drinking Water Act;
- State and local plans and policies protecting surface water and groundwater resources;
- Limits on development of available surface and groundwater resources;
- Compliance with the Clean Water Act;
- Source water protection program requirements;
- Coastal Zone Management Act regulations; and
- State water code regulations.

Project impacts are compared against both current conditions and future conditions.

A computer model called the Army Training and Testing Area Carrying Capacity (ATTACC) model was used to estimate erosion impacts associated with vehicle use in the training ranges. The ATTACC model evaluates the relationship between military land use, land conditions, and land maintenance and repair practices that can be used to restore the carrying capacity of the land. The model first estimates the training load, based on a number of factors comparing the vehicles under consideration to a standard military vehicle (an M1A2 tank). These factors include the weight of the vehicle, wheel type and size, and nature of use during training. Then, incorporating variables representing the physical characteristics of the land (such as soil characteristics, vegetation cover, and terrain), the model predicts soil erosion rates using the Revised Universal Soil Loss Equation developed by the Natural Resources Conservation Service (NRCS). With this estimate as a starting point, model parameters can be varied to identify land management practices (such as reduction in use, revegetation, and application of water) that would reduce damage.

## 4.8.2 Factors Considered for Impact Analysis

Factors considered in determining whether an alternative would have a significant impact on water resources include the extent or degree to which its implementation would:

- Degrade surface or groundwater quality in a manner that would reduce the existing or potential beneficial uses of the water;
- Reduce the availability of, or accessibility to, one or more of the beneficial uses of a water resource;
- Alter the existing pattern of surface or groundwater flow or drainage in a manner that would adversely affect the uses of the water within or outside the project region;
- Be out of compliance with existing or proposed water quality standards or with other regulatory requirements related to protecting or managing water resources;
- Conflict with Hawai'i Coastal Zone Management Program policies;
- Compliance with the Clean Water Act;
- Substantially increase risks associated with human health or environmental hazards; or
- Increase the hazard of flooding or the amount of damage that could result from flooding, including from runoff or from tsunami or seiche runup.

In addition to these factors, public concerns expressed during the scoping process were considered in the impact analysis. These concerns included the cumulative effects of residual contaminants from munitions use, such as lead and explosives, on water quality. In response to these concerns, the Army performed a surface soil investigation at training ranges at SBMR and PTA. Additional public comments concerned surface water and groundwater impacts at PTA, existing groundwater contamination and remediation at SBMR, watershed health, depletion of limited water resources on the islands, and the Army's commitment to preserving water resources for the future. These concerns are addressed in the water resources, human health and safety hazards, and public services and utilities sections of this EIS.

### 4.8.3 Summary of Impacts

Table 4-8 lists the types of water resources impacts associated with the Proposed Action, the Reduced Land Acquisition Alternative, and the No Action Alternative. The four water resource impact issues are impacts on surface water quality, impacts on groundwater quality, impacts as an increased flood potential, and impacts on groundwater supply. A rating of significant impact, significant impact but mitigable to less than significant, less than significant impact, and no impact were assigned to each alternative for each facility, based on the discussion below. A project-wide impact level was assigned to each of the issues, based on a judgment rating from the cumulative impacts for all of the facilities, and in most cases is the worst case rating from any individual facility.

#### *Proposed Action (Preferred Alternative)*

*Significant Impacts*

There are no significant impacts on the water resources for the Proposed Action at any of the facilities that cannot be mitigated to a less than significant impact, so there are no significant impact ratings on Table 4-8.

**Table 4-8**
**Summary of Potential Water Resources Impacts**

| | SBMR | | | DMR | | | KTA/KLOA | | | PTA | | | Project-wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Impact Issues** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** |
| Impacts on surface water quality | ⊘ | ⊘ | ⊙ | ⊙ | ⊙ | ○ | ⊘/⊙ | ⊘/⊙ | ⊘/○ | ⊙ | ⊙ | ⊙ | ⊘ | ⊘ | ⊘ |
| Impacts on groundwater quality | ⊙ | ⊙ | ⊙ | ○ | ○ | ○ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ |
| Increased flood potential | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙/○ | ⊙/○ | ⊙/○ | ○ | ○ | ○ | ⊙ | ⊙ | ⊙ |
| Groundwater supply | ⊙ | ⊙ | ⊙ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ○ | ○ | ○ | ⊙ | ⊙ | ⊙ |

This table summarizes project-wide impacts. For installation-specific impacts see Chapters 5 – 8.
In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | | |
|---|---|---|---|---|
| ⊗ = Significant | | N/A | = | Not applicable |
| ⊘ = Significant but mitigable to less than significant | | PA | = | Proposed Action |
| ⊙ = Less than significant | | RLA | = | Reduced Land Acquisition |
| ○ = No impact | | NA | = | No Action |
| + = Beneficial impact | | | | |

### *Significant Impacts Mitigable to Less than Significant*

*Impact 1: Impacts on surface water quality.* All of the water quality impacts on surface water are summarized under this heading. Some of the individual types of impacts are likely to be less than significant, but the overall impacts on water quality are considered significant but mitigable to less than significant.

*Impact 1a: Impacts on surface water quality from construction*. Less than significant construction impacts on surface water quality would occur at SBMR, DMR, KTA, and PTA. Potential short-term construction-related impacts on water quality could occur if stormwater runoff were to come into contact with disturbed soils or exposed soil contaminants in construction sites, including road construction sites, and if the runoff then discharged to streams or other surface waters. This type of impact could occur at construction sites at all installations, but is expected to be less than significant because construction activities on sites involving disturbance of areas greater than 1 acre (0.4 hectare) (which effectively includes all of the proposed construction projects), must comply with Phase 2 Stormwater Regulations. Also, at PTA, lack of any perennial streams would generally make this type of impact less than significant because stream flow lasts only for a short time following rainfall events.

*Regulatory and Administrative Mitigation 1a:* The Army will implement design measures in accordance with new Phase II Stormwater Management Regulations of the Clean Water Act. The Army will choose the most practicable solution for the specific project or project area during design. As directed via NPDES permit approval, the contractor will be required to implement a stormwater pollution prevention program during construction.

For constructing low-water crossings, the Army will incorporate BMPs that will reduce runoff and sedimentation to aquatic environments in accordance with CWA regulations for stormwater runoff at construction sites.

*Impact 1b: Impacts on surface water quality from chemical residues or spills*. The Proposed Action could result in significant chemical residue spills on the surface soils that could affect the surface water quality at SBMR and PTA. Accumulation of chemical residues in surface soils or occasional spills that may occur during routine training activities can also contribute to degradation of surface water quality.

As with short-term construction-related sources, these may also be from nonpoint sources. As explained below, the Army spill prevention and control plans lessen impacts associated with this type of threat. However, they are related to new, as well as ongoing, activities that would occur over the long-term. Explosives residues on surface soils on live-fire training ranges are an example. Recent soil sampling at SBMR and PTA provided information about concentrations of explosives, semi-volatile organic compounds, and metals in surface and near-surface soils at sites that were selected to represent sites that have a high likelihood of being contaminated based on their use (USACE 2002a). The results indicated sporadic occurrence of contaminant concentrations greater than EPA preliminary remediation goals (PRGs). PRGs are risk-based concentrations designed as initial screening-level values to quickly identify areas in which soil remediation may be necessary to protect health. The site-specific conditions will dictate whether remediation of the soils is necessary, but these screening values can be used as guidance levels to assess the significance of the concentrations in the surface soils that could affect human health by direct contact or that could affect the surface water that comes in contact with these soils.

Concentrations of some metals that exceeded PRGs, such as aluminum and iron, are probably representative of the range of natural background concentrations in Hawaiian soils. Concentrations of lead that exceeded residential or industrial soil PRGs in some samples may be due to disintegration of bullets. Metals concentrations that exceed the PRGs may not necessarily affect surface water because of their low solubility. The principal explosives contaminant of concern identified in soils was RDX, with a much greater solubility. Concentrations of RDX, and other soluble contaminants, in the samples collected from PTA could affect surface and groundwater but are unlikely to result in significant impacts on these media due to the lack of permanent surface water and the great depth to groundwater. Concentrations of soluble contaminants in soils at SBMR have a greater potential to affect surface water because of the higher precipitation there. Due to the low concentration of soluble contaminants documented to date, it is unlikely that these contaminants would significantly affect surface water quality.

Dust control measures to reduce fugitive dust emissions, as discussed in Section 4.5, would be needed at KTA, DMR, SBMR, and PTA. These measures may include treating roads or tracks in maneuver areas with chemicals, such as calcium or magnesium chloride, calcium lignosulfonate, or other environmentally friendly materials that would not impair water quality. These chemicals bind soil particles to form aggregates, and the larger, heavier aggregate particles tend to precipitate from the air sooner than when the soil is finer grained.

These chemicals may affect surface water quality if applied excessively or if applied during rainfall and runoff. Lignosulfonates are products of the wood pulp industry that affect water quality by using available oxygenas the wood fiber decays. Calcium and magnesium chloride are salts, which, although much less soluble than table salt, can dissolve and increase the total dissolved solids concentration in water. Of course, the purpose of the treatments would be to reduce dust, which would occur primarily during dry conditions or in dry areas, such as at PTA and the WPAA. In wetter areas, dusty conditions are likely to occur only during certain times of year and for brief periods. When properly applied, these dust control chemicals are not expected to significantly affect surface water quality or biota (Parametrix, undated).

*Regulatory and Administrative Mitigation 1b.* SBMR is the only installation under evaluation with perennial streams downslope of live-fire training ranges. There is no evidence that explosives residues are present in surface water downstream of SBMR. If explosives are found to contribute to degradation of surface water quality, effective mitigation measures could be implemented.

The Army will implement design measures in accordance with new Phase II Stormwater Management Regulations of the Clean Water Act. The Army will chose the most practicable solution for the specific project or project area during design. As directed via NPDES permit approval, the contractor will be required to implement a stormwater pollution prevention program during construction.

The Army will implement the existing SPCC plan to all new land and activities under the Proposed Action. RCRA requires facilities that manage hazardous materials and generate and store waste to implement an array of procedures to address the potential for spills. Also, the Army is required to prepare SPCC Plans and Installation Spill Contingency Plans (ISCPs) in compliance with DOD Directive 5030.41, to implement USEPA Regulations on oil pollution prevention under the National Oil and Hazardous Substances Pollution Contingency Plan. As defined in Directive 5031.41, an SPCC plan establishes procedures to prevent oil discharges or to minimize the potential for oil discharges at a specific installation. An ISCP establishes procedures for reporting, containing, and removing oil or hazardous substance discharges caused by the specific installation. Thus, each installation implements the programs applicable to the spill hazards that exist at the particular installation. Spill prevention and response is discussed further in the Human Health and Safety Hazards section.

Based on the known significant chemical residue spill impacts, the potential for future significant chemical residue spill impacts, and the mitigation of these spills through compliance with regulatory requirements, the Proposed Action would have a significant but mitigable to less than significant impact on surface water quality at SBMR (Table 4-8).

*Impact 1c: Impacts on surface water quality from suspended sediment*. The Proposed Action could result in a significant long-term impact on surface water quality from suspended sediment loading resulting from erosion related to maneuver training at SBMR, SBER, and KTA. Erosion can increase the turbidity of the water. Results of ATTACC modeling suggest that maneuver training may already increase soil erosion rates and that soil erosion would increase at SBMR, SBER, KTA, and PTA. This is considered to be a potentially significant long-term impact at SBMR, SBER, and KTA, where the eroded sediment could reach surface water, but it is unlikely to affect surface water quality at PTA due to lack of perennial streams there. ATTACC modeling suggests that soils would be significantly disturbed at DMR, but due to the flat slopes and low rainfall at DMR, the impacts on surface water quality are not expected to be significant.

Erosion impacts may occur during construction of roads and trails; these impacts would be temporary and would be reduced to less than significant levels through implementation of construction BMPs as required under Phase 2 stormwater regulations. Similarly, erosion from runoff at building construction sites could affect water quality in nearby streams, but these impacts are not expected to be significant because construction stormwater BMPs would be implemented in compliance with regulatory requirements.

The mitigation measures below will reduce these impacts to less than significant.

*Regulatory and Administrative Mitigation 1c.* The Army will continue to implement land restoration measures identified in the INRMP. Mitigation measures include, but are not limited to, implementation of the ITAM program to identify and inventory land condition using a GIS database; coordination between training planners and natural resource managers; implementation of land rehabilitation measures identified in the INRMP; monitoring of the effectiveness of the land rehabilitation measures; evaluation of erosion modeling data to identify areas in need of improved management; and implementation of education and outreach programs to increase user awareness of the value of good land stewardship.

The Army will develop and implement a DuSMMoP for the training area. The plan will address measures such as, but not limited to, restrictions on the timing or type of training during high risk conditions, vegetation monitoring, soil monitoring, and buffer zones to minimize dust emissions in populated areas. The plan will determine how training will occur in order to keep fugitive dust emissions below CAA standards for $PM_{10}$ and soil erosion and compaction to a minimum. The Army will monitor the impacts of training activities to ensure that emissions stay within the acceptable ranges as predicted and environmental problems do not result from excessive soil erosion or compaction. The plan will also define contingency measures to mitigate the impacts of training activities that exceed the acceptable ranges for dust emissions or soil compaction.

*Additional Mitigation 1c:* The Army proposes to implement design measures in accordance with Army design standards to reduce soil erosion and sediment loading impacts on Waikele Stream, Konokanahua Stream, or tributaries from road construction. Mitigation design measures include, but are not limited to, hardening the roads, raising the elevation of the roadway to improve drainage, installing drainage ditches adjacent to roads to control water running on or off the road, planting grasses to slow overland flow. The Army would choose the most practicable solution for the specific project or project area during design.

*Impact 1d: Impacts on surface water quality from sediment or contaminant loading following wildland fires*. Surface water quality may be affected indirectly by increased erosion caused by wildland fires.

This could create a significant impact on surface water quality at SBMR and PTA. Fires remove vegetation that otherwise would act to intercept and dampen the impacts of raindrops before they hit the soil surface, as well as slowing runoff and anchoring soils.

Fires may occur naturally, or they may be inadvertently initiated because of training activities or other man-made causes. Live-fire training activities on the ranges at SBMR and PTA increase the potential for fires because they can bring flammable or explosive materials in proximity to fuel. Fires can also generate toxic chemicals that have the potential to enter streams via runoff. Most of these chemicals are naturally occurring, although some may be generated by burning of plastics or other man-made materials. Some fires occur naturally, but human activities may increase the frequency of fires, resulting in higher than natural loading of chemical products of combustion to receiving surface waters. The mitigation measures below will reduce the impacts to less than significant.

*Regulatory and Administrative Mitigation 1d.* The IWFMP for Pōhakoloa and O'ahu Training Areas was updated in October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts associated with wildland fires. The plan is available upon request.

### *Less than Significant Impacts*

*Impacts on groundwater quality*. Residues of explosives and other constituents of munitions would continue to be deposited on soils on training ranges at SBMR and PTA. While the rate at which metallic lead from bullets would be deposited on the ranges would likely increase by 25 percent overall, the concentrations of lead that would be detected in soil samples taken at some future date would not increase by a similar amount. There are several reasons for this. The lead comes from the gradual weathering and disintegration of bullets in addition to other possible sources of lead in munitions, all of which is in addition to the natural background concentration of lead in the soils. Each year, more bullets accumulate on the ranges, adding slightly to the average concentration of lead present in the soils. Some of the lead is removed with soils through erosion. Some migrates deeper in the soil column. Also, much of the increased use of bullets will occur on small arms firing ranges where the bullets are deposited in small target areas. Therefore, the additional lead projectiles will not be widely dispersed on the ranges. Therefore, it is likely that the rate at which lead is deposited on ranges will decrease, while the concentration of lead in soils will continue to increase for a time, and then decrease when lead bullets are phased out. Since the lead is widely distributed, except in the small arms target ranges, the rate at which concentrations in soils increase in any particular location should be very low. It should also be noted, as mentioned in the EIS, that the Army is evaluating a gradual shift from use of lead-containing ammunition to use of "green ammunition" that does not contain lead. Small quantities of these residues could be transported downward through soils and rock with infiltrating rainwater. In general, the concentrations of chemicals that would be dissolved and mobilized by contact with rain water are likely to be very small, and as described above, are not likely to impact surface water. The migration pathway of runoff to surface water is more direct than the pathway to groundwater, because infiltrating rainwater must pass through soils and fractured rock in order to reach the depth of the groundwater aquifer. During this migration, interaction between the chemicals and the surfaces of soil particles would further reduce the concentrations of chemicals in the infiltrating water. At both SBMR and PTA, these interactions would occur over appreciable depths to groundwater, and this is expected to prevent significant impacts on groundwater from chemical residues on ranges. At all installations, groundwater could be impacted by accidental chemical spills, or fuel leaks from vehicles and equipment, either during construction or during long term operation of facilities. Accidental spills would be addressed by spill prevention and cleanup procedures that are currently in place, so that such impacts are expected to be less than significant (Table 4-8).

*Increased flood potential*. Flood hazard has been identified as a less than significant impact at SBMR and KTA. The potential for flooding could increase if impermeable surface area increases significantly, reducing infiltration of stormwater, generating more stormwater runoff, or focusing or concentrating the discharge in a smaller area. The result could be more frequent flooding in areas that are already prone to flooding. In general, this is not expected to result in a significant impact because stormwater collection systems would be designed to avoid these impacts, because the increase in impermeable surface area would be small, and because runoff rates already vary over a wide range, so the amount of any increase in runoff would be hard to identify within the natural variability in runoff. The only area in which existing flood zones have been identified is on the Waikele Stream west of WAAF. Flooding there occurs within the gulch of Waikele Stream but can inundate facilities located within the gulch.

None of the project areas is within a tsunami runup zone, although some may be marginally affected by flooding in the event of a tsunami, including areas near the shore at DMR and Kawaihe Harbor (terminus of PTA Trail). The project is not expected to increase exposure to or hazards resulting from flooding.

Based on this assessment of the potential flooding hazards, the Proposed Action would have a less than significant impact on SBMR, DMR, and KTA (Table 4-8).

*Depletion of groundwater supply.* Groundwater use is identified as a less than significant impact at SBMR. Groundwater demand is approaching the limits of supply on O'ahu, and an increase in groundwater use would contribute to the narrowing of this margin. However, groundwater use is not expected to increase significantly as a result of the project because the project would not substantially increase the number of military personnel and would not significantly increase demand for water. Also, there is no local water supply shortage at the principal water use sites (SBMR and KTA), and at PTA the additional water requirements of the Tactical Vehicle Wash would be supplied by hauling in additional water from areas where there is a sufficiently abundant supply. Therefore, the Proposed Action would have a less than significant impact on groundwater supply at SBMR and no impacts on groundwater at DMR, KTA, and PTA.

### Reduced Land Acquisition Alternative

The impacts on water resources of Reduced Land Acquisition would be the same as described under the Proposed Action. Although there would likely be a reduced potential for soil erosion and transport to Waikele Stream or its tributaries because maneuver training would not occur on the SRAA, the increased intensity of use of the available land at SBMR, SBER, and KTA would probably result in greater overall impacts on surface water quality from erosion and suspended sediment loading. The same mitigation measures discussed under the Proposed Action would also be applied to this alternative; therefore, the same ratings for the Proposed Action are assigned to this alternative for all of the water resources' impact issues (Table 4-8).

### *No Action Alternative*

*Significant Impacts Mitigable to Less than Significant*

*Impact 1: Soil erosion and surface water quality from training exercises.* Under No Action, the potential for eroding soils to affect surface water quality at KTA would continue to be potentially significant. ATTACC modeling results indicate that the current land condition has been moderately affected by training and that the current rates of soil erosion exceed the goal of long-term sustainability.

*Regulatory and Administrative Mitigation 1*. Mitigation measures would be the same as those described above for impacts on soil erosion and surface water quality from training exercises of the the Proposed Action.

*Less than Significant Impacts*

Under the No Action Alternative, the current less than significant impact levels for all of the identified water quality issues are expected to continue at the same level. One exception to this is the hazard associated with flooding. Although only the eastern portion of DMR is included in the FEMA flood zone study map for the area, and the flood zone in the rest of DMR has not been determined, it appears likely, based on the portion that was studied, that flooding could occur in the remaining portion of DMR but that it would not be significant.

## 4.9 GEOLOGY, SOILS, AND SEISMICITY

### 4.9.1 Impact Methodology

Geologic impacts include all of the effects that result from the interaction between the project and the geologic environment. For example, project impacts could include changes in erosion rates or changes in the level of exposure of people and structures to earthquakes or unstable slopes.

Identifying project impacts relied heavily on the use of available geologic studies, reports, observations, and engineering judgment to make reasonable inferences about the potential effects of the project, given the interpretation of the geologic setting described in the affected environment sections. In addition, some geologic impacts were evaluated in the context relative to regulatory requirements or guidelines. Regulatory requirements include state and local building codes, grading ordinances, and restrictions on development in protected areas or in areas subject to specific geologic hazards.

In order to provide additional information about existing concentrations of chemical constituents in soils, the Army performed a soil investigation of training ranges at SBMR and PTA. The results of this investigation were evaluated and compared to USEPA Region IX industrial soil PRGs to identify potential chemicals of concern and to determine if exposure to these chemicals in soils might impact human health.

Also, results from ATTACC modeling conducted by the Army were considered in evaluating the impacts of training on land condition, including effects such as soil erosion and compaction and damage to vegetation.

### 4.9.2 Factors Considered for Impact Analysis

The significance of the project impacts is defined in both relativistic and absolute terms. Relativistic criteria base significance on context and tend to be subjective, while absolute criteria are defined in terms of objective standards.

Factors considered in determining whether an alternative would have a significant impact on geology include the extent or degree to which its implementation would:

- Increase the exposure of people or structures to geologic hazards (for example, ground shaking, liquefaction, volcanism, slope failure, expansive soils, hazardous constituents of soils) that could result in injury, acute or chronic health problems, loss of life, or major economic loss;
- Result in a substantial loss of soil (such as through increased erosion), or loss of access to economically significant mineral deposits;
- Adversely affect human health or environmental receptors, such as through exposure to toxic chemicals or irritants present in geologic materials;
- Adversely alter existing geologic conditions or processes such that the existing or potential benefits of the geologic resource are reduced (for example, construction of

a jetty that would interfere with sand transport processes and beach formation or would increase shore erosion);

- Conflict with existing federal, state, or local statutes or regulations;
- Permanently damage or alter a unique or recognized geologic feature or landmark;
- Substantially alter the existing function of the landscape (for example, altering drainage patterns through large-scale excavation, filling, or leveling); or
- Disturb or alter unique, rare, or otherwise important paleontological resources such that the potential to derive benefits from those resources is reduced. (Note that paleontological resources may also be addressed with archaeological resources under the general heading of cultural resources.)

In addition to these factors, public concerns expressed during the scoping process were also considered in the impact analysis. These concerns included the cumulative effects of residual contaminants, such as lead and explosives compounds, from past waste disposal and munitions use, and several comments expressed a concern that existing contamination be remediated prior to undertaking new actions. Some of the public comments related to soils that are susceptible to erosion, especially in the WPAA, where wind erosion and windblown dust were identified as a major concern in several comments.

### 4.9.3 Summary of Impacts

Table 4-9 lists the types of geological impacts associated with the Proposed Action and No Action at the relevant installations.

#### *Proposed Action (Preferred Alternative)*

Significant Impacts

*Impact 1: Soil loss from training activities.* ATTACC modeling results suggest that soil erosion may be significantly increased by training activities under the Proposed Action at SBMR, DMR, KTA, and PTA, due to increased intensity of use within limited maneuver areas. Also, the amount of land subject to increased soil erosion would increase at SBMR and PTA, relative to the No Action Alternative. The ATTACC modeling results indicate that increased training intensity would severely degrade the condition of the land. This qualitative conclusion is based on evaluating a variety of factors, including soil erodibility, which is weighted relatively heavily. The following mitigation measures will substantially reduce the impacts but not to less than significant levels.

*Regulatory and Administrative Mitigation 1.* The Army will develop and implement a DuSMMoP for the training area. The plan will address measures such as, but not limited to, restrictions on the timing or type of training during high risk conditions, vegetation monitoring, soil monitoring, and buffer zones to minimize dust emissions in populated areas. The plan will determine how training will occur in order to keep fugitive dust emissions below CAA standards for $PM_{10}$ and soil erosion and compaction to a minimum. The Army will monitor the impacts of training activities to ensure that emissions stay within the acceptable ranges, as predicted, and that environmental problems do not result from excessive soil erosion or compaction. The plan will also define contingency measures to mitigate the impacts of training activities that exceed the acceptable ranges for dust emissions or soil compaction.

**Table 4-9**
**Summary of Potential Geologic and Soil Impacts**

| | SBMR | | | DMR | | | KTA/KLOA | | | PTA | | | Project-wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Impact Issues** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** |
| Soil loss from training activities | ⊗ | ⦸ | ⦸ | ⊗ | ⊗ | ○ | ⊗/○ | ⊗/○ | ⦸/○ | ⊗ | ⊗ | ⊙ | ⊗ | ⊗ | ⦸ |
| Soil erosion and loss from wildland fires | ⦸ | ⦸ | ⦸ | ⦸ | ⦸ | ⊙ | ⦸/⦸ | ⦸/⦸ | ⦸/⦸ | ⦸ | ⦸ | ⦸ | ⦸ | ⦸ | ⦸ |
| Soil compaction | ⦸ | ⊙ | ⊙ | ○ | ○ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⦸ | ⦸ | ⊙ | ⦸ | ⦸ | ⊙ |
| Exposure to soil contaminants | ⊙ | ⊙ | ⊙ | ○ | ○ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Slope failure | ⦸ | ⦸ | ○ | ⦸ | ⦸ | ○ | ⊙/⊙ | ⊙/⊙ | ⊙/⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⦸ | ⊙ |
| Volcanic and seismic hazards | ○ | ○ | ○ | ⊙ | ⊙ | ⊙ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |

This table summarizes project-wide impacts. For installation-specific impacts see Chapters 5 – 8.
In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | | |
|---|---|---|---|---|
| ⊗ | = Significant | N/A | = | Not applicable |
| ⦸ | = Significant but mitigable to less than significant | PA | = | Proposed Action |
| ⊙ | = Less than significant | RLA | = | Reduced Land Acquisition |
| ○ | = No impact | NA | = | No Action |
| + | = Beneficial impact | | | |

The Army will implement land management practices and procedures described in the ITAM annual work plan to reduce erosion impacts (USARHAW 2001a). Currently these measures include implementation of a training requirement integration (TRI) program; implementation of an Integrated Training Area Management (ITAM) program; Sustainable Range Awareness (SRA) program; development and enforcement of range regulations; implementation of an Erosion and Sediment Control Management Plan; coordinating with other participants in the Koolau Mountains Watershed Partnership (KMWP); and continued implementation of land rehabilitation projects, as needed, within the Land Rehabilitation and Maintenance (LRAM) program. Examples of current LRAM activities at KTA include revegetation projects involving site preparation, liming, fertilization, seeding or hydroseeding, planting trees, irrigation, and mulching; a combat trail maintenance program (CTP); coordination through the Troop Construction Coordination Committee (TCCC) on road maintenance projects; and development of mapping and GIS tools for identifying and tracking progress of mitigation measures.

### *Significant Impacts Mitigable to Less than Significant*

*Impact 2: Soil erosion and loss from wildland fires*. As described in the water resources section, fire could cause an increase in soil erosion by removing vegetation that normally slows runoff, intercepts raindrops before they reach the soil surface, and anchors the soil. In areas with steep slopes and rapid runoff, erosion can cause rapid removal and redeposition of soils, gullying, or unstable slopes. This is considered a potentially significant but mitigable impact at all installations, and along the tank trails between installations. The effects would be least at DMR, because there is less vegetation and slopes are generally flatter, and at KTA, because of the wetter climate there. The following mitigation will reduce the impacts to less than significant levels.

*Regulatory and Administrative Mitigation 2*. The IWFMP for Pōhakoloa and Oʻahu Training Areas was updated in October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts associated with wildland fires. The plan is available upon request.

*Additional Mitigation.* None identified.

*Impact 3: Soil Compaction*. Soils in training areas, and especially in areas that have not previously been used for maneuver training, such as the SRAA at SBMR, or portions of the WPAA, are likely to become compacted by use of tracked or wheeled vehicles, potentially affecting their ability to support vegetation and altering their permeability and moisture retention capacity. Widespread compaction could generally reduce recovery of vegetation cover. Preferred drainage pathways could develop along the compacted linear track left by off-road vehicles, creating increased erosion along the tracks. The impacts of these changes are considered to be significant depending on the amount of land area affected. ATTACC modeling results suggest that a large proportion of the land area in the maneuver areas could be affected. The following mitigation will reduce the impacts to less than significant levels.

*Regulatory and Administrative Mitigation 3*. Some areas may be more vulnerable to these impacts than others, because of soil characteristics, depth, existing conditions, soil moisture, or other conditions. Expansion of the ITAM Program, as discussed in Regulatory and Administrative Mitigation 1, will mitigate this impact.

*Impact 4: Slope Failure*. Construction and use of Helemanō Trail and Dillingham Trail may increase the potential for slope failure adjacent to the roads. Each road includes segments that would traverse soils with high erosion hazards, on or adjacent to steep slopes. Construction of the roads may require widening existing roads and cutting or filling slopes, leading to potential slope failure. Intense use of the roads by heavy vehicles could result in loading of weakly supported slopes that could also contribute to slope failure. Roads can alter drainage patterns, leading to poor drainage or flooding, increasing runoff rates and volumes, or focusing runoff at points of discharge that may become sites of rapid erosion. Each of these conditions could contribute to hazards of slope failure in susceptible areas. This is considered a potentially significant impact because slope failure could result in disfigurement of the landscape, obstruction of stream channels, safety problems, and interruption of the use of the road. The following mitigation will reduce the impacts to less than significant levels.

*Regulatory and Administrative Mitigation 4*. None proposed.

*Additional Mitigation 4.* The Army proposes to minimize or avoid cut, where practicable. Cut slopes would be blended into the landscape by rounding the edges of the slope, differential orientation of the slope and the roadbed alignments where practicable. Use of these techniques would be varied based on the specific conditions, including depth of the cut, orientation of the slope, and type of material (e.g., dirt slope and rock slope). In accordance with Army design standards, potential mitigation measures for this impact also include, where practicable, selecting the least failure-prone route, geotechnical testing soils where necessary along the route to identify problems, designing the roadbed, slope and surface to avoid slope failure, properly sizing drainage systems, designing storm drainage outfalls for efficient performance, and properly monitoring and maintaining the road.

### Less than Significant Impacts

*Exposure to Soil Contaminants.* An important factor in evaluating risk due to exposure to contaminated soils is the fact that munitions are fired from firing points down range and into the range impact areas. These areas are not accessible to or entered by soldiers or members of the public because of the safety explosive risk they represent. Therefore, it is unlikely that human beings, either military personnel or off-post residents, would come into contact with the constituents of these munitions in the downrange or impact area soils. Taken together, the chemical concentrations on the training ranges represent a low risk to personnel who use the ranges. There would be no threat to the general public from munitions constituents related to range use because there would be no public access to these areas.

Based on the analysis described above, this represents a less than significant impact at SBMR.

With regard to the presence of pesticides in land within the SRAA, the USEPA has investigated pesticide use in the Del Monte plantation lands surrounding Kunia, and did not find unusual concentrations of farm chemicals in the SRAA (the Kunia Plantation Superfund Site investigations are discussed further in Section 5.11).

The only area that presents a potential opportunity for contact with contaminated soils is in the area of the proposed BAX at PTA. The construction of the BAX will require the conversion of a portion of Training Area 12 to a training area where soldiers could be exposed to the soils. However their exposure would be limited to training for a period of days or weeks. The level of chemical compounds present at Range 12 are all below their respective PRGs. Considered together, the potential duration of exposure to the chemical concentrations on the training ranges at PTA, including Range 12, represent a low risk to personnel who use them.

As discussed in the Affected Environment section, composite soil sampling at selected ranges within PTA revealed the presence of metals, explosives, and semi-volatile organic compounds. The observed concentrations were generally less than industrial PRGs. One explosive compound, RDX, was detected in samples from Ranges 5 and 9 at concentrations above the industrial PRG while Training Area 12 was below. The risks from multiple chemical exposures are additive, and similar calculations can be done for each of the contaminants to which people may be exposed at PTA. The risks from HMX, nitroglycerin, and TNT are very small compared to the risk from RDX, and the sum of their risks is less than $0.74 \times 10^{-6}$. The risks associated with each of the metals can be calculated similarly, and the results would be similar. The highest risks are associated with the iron and aluminum in the soil, both of which occur naturally at high concentrations.

Maneuver training conducted in the WPAA would not result in significant exposures to high explosives residues in soils, either from past or proposed activities, because the training there under the Proposed Action would involve simulated rather than live artillery fire.

Overall, the sum of the carcinogenic and non-carcinogenic risks, based on the available soil sampling data and using the PRGs to estimate risk, is less than the EPA threshold for worker exposure. It is unlikely that troop exposures to RDX or other chemicals on the ranges would be similar to worker exposures in an industrial setting. For example, workers are assumed to ingest 100 mg of soil per day, 250 days per year for 25 years. This assumption over-estimates troop exposures, because troops are likely to be exposed only temporarily, and only for short durations. Based on the conservative analysis described above, this represents a less than significant impact.

*Volcanic and seismic hazards*. PTA is subject to volcanic eruptions, lava flows, occasional explosive eruptions, and volcanic gas venting, and earthquakes. The Proposed Action would increase the hazard associated with these conditions relative to No Action because it would involve constructing additional structures and increasing personnel. While the hazard associated with an eruption of lava or volcanic gases is high if directed toward an area occupied by people or structures, the probability of a lava flow occurring within the PTA during the next 50 to 100 years is low, based on the frequency with which this has occurred in the past. (There are no historical lava flows within PTA.) Also, existing warning systems are expected to generally provide sufficient warning of an eruption that personnel and equipment would probably have time to evacuate from the path of a lava flow. The hazards associated with future earthquakes at PTA are considered less than significant because new structures would be designed to withstand the expected range of seismic shaking and because the area is underlain by thin soils and hard rock, which, unlike thick alluvial deposits, transmits rather than amplifies seismic wave energy. Most earthquakes in the Hawaiian Islands are centered on the south side of the island of Hawai'i or beneath one of the active volcanoes (Kīlauea and Mauna Loa). On O'ahu, the expected intensity of ground shaking in a reasonably probable earthquake would be moderate to low because of its distance from the source of the earthquakes. There is very little risk of renewed volcanic activity on O'ahu, so the impacts there are considered less than significant.

### *Reduced Land Acquisition Alternative*

The geologic impacts under Reduced Land Acquisition would be nearly the same as those described for the Proposed Action, except that impacts would be substantially reduced in the SRAA. This would result in reduced impacts related to soil erosion and soil compaction in this area but would result in increased impacts in areas where training would be concentrated. There would be a less than significant impact on soil compaction at SBMR as a result of this change, because no maneuver training would take place at the SRAA, but all other impacts would remain the same. Mitigation would be the same as that under the Proposed Action, except that it is likely to be less successful because, with reduced land available for training, the impacts of training would be concentrated on a smaller amount of land. One of the available mitigation measures is to take damaged land out of service until it recovers; but this measure would be less feasible if training were concentrated in a smaller land area. The impact from exposure to contaminated soils would be the same as for the Proposed Action, and would be less than significant for the same reasons described above.

### No Action Alternative

Many of the impacts discussed under the Proposed Action would also occur under No Action but at a different magnitude or level of significance. Only the differences relative to the Proposed Action are discussed here.

*Soil loss from training activities*. ATTACC modeling indicates that current land condition is good, i.e. no impact, at DMR and PTA, and that damage that occurs under current training conditions at SBMR and KTA is significant but mitigable to less than significant with application of the ITAM Program. The INRMP for installations on O'ahu suggests that severe soil erosion has occurred in the past in certain ridge top areas at SBMR. Those areas are expected to be addressed through the ITAM process and will gradually recover under improved land management.

*Soil erosion and loss from wildland fires*. Under the No Action Alternative, the potential for wildland fires would be about the same as those under existing conditions. If wildland fires occur, they can cause a severe increased hazard of soil erosion because of the removal of vegetative cover resulting in a significant impact. Mitigation would be the same as that described for the Proposed Action and would reduce the impact to less than significant.

*Soil Compaction*. Soils in training areas would be subject to existing levels of compaction. Most of these effects have already occurred, although continued maneuver training would reduce the ability of soils to recover from these effects and impacts would be less than significant.

*Exposure to soil contaminants*. The impact from exposure to contaminated soils would be the same as for the Proposed Action, and would be less than significant for the same reasons described above.

*Slope Failure*. Slope failure is not considered a significant impact of No Action because it has not been identified as a significant problem under existing conditions, and No Action would not result in any substantial change in land use compared to existing conditions.

*Volcanic and Seismic hazards*. The potential for strong ground motion or volcanic eruptions that could present a hazard to people or property would be the same as that described for the Proposed Action. The impacts would be greatest at PTA, but they are not expected to be significant.

## 4.10. BIOLOGICAL RESOURCES

### 4.10.1 Impact Methodology

Potential direct and indirect impacts on biological resources were analyzed for local terrestrial and aquatic ecosystems, including general vegetation and wildlife resources, along with sensitive species, biologically sensitive areas, designated critical habitat, regulated habitats, and biological resource management plans and practices.

The methods for assessing potential direct and indirect impacts on biological resources generally include the following:

- Comparing the location of such resources in relation to the physical locations of the proposed actions to determine potential direct and indirect impacts on these resources; and
- Examining the types and intensity of activities proposed in each location to determine the potential for impacts on these resources.

For this analysis, specific potential impacts on biological resources are based on the following:

- Relative importance or value of the resource affected, for example its legal, commercial, recreational, ecological, or scientific value;
- The resource's relevant occurrence in the region;
- Sensitivity of the resource to the proposed action;
- Anticipated physical extent of the potential impact; and
- Anticipated duration of the ecological ramifications of the potential impact.

Each activity in the Proposed Action is assessed based on its location and associated activities in relation to the known presence and extent of biological resources on the installation. The sensitivity of biological resources is evaluated based on the following criteria, listed in order of importance:

- Designation of the resource by federal and state resource agencies (for example, US Army Corps of Engineers, NOAA Fisheries and the USFWS) as a high value or sensitive resource;
- Any known or presumed regional sensitivity of the resource; and
- Any known or presumed local significance of the resource.

Direct impacts may be short-term or long-term, depending on how the biological resources are altered or lost during the course of the project implementation and operation. Examples of direct impacts from project-related construction include grading or brushing vegetation (using a chain to tear out shrubs and brush to leave behind herbaceous plants), filling drainage areas, and losing or interrupting wildlife foraging or nesting areas. Direct impacts for each proposed action under each alternative are defined by the expected grading limits for that action. This impact analysis assumes that all biological resources within the area of proposed grading would be lost.

Indirect impacts occur when project-related activities affect biological resources in a manner other than a direct loss of the resource. For example, indirect impacts from a construction project might last only during construction or for the long-term operation of the facility. Noise, lighting, erosion and siltation, substantial reduction in water quality, dust, and increased human activity within or directly adjacent to sensitive habitat areas are examples of potential indirect impacts. Indirect impacts resulting from the proximity of construction and operation along the roads generally are considered here to affect habitats and species within 167 feet (50 meters) of the development. This boundary was determined by looking at survey methods of biological resources along other trails and roads in Hawai'i. Additionally, the dust and noise generated by the limited activity that will occur on these roadways will also fall within this buffer, though may extend a greater distance in isolated instances.

In addition, results from the ATTACC model, which estimates the effects of maneuver training on the landscape, were considered when evaluating the potential impacts.

### 4.10.2 Factors Considered for Impact Analysis

Impacts on biological resources were evaluated by determining the sensitivity, significance, or rarity of each resource that would be adversely affected by the Proposed Action, as described in the previous section. The significance may be different for each habitat or species and is based on the resource's rarity or sensitivity and the level of impact that would result from the proposed project.

Most impacts on high sensitivity resources are considered significant, while the determination of significance for impacts on the moderate and low sensitivity resources depends more on site-specific factors, such as the habitat quality and population size, as well as the nature and extent of the anticipated impact. For example, impacts on moderate resources could be considered significant if the anticipated impact were to greatly reduce the population or geographic distribution of a species of special concern.

Factors considered in determining whether an alternative would have a significant impact on biological resources include the extent or degree to which its implementation would do any of the following:

- Cause the "take" of a highly sensitive resource, such as a threatened and endangered or special status species (USFWS, NOAA);
- Result in a jeopardy biological opinion by the USFWS or NOAA;
- Reduce the population of a sensitive species, as designated by federal and state agencies, or a species with regional and local significance. This can happen with a reduction in numbers, by alteration in behavior, reproduction, or survival, or by loss or disturbance of habitat;

- Have an adverse effect on a wetland or riparian habitat regulated by the local, state, or federal government or on another sensitive habitat (such as designated critical habitat) identified in local or regional plans, policies, or regulations or by the USFWS or NOAA;
- Interfere with the movement of any native resident or migratory wildlife species (including aquatic species) or with established native resident or migratory wildlife corridors;
- Alter or destroy high to moderate habitat that would prevent biological communities in the area prior to the project from reestablishing;
- Conflict with Hawai'i Coastal Zone Management Program policies;
- Introduce or increase the prevalence of undesirable nonnative species; or
- Cause long-term loss or impairment of a substantial portion of local habitat (species-dependent).

In addition to these factors, public concerns expressed during the scoping process were also considered in the impact analysis. These concerns included impacts on native species, particularly federally listed ones, and the loss or disturbance of natural habitat. Marine mammals and the Humpback Whale Sanctuary were also mentioned as specific issues of concern.

### 4.10.3 Summary of Impacts

In response to the agency and public comments received during the Draft EIS comment period we reevaluated our analysis of the biological resources. As a result of considering these comments and a reanalysis of the available information, we recognize that the impacts to biological resources from fire could not be mitigated to the less than significant level. However, these impacts will be substantially reduced as a result of mitigation.

Table 4-10 lists the types of biological impacts associated with the evaluated alternatives at the relevant installations. General descriptions of the impacts are also provided.

#### *Proposed Action (Preferred Alternative)*

The Proposed Action would affect biological resources identified within the SBCT ROI. These resources include general plants, animals, and vegetation communities, as well as sensitive species and habitats. Sensitive habitats refer to BSAs, as identified in the O'ahu and PTA INRMPs (USARHAW and 25th ID[L] 2001a, 2001b), wetlands, and federally designated critical habitat. Impacts to these resources are summarized below and are discussed in detail for SBMR, DMR, KTA, and PTA in the appropriate chapters.

*Significant Impacts*

*Impact 1: Impact from fire on sensitive species and sensitive habitats.* Fire would have a significant impact on SBMR, KTA, and PTA. At DMR and KLOA impacts would be significant but mitigable to less than significant. Impacts are not mitigable to the less than significant level when considered project-wide. The proposed live-fire training would increase the probability

**Table 4-10**
**Summary of Potential Biological Resources Impacts**

| | SBMR | | | DMR | | | KTA/KLOA | | | PTA | | | Project-wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Impact Issues** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** |
| Impacts from fire on sensitive species and sensitive habitat. | ⊗ | ⊗ | ⊗ | ⊘ | ⊘ | ⊘ | ⊗/⊘ | ⊗/⊘ | ⊗/⊘ | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ | ⊗ |
| Impacts from construction and training activities on sensitive species and sensitive habitat. | ⊘ | ⊘ | ⊘ | ⊘ | ⊘ | ⊘ | ⊘/⊘ | ⊘/⊘ | ⊘/⊘ | ⊗ | ⊗ | ⊘ | ⊗ | ⊗ | ⊘ |
| Impacts from the spread of nonnative species on sensitive species and sensitive habitat. | ⊘ | ⊘ | ⊘ | ⊘ | ⊘ | ⊘ | ⊘/⊘ | ⊘/⊘ | ⊘/⊘ | ⊘ | ⊘ | ⊘ | ⊘ | ⊘ | ⊘ |
| Impacts from construction and training activities on general habitat and wildlife. | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙/⊙ | ⊙/⊙ | ⊙/⊙ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ |
| Threat to migratory birds. | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙/⊙ | ⊙/⊙ | ⊙/⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Noise and visual impacts. | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙/⊙ | ⊙/⊙ | ⊙/⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Vessel impacts on marine wildlife and habitat. | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Runoff impacts on marine wildlife and coral ecosystems. | N/A | N/A | N/A | ○ | ○ | ○ | ○/ N/A | ○/ N/A | N/A | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |

This table summarizes project-wide impacts. For installation-specific impacts see Chapters 5 – 8.
In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact

N/A = Not applicable
PA = Proposed Action
RLA = Reduced Land Acquisition
NA = No Action

that there would be a wildland fire in the project ROI (Section 4.12.3, Impact 7). Full implementation of the terms and conditions of the Biological Opinions for SBCT and current force activities on the islands of Oʻahu and Hawaiʻi (dated October 2003 and December 2003, respectively) and full implementation of the Wildland Fire Management Plan (dated October 2003) will substantially reduce the impacts, but not to the less than significant level. The Army has three years to develop and execute the O'ahu Implementation Plan as directed by USFWS in the Biological Opinion. The Army has two years to execute the terms and conditions defined in the Biological Opinion for the Pohakuloa Training Area. Since there is a risk that a wildfire could result in an irretrievable loss of individuals of sensitive species, the Army has made a conservative determination that although the mitigation will considerably reduce the impacts to biological resources, the impacts may not be reduced to a less than significant level. The mitigation measures below will substantially reduce the impact but not to less than significant.

*Regulatory and Administrative Mitigation 1.* The effects of the proposed action on listed species in the ROI have been evaluated in the ESA Section 7 Consultation with USFWS. The Army will implement all the terms and conditions defined in the Biological Opinions issued by USFWS for current force and SBCT proposed actions on the islands of Oʻahu and Hawaiʻi. The terms and conditions that implement the reasonable and prudent measures determined during this consultation will be incorporated into the Proposed Action. These measures will help avoid effects and compensate for impacts on listed species that would result directly and indirectly from implementation of the Proposed Action. The Biological Opinions are available upon request.

The IWFMP for Pōhakuloa and Oʻahu Training Areas was updated in October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts associated with wildland fires. The plan is available upon request.

*Additional Mitigation 1.* No additional mitigation measures were identified for this impact.

*Impact 2: Impacts from construction and training activities on sensitive species and sensitive habitat.* The construction and training impacts on sensitive biological resources associated with the Proposed Action at PTA are significant and not mitigable to the less than significant level. These activities may have a significant and mitigable impact on sensitive species and habitat (including critical habitat) on SBMR, DMR, and KTA/KLOA. Federally listed species and critical habitat, observed in or with the potential to occur within the SBMR, DMR, KTA/KLOA and PTA ROI are listed in Appendix I-3. SBCT activities in this ROI include the use of tactical vehicles for off-road maneuvers, increased dismounted maneuvers, and increased amount of ammunition used (including live fire at SBMR, KTA [SRTA only] and PTA). The direct and indirect effects would be habitat disturbance, deterrence of wildlife use, spread of nonnative species, increase in the probability of fire and direct take of listed wildlife, and destruction of listed plants. At PTA, individuals of sensitive plant species would be eliminated by tactical vehicle maneuvers, construction, and dismounted training and there is the potential for currently unsurveyed lava tubes with sensitive arthropod species to be crushed during training maneuvers. These installation-specific impacts would be mitigated to the less than significant level by the regulatory and administrative measures described below.

The project-wide impact from construction and training on sensitive species and sensitive habitat, including their federally designated critical habitat, would be significant but not mitigable to the less than significant level. The combined impacts of fire at PTA, SBMR, KTA, and DMR and mounted maneuver at PTA could cause long-term loss or impairment of a substantial portion of natural habitat and the loss of individuals. Though the following mitigation measures would decrease the likelihood of this happening, there is a risk that a wildfire could result in an irretrievable loss of individuals of sensitive species. The overall impact of project actions on sensitive (listed) species and their sensitive habitat (including federally designated critical habitat) is still considered significant, according to factors detailed in Section 4.10.2., but not mitigable to less than significant. The mitigation measures below will substantially reduce the impact, but not to less than significant.

*Regulatory and Administrative Mitigation 2.* The Army will implement all the terms and conditions defined in the Biological Opinions issued by USFWS for current force and SBCT proposed actions on O'ahu and the island of Hawai'i. The terms and conditions that implement the reasonable and prudent measures determined during this consultation will be incorporated into the Proposed Action. These measures will help avoid effects and compensate for impacts on listed species that would result directly and indirectly from implementing the Proposed Action. The Biological Opinions are available upon request.The Army will implement land management practices and procedures described in the ITAM annual work plan to reduce erosion impacts (US Army Hawai'i 2001a). Currently these measures include implementing a training requirement integration (TRI) program; implementing an Integrated Training Area Management (ITAM) program; a Sustainable Range Awareness (SRA) program; developing and enforcing range regulations; implementing an Erosion and Sediment Control Management Plan; coordinating with other participants in the Ko'olau Mountains Watershed Partnership (KMWP); and continuing to implement land rehabilitation projects, as needed, within the Land Rehabilitation and Maintenance (LRAM) program. Examples of current LRAM activities at KTA include revegetation projects involving site preparation, liming, fertilization, seeding or hydroseeding, tree planting, irrigation, and mulching; a combat trail maintenance program (CTP); coordination through the Troop Construction Coordination Committee (TCCC) on road maintenance projects; and development of mapping and GIS tools for identifying and tracking progress of mitigation measures.

*Additional Mitigation 2:* The Army proposes to fence or flag where practicable any sensitive plant communities from activities that may take place in the ROI. The Biological Opinions outline fencing for the majority of the sensitive species. USARHAW will evaluate if additional fencing may be necessary.

### *Significant Impacts Mitigable to Less Than Significant*

*Impact 3: Impact from the spread of nonnative species on sensitive species and sensitive habitat.* In general, nonnative plant and animal species pose a threat to Hawaiian native ecosystems (Atlas 1998). The Proposed Action in the SBMR, DMR, KTA/KLOA, and PTA ROIs would increase the potential for the introduction and spread of alien species through troops and equipment movement, construction, and fires. Nonnative species alter habitat, prey on native species, compete for resources, and carry diseases, all of which decrease the success of native species.

*Regulatory and Administrative Mitigation 3.* As required in the terms and conditions of the Biological Opinions, the Army will implement the following:

- Educate soldiers and others potentially using the facilities and roads in the importance of cleaning vehicles, equipment, and field gear;
- Educate contractors and their employees about the need to wear weed-free clothes and to maintain weed-free vehicles when coming onto the construction site and to avoid introducing nonnative species to the project site;
- Prepare a one-page insert to construction contract bids informing potential bidders of the requirement; and

- Inspect and wash all military vehicles at wash rack facilities before they leave SBMR, KTA, or PTA to minimize the spread of weeds, such as fountain grass and animal (invertebrate) relocations.

USARHAW will follow HQDA guidance developed in consultation with the Invasive Species Council and compliance with Executive Order 13112, which determines federal agency duties for preventing and compensating for invasive species impacts. USARHAW will agree to all feasible and prudent measures recommended by the Invasive Species Council that would be taken in conjunction with SBCT action to minimize the risk of harm. Implementing an Environmental Management System will further improve the identification and reduction of environmental risks inherent in mission activities.

In accordance with USDA regulations and requirements, the USDA will inspect and certify cargo originating outside of Hawai'i to ensure it is not carrying the brown tree snake or other reptiles before cargo is transported for use on training ranges.

*Additional Mitigation 3:* The Army proposes to use native plants in any new landscaping or planting efforts where practicable. When practicable, natural habitats would remain intact or adjacent areas would be restored as habitat.

### *Less than Significant Impacts*

*Impacts from construction and training on general habitat and wildlife.* The project-wide impact as a result of training on general vegetation, wildlife, and habitat would be less than significant. At all project installations, there are impacts on general vegetation and wildlife from vehicle maneuvers. Impacts are limited to some extent by terrain. Additionally, the Army's ITAM program is used to limit the potential impact on land from training by rotating land used for maneuvers and monitoring factors like vegetation cover and soil moisture. The Army will also develop the DuSMMoP, which should reduce the potential for soil erosion harmful to general habitat and wildlife.

The Army proposes to conduct more intensive surveys of lava tubes, which are identified as potentially supporting native root-dependent arthropods. Lava tubes found to contain or support these arthropods will be avoided where practicable. All generated construction- and training-related drainage will be channeled away from lava tubes where practicable.

*Threat to migratory birds*. The construction and subsequent presence of FTI antennas would not significantly affect migratory bird species known to occur in the SBMR ROI, even those that migrate at night (USFWS 2000). (Specific location, height, and structural features are described in Appendix D.) In general these monopole antennas will be no higher than 100 feet (33 meters) and will be mounted on existing structures. The Army would apply the SOPs and BMPs identified for federal agencies in Executive Order 13186 to minimize the overall impact of SBCT actions on migratory birds. These are identified in Section 5.10.2 and in more detail in Appendix I-2.

*Noise and visual impacts*. The Proposed Action would have short- and long-term noise impacts on biological resources within the SBMR, DMR, KTA/KLOA, and PTA ROIs. These impacts would have negative effects but would be less than significant. These impacts would arise from the increase in soldiers, off-road mounted maneuver, and vessel and helicopter use. They could affect marine mammals, which are sensitive to the presence of and noise produced by vessels and low-flying aircrafts. Terrestrial wildlife would be affected by off-road mounted and dismounted maneuver, the increase in ammunition use and low-flying helicopters. The Army's SOPs restrict the proximity of aircraft to the water surface and would prevent a significant impact occurring as a result of intentional aircraft operation. The remaining sources would not affect species and habitats in any manner identified within the significance factors and methodology described in 4.10.1 and 4.10.2, such as causing a population level decrease or 'take' of a federally listed species.

*Vessel impacts on marine wildlife and habitat.* Less than significant impacts on marine wildlife are expected from vessel transport between O'ahu and the island of Hawai'i. The increase from 60 to 66 LSV trips a year is minor and not significant. Assuming that low frequency or mid-range sonars are not used from LSVs, impacts from vessel transit is expected to be minor and not significant. (Low frequency and/or mid-range sonars have been shown to cause injury and mortality in marine wildlife (Rossiter 2003), but these emissions typically occur off of vessels engaged in defense training maneuvers, not transport). Existing MMPA regulations prohibit any boats in Hawaiian waters to approach within 100 yards (91 meters) of adult whales and within 300 yards (274 meters) of mother/calf pairs (NOAA 1997). LSVs and barges transit through Penguin Banks, a known high-concentration area for humpback whales. However since they travel at a maximum of 10 knots, collisions are unlikely. Impacts on marine wildlife from vessel transport in the ROI waters and/or in the Sanctuary under the Proposed Action are not considered to be significant. TSVs are not in use at this time. They may be utilized in the future. When and if that occurs, separate NEPA documentation will be done to address impacts from TSV use to marine wildlife.

*Runoff impacts on marine wildlife and coral ecosystems.* There would be less than significant impacts on marine wildlife and coral ecosystems in the PTA ROI. No impacts from potential runoff are expected for marine wildlife resources or coral ecosystems at the other sites. The expected increase in erosion to the ocean at PTA would be within the natural range that exists due to rainfall and runoff variation. There are no contaminants moving off the range, which is quite a distance from the coastline. No contamination of surface water or groundwater is expected (see Section 8-08 Water Resources). There is no runoff carrying contaminants from UXOs to nearshore ocean waters. There are no UXOs in the marine ROI. No water-contaminating activities are occurring in the upland portions of the marine ROI habitat, so no direct effects from runoff on marine wildlife or coral reefs and their associated organisms would occur. Impacts on marine wildlife and coral ecosystems in the ROI waters are not considered to be significant.

### Reduced Land Acquisition Alternative

All of the impacts described for the Proposed Action would occur under Reduced Land Acquisition. However, because there is a reduction in size of the SRAA (by 1,300 acres [526 hectares]) impacts at that location from construction and training activities described above would be slightly less than those under the Proposed Action. There is no change in the significance level since the SRAA is an already disturbed area and the training proposed at

SRAA would occur just at PTA. Impacts on biological resources in the SBMR ROI would be further decreased under this alternative due to the removal of QTR2 from proposed actions in this area. There would be less of a loss and degradation of general and sensitive habitat in the SBMR ROI but this impact would still be considered less than significant. Impacts in the PTA ROI would increase slightly due to the placement of QTR2 in the ROI and the subsequent increase in mounted maneuver within the PTA ROI. However, this impact would still be significant and not mitigable.

### *No Action Alternative*

The current baseline of existing conditions would continue under No Action.

There would be a continuation of existing significant and not mitigable to less than significant impacts. This includes fire impacts on sensitive species and habitat. Because there is a risk that a wildfire could result in an irretrievable loss of individuals of sensitive species, the Army has made a conservative determination that even under the No Action Alternative species and habitat could be affected by fire under the current force activities. Significant measures have been developed to prevent and control wildfires, and they will be implemented through the IWFMP.

Impacts from construction and training activities and the spread of nonnative species would be significant and mitigable to less than significant for all project areas.

Ongoing Army environmental management and stewardship activities, described in Chapter 2, would continue to decrease impact intensity and to protect sensitive plants and habitats within the ROI. All determinations made through ESA Section 7 Consultation, as described above and detailed in the project location chapters, would apply under this alternative as well.

The following less than significant impacts on biological resrouces would occur as a result of continued training under the No Action Alternative:

- Threats to migratory birds and noise and visual impacts;
- Impacts from construction and training on general habitat and wildlife:
- Vessel impacts on marine wildlife and habitat; and
- Runoff on marine wildlife and coral ecolystems.

These impacts would be limited and would be addressed by ongoing Army environmental management and stewardship activities.

## 4.11 CULTURAL RESOURCES

### 4.11.1 Impact Methodology

The methods for assessing potential impacts on cultural resources include identifying significant cultural resources in the areas of potential effect (APEs) under the Proposed Action to determine potential direct and indirect impacts on these resources.

To identify cultural resources in the project areas, historic and current maps and aerial photographs, cultural resources reports, and archival records were reviewed. In addition, federal, state, and local inventories of historic places, including the NRHP, were reviewed for information related to prehistoric and historic resources within the project areas. Project areas were surveyed to confirm presence or absence of previously recorded archaeological resources as well as to identify previously unrecorded cultural resources. Native Hawaiian groups were consulted in an attempt to identify and locate ATIs in the project areas.

### 4.11.2 Factors Considered for Impact Analysis

Factors determining significance of impacts on cultural resources are derived from federal laws and regulations regarding cultural resources protection.

Section 106 of the NHPA requires federal agencies to consider the effects of their actions on properties listed on or eligible for listing on the NRHP. Eligible properties would include properties significant for their importance to Native Hawaiian groups. Section 106 and its implementing regulations state that an undertaking has an effect on a historic property (i.e., NRHP-eligible resource) when that undertaking may alter those characteristics of the property that qualify it for inclusion on the NRHP. An undertaking is considered to have an adverse effect on a historic property when it diminishes the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects include, but are not limited to, the following:

- Physical destruction, damage, or alteration of all or part of the property;
- Isolation of the property or alteration of the character of the property's setting when that character contributes to the property's qualifications for the NRHP;
- Introduction of visual, audible, or atmospheric elements that are out of character with the property, or changes that may alter its setting;
- Neglect of a property, resulting in its deterioration or destruction; and
- Transfer, lease, or sale of a property without adequate provisions to protect its historic integrity.

Native Hawaiian sites, including sacred sites, burials, and cultural items, whether or not they are considered eligible for the NRHP, may also be protected under AIRFA, ARPA, or NAGPRA. Factors considered in determining whether an alternative would have a significant impact on cultural resources include the extent or degree to which its implementation would result in:

- An adverse effect on a historic property or TCP as defined under Section 106 of the NHPA; or
- A violation of the provisions of AIRFA, ARPA or NAGPRA.

It should be noted that an adverse effect on an historic property as defined by NHPA is not necessarily a significant impact under NEPA. While mitigation under NHPA does not necessarily negate the adverse nature of an effect, mitigation under NEPA can reduce the significance of an impact. NHPA and NEPA compliance are separate and parallel processes, and the standards and thresholds of the two acts are not precisely the same.

It should also be noted that some mitigation measures for other resource areas, such as cultivating land to revegetate a plant species, might involve actions that could create adverse effects on cultural resources. Prior to implementation, these actions would also undergo Section 106 review following federal guidelines.

In addition to these factors, public concerns expressed during the scoping process were also considered in the impact analysis. These concerns included access to traditional and religious sites for ceremonial purposes, access for hunting and gathering, protection and preservation of archaeological and traditional sites, interpretation of significance based on Native Hawaiian tradition and the knowledge of elders of the community, community involvement in managing cultural resources on Army land, and compliance with federal and state laws and regulations concerning cultural resources protection.

### 4.11.3 Summary of Impacts

Table 4-11 lists potential cultural resource impacts associated with the Proposed Action, Reduced Land Acquisition, and No Action at the relevant installations, based on identified cultural resources. General descriptions of identified impacts are provided.

Specifically for SBCT, the Army has complied with its responsibilities under the NHPA by executing a PA with the SHPO and the ACHP and through consultation with the OHA, the NPS, the ROOK, the OCHCC, Hui Malama I Na Kupuna ‘O Hawai’i Nei, the OIBC, the HIBC, the HHF, and Native Hawaiian organizations, families, and individuals that attach traditional religious and cultural importance to cultural sites within the various project areas. The January 2004 PA for the SBCT project does not override any rights Native Hawaiians and Native Hawaiian organizations have under federal law, as described in 36 CFR 800.2(c)(ii)(B). Appendix J contains a copy of the PA.

#### *Proposed Action (Preferred Alternative)*

*Significant Impacts*

There would significant impacts on cultural resources and ATIs under the Proposed Action. Mitigation measures have been developed to lessen impacts to these resources.

**Table 4-11**
**Summary of Potential Cultural Resource Impacts**

| Impact Issues | SBMR | | | DMR | | | KTA/KLOA | | | PTA | | | Project-wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA |
| Impacts on historic buildings | ⊙ | ⊙ | ○ | ○ | ○ | ○ | ⊗/○ | ⊗/○ | ○/○ | ⊗ | ⊗ | ○ | ⊗ | ⊗ | ○ |
| Impacts on archaeological resources from range and facility construction | ⊗ | ⊗ | ○ | ○ | ○ | ○ | ⦸/○ | ⦸/○ | ○/○ | ⊗ | ⊗ | ○ | ⊗ | ⊗ | ○ |
| Impacts on archaeological resources from training activities | ⦸ | ⦸ | ⊙ | ⊗ | ⊗ | ⊙ | ⊙/○ | ⊙/○ | ⊙/○ | ⊗ | ⊗ | ○ | ⊗ | ⊗ | ⊙ |
| Impacts on archaeological sites from construction of FTI | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ○/○ | ○/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Impacts on ATIs | ⊗ | ⊗ | ○ | ⊗ | ⊗ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊗ | ⊗ | ○ | ⊗ | ⊗ | ○ |
| Impacts from installation information infrastructure architecture construction | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Impacts on archaeological sites from road or trail construction | ⊙ | ⊙ | ○ | ⦸ | ⦸ | ○ | N/A | N/A | N/A | ⊗ | ⊗ | ○ | ⊗ | ⊗ | ○ |
| Impacts on archaeological sites from road use | ○ | ○ | N/A | ⊙ | ⊙ | ○ | ⊙/⊙ | ⊙/⊙ | ⊙/⊙ | ⦸ | ⦸ | ○ | ⦸ | ⦸ | ○ |

This table summarizes project-wide impacts. For installation-specific impacts see Chapters 5 – 8.
In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⦸ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact

N/A = Not applicable
PA = Proposed Action
RLA = Reduced Land Acquisition
NA = No Action

### *Significant Impacts*

*Impact 1: Impacts on historic buildings.* Potential significant impacts on historic buildings would occur at KTA and PTA. Constructing the CACTF could have significant impacts on historic buildings at KTA. Among the properties to that may be adversely affected by the Proposed Action are the Nike Missile Site and other buildings that may be eligible for listing on the NRHP as Cold War-era properties. Construction of the Range Maintenance Facility at PTA would require demolishing Cold War-era buildings; the BAAF runway scheduled for upgrade may be a Cold War-era historic property as well. The Ke‘āmuku Village Complex within the WPAA may be eligible for listing on the NRHP. The construction of the Range Control Facility at SBMR would require demolishing buildings that are or will soon be 50 years of age and therefore may be eligible for the NRHP. The mitigation measures given below will mitigate the severity of the demolition of historic buildings at PTA but not to less than significant levels.

*Regulatory and Administrative Mitigation 1.* The Army will consult with the SHPO, ACHP, and interested parties, in accordance with Section 106 of the NHPA, on the Nike Missile Site complex. The Army will manage and will renovate this complex in compliance with the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.

The Army will require WPAA buildings to be avoided by using range management protocols, which will require the area around the buildings to be off-limits to military training activities. Ke'āmuku Village will be marked as off-limits for training to protect it from damage.

*Impact 2: Impacts on archaeological resources from range and facility construction.* The greatest number and intensity of impacts from the Proposed Action would occur at SBMR and PTA. These two areas have the most proposed transformation related ground-disturbing activities and may have the most impacts on archaeological resources.

Facility construction involves ground softening at the PTA BAX, and grubbing vegetation, grading site surfaces, excavating the subsurface, and moving heavy construction equipment at all construction sites. All of these activities may result in direct destruction of or damage to archaeological resources. The mitigation measures given below would mitigate the severity of the impacts but not to less than significant levels.

*Regulatory and Administrative Mitigation 2.* Before construction, the Army will complete the evaluation of any archaeological sites within areas subject to range and facility construction. Sites determined to be eligible for the NRHP will be flagged for avoidance. The projects will be designed to avoid all eligible and unevaluated archaeological sites, to the full extent practicable. Geographical information system (GIS) and global positioning system (GPS) information will be given to project designers and range control to ensure that any sites are considered in project design. If it is not possible to avoid archaeological sites, the Army will consult in accordance with the PA to determine the appropriate mitigation for the damage to the sites, such as data recovery or other mitigation measures. To address the accidental discovery of archaeological sites, human remains, or cultural items, the Army has developed an inadvertent discovery plan (IDP) as part of the PA.

*Impact 3: Impacts on archaeological resources from training activities.* Significant impacts on archaeological sites would occur on DMR and PTA. Significant but mitigable to less than significant impacts would occur on SBMR and KTA. Potential impacts from the proposed training activities include damage to sites from subsurface excavations related to troop training (e.g., field fortifications, emplacement of obstacles), increased access by ground troops into the ranges, off-road vehicular movement, possible damage from live fire where resources are in the line of fire, and cleanup of unexploded ordnance within or adjacent to historic properties. Off-road mounted maneuvers with tactical vehicles could result in greater impacts on archaeological sites in all of the training areas. Activities such as revegetation could also cause impacts through ground disturbance. The presence of large numbers of personnel could affect resources through vandalism or accidental damage. Mitigation measures described below will reduce the severity of the impacts on these resources but not to less than significant levels.

*Regulatory and Administrative Mitigation 3.* The Army will evaluate archaeological sites within training areas related to SBCT. Sites determined to be eligible for the NRHP and sites pending evaluation will be identified and avoided through protective measures, to the full extent practicable. If it is not feasible to avoid identified archaeological sites or newly discovered sites, the Army will consult in accordance with the PA to determine the appropriate mitigation for the damage to the sites, such as data recovery or other mitigation measures. To address the accidental discovery of archaeological sites, human remains, or cultural items, the Army has developed an IDP as part of the PA .

*Impact 4: Impacts on Areas of Traditional Importance.* Potentially significant impacts on ATIs may occur at SBMR, DMR, and PTA.

Potential impacts related to construction of training facilities could include destroying or damaging ATIs, including shrines, archaeological sites, burials, or elements of Native Hawaiian cultural landscapes. Purchasing the SRAA at SBMR and the WPAA at PTA, and then using them for military training, could limit Native Hawaiian access to and use of sites on these parcels for traditional or religious purposes. Native Hawaiians consider range and training activities inappropriate and disrespectful uses of the land that disturb and change the character and feeling of spiritual places.

Construction of FTI antennas at SBMR, including on Mount Ka'ala, and at PTA may result in visual intrusion on cultural landscapes. Because some sites would require construction, they could have an adverse effect on the nature of the cultural landscape.

Activities relating to the construction of Dillingham Trail from DMR to SBMR could also result in significant impacts on such cultural properties; however, identified mitigations, including identification and avoidance, may reduce the severity of the impacts, but not to less than significant levels.

*Regulatory and Administrative Mitigation 4.* Facility construction or training area uses will be designed to avoid identified traditional places and limit visual impacts on TCPs by site location, design, and orientation, where feasible.

If avoiding identified TCPs or ATIs is not feasible because of interference with the military mission or risk to public safety, the Army will consult with the SHPO and Native Hawaiians, in accordance with the PA, to identify impacts and develop appropriate mitigation measures. Mitigation for impacts on the cultural landscape could include consulting with Native Hawaiians and using a cultural monitor during construction.

The Army will continue to provide Native Hawaiians with access to traditional religious and cultural properties, in accordance with AIRFA and Executive Order 13007, on a case-by-case basis. This access program will be expanded to include new land acquisitions.

The Army previously identified Native Hawaiian burial sites in the SBCT ROI. The Army completed notification and consultation procedures for these burial sites, in accordance with NAGPRA, and left these human remains in place. To address any impacts on any burial sites or an inadvertent discovery of Native Hawaiian human remains or funerary objects, the Army will abide by all notification and consultation requirements outlined in Section 3 of NAGPRA.

*Impact 5: Impacts on archaeological sites from road or trail construction.* Construction of PTA Trail and the proposed trails through WPAA would result in a potentially significant impact on archaeological resources. Trail construction would involve vegetation removal and grading soil, as well as the regular use of heavy equipment. Some trail or road construction at WPAA is projected to go through areas with a high potential for archaeological resources. Cultural resources in the trail corridor and in construction staging areas may be adversely affected during construction of the trail. The PTA Trail route, as established, avoids all archaeological and historic sites in the Kawaihae area, but any alteration in the alignment could result in impacts on historic properties. Activities at WPAA could result in direct destruction or direct or indirect damage to archaeological resources by contributing to soil erosion. Additionally, construction activities could expose or disturb previously undiscovered cultural resources.

Construction of Dillingham Trail would involve vegetation removal and soil grading, as well as the regular use of heavy equipment. Cultural resources in the trail corridor and in construction staging areas could be adversely affected during construction. GIS and GPS information is available for all sites in the Dillingham Trail construction corridor. The project designers will use this information to avoid these sites and thereby mitigate impacts to less than significant levels.

*Regulatory and Administrative Mitigation 5.* In accordance with the PA, the Army will identify cultural properties, evaluate cultural properties for NRHP eligibility, and implement avoidance strategies to the full extent practicable. GIS and GPS information will be provided to project designers to ensure that sites are considered in the design and construction of all the proposed military vehicle trails and training roads on WPAA. If it is not possible to avoid archaeological sites, the Army will consult, in accordance with the PA, to determine the appropriate mitigation for the damage to the sites, such as data recovery or other mitigation measures. To address the accidental discovery of archaeological sites, human remains, or cultural items, the Army has developed an IDP as part of the PA.

### *Significant Impacts Mitigable to Less than Significant*

*Impact 6: Impacts on archaeological resources from road use.* Impacts on sites along PTA Trail from military use of the trail could include erosion and possible vandalism or human access. These impacts are likely to be less than significant and will be mitigated by installation cultural resources personnel regularly monitoring them. Road use within WPAA poses a greater risk to resources recorded within the proposed new training area. The large number of gravel roads proposed would create additional impacts on sites within the WPAA, including erosion and possible vandalism or human access. The mitigation measures given below will mitigate the severity of the impacts to less than significant levels.

*Regulatory and Administrative Mitigation 6.* Eligible and unevaluated sites will be flagged and mapped on a range control GPS map. Installation cultural resources staff will monitor the sites regularly. Participants in training activities on the ranges will be ordered to avoid identified sites. To address the accidental discovery of archaeological sites, human remains, or cultural items, the Army has developed an IDP as part of the PA.

### *Less than Significant Impacts*

*Impacts on archaeological sites from FTI construction*. FTI antenna construction would have less than significant impacts at SBMR, DMR, and PTA, and no impact at KTA. FTI antennas would be constructed at SBMR and outlying areas. The FTI project at DMR would construct antennas within the installation boundary and on Dillingham Ridge to the southwest of the installation. FTI antennas would be erected at PTA, the WPAA, and several sites off PTA. Antenna support structure locations were chosen to avoid archaeological resources. The FTI project at KTA would construct antennas on disturbed sites and thus is considered to have no impact on archaeological resources.

### ***Reduced Land Acquisition Alternative***

Impacts under the RLA Alternative would be approximately the same as under the Proposed Action, but with less intensity of impacts at SBMR. The smaller acreage to be acquired and used for training in the SRAA means that fewer archaeological sites would be affected by Army activities in that area, and there would be less risk of inadvertent discovery of archaeological resources. Impacts at PTA would remain roughly the same as under the Proposed Action, because QTR2 at PTA would be located on land that was previously used for an impact area, and therefore there are few undisturbed archaeological resources remaining.

### ***No Action Alternative***

Existing conditions would continue under No Action. Less than significant impacts under No Action generally result from ongoing training activities or infrastructure projects. Ongoing training activities include continued off-road vehicle use. This would result in ongoing impacts on cultural resources in the training areas caused by ground troop activities, off-road vehicle movement, and subsurface excavations. Archaeological resources on the training areas are monitored following exercises to document adverse effects on the sites. Under No Action, current force training would continue, and there would be no additional impacts on cultural resources. USARHAW will continue to inventory eligible historic properties, in compliance with Section 110 of the NHPA, and project planning will comply with Section 106 and its implementing regulations. Impacts on cultural resources would be mitigated in compliance with these regulatory requirements.

## 4.12 HUMAN HEALTH AND SAFETY HAZARDS

### 4.12.1 Impact Methodology

Numerous federal, state, and local laws regulate the storage, use, recycling, disposal, and transportation of hazardous materials and waste. There are similar laws to prevent and abate wildfires, and their primary goal is to protect human health and safety. The methods for assessing potential human health and safety hazard impacts generally include the following:

- Reviewing and evaluating each of the proposed actions to identify the action's potential to use hazardous or toxic materials or to generate hazardous waste, based on the activities proposed;
- Comparing the location of each proposed action with baseline data on known or potentially contaminated areas (such as potentially UXO-contaminated land);
- Assessing the compliance of each proposed action with applicable site-specific hazardous materials and waste management plans;
- Assessing the compliance of each proposed action with applicable site-specific standard operating procedures and health and safety plans in order to avoid potential hazards;
- Using professional judgment to determine if there are any additional known or suspected potential human health and safety hazard impacts or concerns related to each Proposed Action, based on the status of the range as it is the guidance of the Army restoration program that remedial activities only be conducted on closed or closing ranges and not on active/inactive ranges; and
- Assessing causes of wildfires in conjunction with established wildfire management protocols.

The overall methodology, including data sources and assumptions, used to conduct the human health and safety hazard impact evaluation is consistent with the Army NEPA Manual for Installation Operations and Training (US Army 1998). This manual describes the various types of materials and waste that should be considered to identify potential impacts of proposed actions.

### 4.12.2 Factors Considered for Impact Analysis

Regulatory standards and guidelines have been applied to determine the significance of each proposed action or alternative's potential impact from nonchemical hazards and hazardous materials and waste. Factors considered in determining whether an alternative would have a significant human health and safety hazard impact include the extent or degree to which its implementation would do one of the following:

- Generate either hazardous or acutely hazardous waste, resulting in increased regulatory requirements over the long term;
- Cause a spill or release of a hazardous substance (as defined by Title 40, CFR Part 302 [CERCLA], or Parts 110, 112, 116 and 117 [CWA]);

- Expose the environment or public to any hazardous condition through release or disposal (for example, open burn/open detonation disposal of unused ordnance);
- Require the removal or upgrade of an underground storage tank;
- Cause the accidental release of friable (easily crumbled by hand pressure) asbestos or lead-based paint during the demolition or renovation of a structure;
- Adversely affect the progress of IRP site remediation;
- Expose military personnel or the public to areas potentially containing UXO;
- Endanger the public or environment during the storage, transport, or use of ammunition;
- Adversely affect wildfire danger; or
- Expose the public to electromagnetic fields with cycle frequencies greater than 300 Hz.

In addition to these factors, public concerns expressed during the scoping process were also considered in the impact analysis. These concerns included the impact of the Proposed Action on the public and the environment, specifically training, ammunition and the presence of UXO, and the potential contamination by various hazardous chemicals and materials. The public also expressed concern about wildfires.

### 4.12.3 Summary of Impacts

Table 4-12 lists the types of human health and safety hazard impacts associated with the Proposed Action, Reduced Land Acquisition Alternative, and the No Action at the installations; general descriptions of the impacts are also provided.

#### *Proposed Action (Preferred Alternative)*

##### *Significant Impacts*

There are no significant and unmitigable impacts involving human health and safety hazards from the Proposed Action.

##### *Significant Impacts Mitigable to Less than Significant*

*Impact 1: Ammunition*. Recent range studies at both SBMR and PTA have revealed elevated levels of munitions byproducts, such as lead and RDX, above USEPA Region IX residential and industrial PRGs at each installation (the investigation report is included in Appendix M1). As defined in the Military Munitions Rule, ammunition used for its intended purpose on military ranges is not considered a regulated hazardous material. This material, however, is an environmental hazard and is therefore considered significant. In addition, under the Proposed Action, the quantity of ammunition rounds fired during Army training on all Army training ranges in Hawai'i would increase from 16 million to 20 million rounds per year, primarily consisting of small arms munitions. The proposed increased level of training could elevate contamination levels in range soils by 25 percent over the contamination generated

**Table 4-12**
**Summary of Potential Human Health and Safety Hazard Impacts**

| | SBMR | | | DMR | | | KTA/KLOA | | | PTA | | | Project-wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Impact Issues** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** | **PA** | **RLA** | **NA** |
| Hazardous materials management | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ |
| Hazardous waste management | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ |
| Ammunition | ⊘ | ⊘ | ⊙ | ○ | ○ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊘ | ⊘ | ⊙ | ⊘ | ⊘ | ⊙ |
| Unexploded ordnance | ⊘ | ⊘ | ⊙ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ⊘ | ⊘ | ⊙ | ⊘ | ⊘ | ⊙ |
| General training | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ○/○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Installation restoration program sites | ⊘ | ⊘ | ○ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ○ | ○ | ○ | ⊘ | ⊘ | ⊙ |
| Lead | ⊘ | ⊘ | ⊙ | ○ | ○ | ○ | ⊘/○ | ⊘/○ | ○/○ | ⊘ | ⊘ | ⊙ | ⊘ | ⊘ | ⊙ |
| Asbestos | ⊘ | ⊘ | ○ | ○ | ○ | ○ | ⊘/○ | ⊘/○ | ○/○ | ⊘ | ⊘ | ○ | ⊘ | ⊘ | ○ |
| Polychlorinated biphenyls | ○ | ○ | ○ | ○ | ○ | ○ | ⊙/○ | ⊙/○ | ○/○ | ○ | ○ | ○ | ⊘ | ⊘ | ○ |
| Electromagnetic fields | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Petroleum, oils and lubricants | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ |
| Pesticides/herbicides | ⊙ | ⊙ | ○ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Biomedical waste | ⊙ | ⊙ | ○ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Radon | ○ | ○ | ○ | ○ | ○ | ○ | ○/○ | ○/○ | ○/○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Wildfires | ⊘ | ⊘ | ⊙ | ⊘ | ⊘ | ⊙ | ⊘/⊘ | ⊘/⊘ | ⊙/⊙ | ⊘ | ⊘ | ⊙ | ⊘ | ⊘ | ⊙ |

This table summarizes project-wide impacts. For installation-specific impacts see Chapters 5 – 8.
In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⊘ = Significant but mitigable to less than significant
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○ = No impact
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by current force training. However, the analysis showed that the areas where the contamination occurs is in areas where the contamination is not running off-site. In addition, the Soldiers will not be conducting foot maneuvers in this area and will not be exposed to the contaminants. Only government personnel or government contractors specifically trained and certified to travel safely in the impact area access the contaminated areas on a regular basis.

In addition, under the Proposed Action, SRTA ammunition would be used at KTA. Although SRTA is consideredto be live-fire, it does produce some of the safety risks related to true live-fire training. SRTA would not likely produce a significant wildland fire threat because the ammunition has a plastic tip and does not include the use of tracer rounds. Additionally, the ammunition does not contain lead and would not contaminate the soil. As discussed in Section 4.2, the Army will restrict access at KTA when training with SRTA ammunition.

The regulatory and administrative measures defined below will reduce the significant impacts from contaminants associated with ammunitions to less than significant.

*Regulatory and Administrative Mitigation 1.* All government personnel or government contractors accessing impact areas will continue to follow OSHA and Army standards and guidelines to minimize health and safety impacts from exposure to any contaminants or ordnance. The general public will be allowed in or near impact areas only at times and in group sizes approved by USARHAW Command. Army-trained and -certified personnel would escort the general public at all times. Access is limited to only those areas deemed safe by USARHAW Range Control.

The Army will undertake additional risk-based investigations as appropriate in the event any active range is closed and transferred out of DoD control. Based on the results of this health risk-based analysis, all remediation necessary to mitigate an imminent threat to human health and the environment would be undertaken at such time.

When the CACTF is active, the Army will establish all prudent measures to prevent unauthorized access within the SDZs for SRTA, which are up to 2,300 feet (700 meters) during training operations. This would help ensure public safety during training.

*Additional Mitigation 1.* No additional mitigations have been proposed.

*Impact 2: Unexploded ordnance (UXO).* Of the 25 percent increase in ammunition under the Proposed Action, only 1.3 percent of the total increase would be from UXO-producing munitions (mortars, artillery, and grenades). UXO could affect the construction of the proposed ranges on SBMR and PTA. Construction would involve moving soils that could be contaminated with UXO from prior activities in the range ordnance impact area. The potential presence of UXO within the construction area could lead to a significant safety impact. Additionally, training operations could contaminate the range with UXO, creating a safety risk to personnel. Maneuver training would be conducted at PTA in the same training area locations as are presently used, excluding the 1.500-acre MPRC area, at the company level. This would typically occur at times when PTA is in full use in support of brigade training exercises, currently twice a year, to increase throughput during times of heaviest use at PTA. Although no live-fire training would be conducted in this area to introduce new UXO, the existing presence of UXO is suspected. It is not considered necessary for EOD specialists to clear UXO because of the minimal degree of UXO suspected.

Although WPAA is part of the former Waikoloa Maneuver Area, which is a Formerly Used Defense Site (FUDS) and supported live-fire training in the past, a risk-based analysis assessed this area as a low probability of UXO exposure. The PTA Trail is also part of this former maneuver area and was considered a medium to high risk of UXO exposure. Construction would be preceded by Army-sponsored surface and subsurface clearance and if necessary followed by ordnance health and safety monitoring during construction in order to reduce potential exposure and impacts from this project Although UXO presents a significant impact, USARHAW would follow proper abatement techniques, which would make this impact mitigable. In addition to these mitigation measures, the Army would continue to educate soldiers on how to identify UXO and the proper safety procedures for handling UXO, as explained in Section 3.12. The mitigation measures below would reduce the significant impact to less than significant.

*Regulatory and Administrative Mitigation 2.* Before the start of any construction activities, the Army will employ qualified personnel to conduct a UXO survey of the proposed construction area. If the risk of encountering UXO is low, then UXO construction support will be used. If the risk of encountering UXO is high, then UXO clearance will be performed to ensure the safety of the site. The Army will document UXO surveys and removal actions in full accordance with applicable laws, regulations, and guidance. The Army will perform UXO clearance activities if rounds are fired outside of designated impact areas or present an immediate threat to human health or safety.

*Additional Mitigation 2.* No additional mitigations have been proposed.

*Impact 3: Installation restoration program sites.* Construction and operational activities associated with the Proposed Action would have significant and mitigable impacts on the installation restoration program at SBMR. Additionally, the Proposed Action would affect the TCE monitoring program on WAAF. The proposed Multiple Deployment Facility at WAAF would be in the area of TCE monitoring well MW 2-3, which is used for long-term monitoring of the TCE plume under SBMR. The size of the plume has remained relatively static since its discovery, so long-term monitoring continues as part of the IRP. The mitigation measures below would reduce the significant impact to less than significant.

*Regulatory and Administrative Mitigation 3.* No mitigation was identified.

*Additional Mitigation 3.* The Army proposes to build the proposed WAAF facility to incorporate an existing monitoring well into the design, as long as construction does not affect the well by contaminating, destroying, permanently sealing, or otherwise preventing future well sampling. Technicians would have access to this well in order to continue the monitoring program. As the well currently exists within the apron/runway vicinity, the location is not believed to be a significant hindrance because the wellhead could be flush mounted in the apron surface, in a way similar to those at civilian gasoline service stations.

*Impact 4: Lead.* Potential short-term construction-related impacts could expose workers to lead at the Proposed Action sites. This impact would be relevant at any installation where structures would be renovated or demolished: SBMR, KTA, and PTA. The workers could be exposed to LBP and pipes during demolition or soil grading and excavation at specific project sites. This impact is considered significant but would be reduced to less than significant with implementation of mitigation identified below.

Additionally, berms used to stop projectiles fired at the ranges are expected to contain significant quantities of lead and potentially UXO. Recent range soil sampling activities at SBMR and PTA revealed elevated levels of metals, including lead, in excess of USEPA

Region IX residential and industrial PRGs. Further discussion on findings and potential effects are addressed in Section 4.8, Water Resources, and Section 4.9, Geology, Soils, and Seismology. Construction on existing or former range areas would redistribute lead-containing material from the berms at the new locations. This could release lead to the environment and extend the magnitude of lead contamination in the training area. The presence of lead could cause additional soils to become contaminated due to vehicle and equipment movement and soil erosion. Additional contamination would increase the volume of soil that would need to be remediated in the future. SBMR and PTA could be affected by this impact. The mitigation measures below would reduce the impact to less than significant.

*Regulatory and Administrative Mitigation 4.* The Army will expand existing programs for lead-based paint (LBP) to any SBCT-related activities that would affect older structures that had the potential use of LBP throughout the installations. Lead is managed in place for existing structures. If the structures are demolished or renovated, a survey is required prior to demolition/renovation and appropriate actions must be taken to prevent the release of LBP into the environment. Construction workers must be properly trained/certified to handle these materials, and any debris must be tested by TCLP and disposed of, according to the results.The Army will retain lead-contaminated soils from existing berms on-site and use the soils in the construction of new berms associated with the UACTF, PTA AALFTR or PTA BAX. If lead-contaminated soils were not reused at the site for new berm construction, contaminated soils would be remediated for lead, in accordance with applicable federal and state standards.

*Additional Mitigation 4.* No additional mitigations have been proposed.

*Impact 5: Asbestos.* Potential short-term construction-related impacts could involve the exposure of workers to friable asbestos at some of the proposed project sites. The workers could be exposed to asbestos at any installation where renovation, demolition, or grading would take place: SBMR, KTA, and PTA. This would be a temporary, significant, but mitigable impact.

*Regulatory and Administrative Mitigation 5.* The Army will expand existing programs for asbestos to any SBCT-related activities that would affect older structures that had the potential use of asbestos through the installations. Asbestos is managed in place for existing structures. If the structures are demolished or renovated, a survey is required prior to demolition/renovation, and appropriate actions must be taken to prevent the release of asbestos into the environment. Construction workers must be properly trained/certified to handle these materials, and any debris must be tested by TCLP and disposed of according to the results.

*Additional Mitigation 5.* No additional mitigations have been proposed.

*Impact 6: Wildfires.* The Proposed Action would result in a significant but mitigable wildfire impact at the installations and along the trails and roads. Due to Hawai'i's climate, vegetation, range operations, and rugged terrain limiting accessibility for fire suppression efforts, there has always been a high risk of wildfire within the subject Army installations. Numerous new ranges would be operated under the Proposed Action, some of which would support live-fire training. The Proposed Action would have significant impacts on the potential to start wildfires because of increased live-fire activities, increased nonlive-fire activities that can still ignite wildfires, and increased transportation of personnel and ordnance in areas infrequently used. A wildfire could damage animal and plant communities and cultural resources and places of traditional importance and could contribute to soil erosion by removing vegetation. However, this impact is mitigable to less than significant.

*Regulatory and Administrative Mitigation 6.* The IWFMP for Pōhakuloa and O'ahu Training Areas was updated in October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts associated with wildland fires. Public and firefighter safety is the first priority in every fire management activity. The plan considers the potential need for firebreaks and/or fuel breaks at each installation along with other safety concerns. The plan is available upon request.

### *Less than Significant Impacts*

Concerns for impacts on human health were addressed in the analysis for air quality and, in particular, fugitive dust and $PM_{10}$. We determined that impacts on human health associated with fugitive dust and resulting from the Proposed Action would be less than significant (see Section 4.5). The analysis is not duplicated here.

*Polychlorinated biphenyls.* In the EIS, the Army believed that the impacts from PCBs would be significant with the construction proposed at KTA. Upon further evaluation of the KTA project area, the Army determined that the PCB levels in soil in the proposed construction area are below federally designated health risk standards. The proposed CACTF potentially lies adjacent to the former missile launch facility at KTA, which previously housed the emergency power generator and power distribution transformers. Although the former site has the potential to be preserved as historic, activities around this site and connected to the construction and operation of the new range would have the potential to move soil and release imbedded PCBs to the air and environment. Because the PCBs exist below federally designated health risk standards, if soils were suspended in the air and if personnel, the community, or the environment were exposed to these soils, the impact would be less than significant.

*Hazardous materials management.* Short-term adverse impacts would be associated with construction activities at the proposed project sites on SBMR, KTA, and PTA. Construction-related activities would require the use of hazardous materials in excess of existing quantities. However, contract specifications control the purchase amounts and use of hazardous materials and require compliance with federal, state, and local requirements and with installation policy on hazardous materials. In addition to general construction materials used for infrastructure, petroleum asphalt would be used in replacing or upgrading the runways and constructing roadways as part of the Proposed Action at WAAF, DMR, KTA, and PTA. Skin contact and breathing mists, fumes, or vapors would be avoided by the construction team. Construction and disposal would be conducted in accordance with federal, state, and local regulations.

Lead-acid batteries would generate power for the proposed FTI sites. The batteries would be managed and stored in the same manner as batteries used at the project installations, which would not create a significant impact.

A new chemical would be used in conjunction with the proposed Stryker training as part of the Joint Biological Point Detection System (JBPDS). A sodium azide (Na $N_3$) solution is used to preserve suspected biological agent samples during combat maneuvers. This material would be managed through SBMR and is described in more detail in Chapter 5, Section 5.12.

This overall impact is expected to be less than significant because the Army follows strict SOPs for storing and using hazardous materials. In following existing practices, the Proposed Action is not expected to cause the spill or release of hazardous materials or waste. Therefore, no new procedures would need to be implemented to store or use the construction-related or operation-related hazardous materials. Hazardous materials would be handled in accordance with existing regulations and installation-wide hazardous materials management and standard operating procedures.

*Hazardous waste management.* Construction and renovation of buildings at SBMR, KTA, and PTA, as well as roadway and runway upgrades at WAAF, DMR, KTA, and PTA could temporarily generate small amounts of hazardous waste. Operational activities associated with SBCT that could yield hazardous waste (e.g., the use of lead-acid batteries or the introduction of sodium azide waste to SBMR) would be handled in accordance with the USARHAW hazardous waste management plan and federal and state regulations. The additional hazardous waste generated by SBCT would not significantly increase the total amount of hazardous waste managed and disposed of from the installations. The Army follows strict regulations and SOPs for the temporary storage and disposal of hazardous waste. Hazardous waste associated with construction activities would cease to be generated at the completion of construction.

*Ammunition.* Although ammunition is the most prevalent hazardous material and waste issue associated with the Proposed Action, the increase would be maintained and managed by the administration in accordance with federal and USARHAW protocol, therefore creating no additional significant impact. With the exception of the increased use of ammunition resulting in an increased release of munition byproducts under the Proposed Action at SBMR and PTA (as discussed above under Impact 1), the rest of the Proposed Action poses a less than significant impact from ammunition. Four new range areas are proposed for SBMR and two proposed range areas for PTA. Each of these facilities would support live-fire training by multiple types of ordnance under diverse training conditions. No new ranges are projected for DMR.

The 105mm cannon on the Stryker MGS and the 120mm mortar are the only new weapons introduced to training as a result of the transformation. These weapons would be used at ranges on SBMR and PTA. The amounts of other weapon systems would also be increased with the elevated level of training associated with Transformation. Although the Proposed Action would generate a significant increase of four million rounds of ammunition per year (an approximately 25 percent increase) due to the elevated level of training and expansion in military force, the impact of this increase would not be significant, with the exception of the residual contamination released after munition fire, because artillery and ammunition management would not change. Handling and storage methods, disposal protocols, and safety procedures would continue to be conducted in accordance with existing regulations. No new conventions would need to be instated, thus creating a less than significant impact from the increase in ammunition and ordnance.

Other, more significant, ammunition-related issues are discussed in the significant impact and significant impact to less than significant sections, above.

*General training.* There would be less than significant impacts relating to general training at SBMR, DMR, KTA, and PTA. SBCT actions relevant to this type of activity include military training on training lands outside of developed areas, e.g., the cantonment area. Such training would include non live-fire, mounted maneuver training (using vehicles, such as the Stryker and HMMWV), and other non live-fire dismounted (foot traffic) military training. Most of the non live-fire training by SBCT forces would be similar to that currently being conducted by light infantry brigades. There would be a slight increase in transformed live-fire training that would occur on existing ranges on SBMR and PTA. The increase would be maintained and managed by administration in accordance with federal and USARHAW protocol, therefore creating no additional significant impact. SBCT would increase the level and extent of training in Hawai'i, but training procedures would continue to be managed in accordance with Army protocol.

When troops train at the ranges, safety protocol must be followed in order to protect the public from injury or accidents. SDZs are set up, in accordance with Army Pamphlet 385-64, Ammunition and Explosive Safety Standards. In addition, in order to prevent conflict with recreational activities in areas near the training ranges, land use restrictions are set up to limit access to the areas during range training times. These preventative measures are discussed in further detail in Section 4.2, Land Use. SDZs are included in the design configuration for the proposed ranges at SBMR, KTA, and PTA.

Additionally, similar safety protocol must be implemented to protect Army personnel during range training. Soldiers and officers are given safety manuals with a complete discussion of safety procedures while training. In addition, before training, troops are briefed on range-specific safety measures that may be necessary during the special exercise. Finally, soldiers and officers are provided with field manuals for each specific operation and exercise that give more detailed procedures and protocol to be followed in order to prevent accidents.

*Installation Restoration Programs* sites. The SRAA is part of the Del Monte NPL site, which the EPA designated as a Superfund site under CERCLA. This Superfund investigation originated at the Del Monte well in Kunia (south of SBMR and the SRAA). The Del Monte farmland parcel just south of SBMR (north of Kunia Village) is included in the NPL study (Figure 5-43). The site includes former USTs and buried drums of chemicals, such as methyl bromide (USEPA 2003), although no chemicals were detected at levels considered to be a threat to human health or the environment or that require cleanup (Rosati 2003). Under an agreement with the EPA, Del Monte conducted a remedial investigation and a baseline human health risk assessment, and a phytoremediation treatability study and produced an addendum to the remedial investigation report. Based on the results of these studies, the EPA issued a ROD in September 2003 establishing specific remedial actions to rectify the Superfund site. The Army's proposed acquisition of SRAA would in no way interfere with the progress of Del Monte's remedial programs as designated by EPA.

The parcel just north of SBMR (Poamoho Village), to be acquired under the Proposed Action as part of the development of Helemanō Trail, was previously included in the NPL listing but was removed from the Superfund designation in January 2004. This followed several rounds of investigations, resulting in confirmation that the site did not pose a threat to human health or the environment. For these reasons, the proposed acquisition areas are not considered significantly affected by the ongoing Superfund remedial programs.

*Electromagnetic fields.* Operational activities at several proposed projects, such as the FTI sites, could emit EMF, and some current equipment emits various levels of EMF. This would create a less than significant impact at SBMR, DMR, KTA, and PTA. However, since the general public is typically not allowed in areas that could contain EMF hazards from Army equipment and, therefore, would not be inadvertently exposed to EMF, this impact is not expected to pose a significant impact. Signs would be posted around the perimeter of all potentially harmful EMF sources to warn people about the EMF source. DOD Instruction 6055.11 and Army Pamphlet 385-64, as well as other Army regulations pertaining to EMF, would continue to be followed in operating the new facilities to protect personnel. Only trained personnel would work with equipment emitting EMF.

*Petroleum, oils, and lubricants.* Due to the elevated level of training, increased fuel storage and use would be encountered at SBMR and PTA. Based on the number of new vehicles and projected driving frequency during training events, an estimated increase of 83,660 gallons per year of JP-8 fuel would be added to the already existing bulk storage facility on SBMR. Tankers would also be used to carry fuel to the range areas for the vehicles. This number does not include the additional fuel needed for UAV vehicles because design information is confidential, but this number is considered inconsequential due to the fuel efficiency of the UAV.

Construction and upgrades of the roadways and runways at WAAF, DMR, KTA, and PTA would result in less than significant POL impacts. Operating several facilities, such as the proposed Tactical Vehicle Washes on SBER, KTA, and PTA and the proposed motor pool on the SRAA, would also create less than significant impacts. There are no storage tanks within the project areas, and the only new storage tanks installed as a result of the transformation would be those associated with the motor pool on SBSR, which would be installed and monitored in accordance with existing Army, state, and federal regulations. Under the Proposed Action, 400 wheeled Stryker vehicles would be added to SBMR and would be used there and at DMR, KTA, and PTA. Construction activities could expose additional areas to potential construction equipment leaks, spills, or drips to the environment. Best management practices would be practiced at each of these proposed facilities, and project area personnel would follow USEPA and USARHAW protocol for using and handling hazardous materials, such as POLs. Each facility maintains strict SOPs and spill contingency plans for hazardous materials and waste, identifying specific operating responsibilities and procedures.

*Pesticides/Herbicides.* Land acquisition activities would slightly increase the use of pesticides at SRAA and PTA. Although the Proposed Action would generate a slight increase in the amount of pesticides used on these installations in order to maintain the proposed ranges, pest management would continue to be managed by DPW in accordance with the USAG-HI IPMP, and pesticides would continue to be stored at the Pest Control Shop on SBMR and the Environmental Shop on PTA. This impact is considered less than significant.

*Biomedical waste.* Although the Proposed Action presents an increase of approximately 810 soldiers, 502 spouses, and 1,053 children to be stationed at SBMR, this impact is considered less than significant because the method of management and disposal of biomedical waste would not change. Biomedical wastes generated on SBMR and PTA are delivered outside of the project areas to TAMC and Hilo Hospital, respectively, for temporary storage before being picked up for permanent disposal off-island by DRMO. These facilities are well managed and would be able to handle the increase in waste. A less than significant impact is expected from biomedical waste on SBMR and PTA, with no mitigation required, and no impact is expected on DMR or KTA regarding biomedical waste. Biomedical waste is not addressed in the individual section analyses in Chapters 5 through 8 of this EIS.

#### No Impacts

*Radon.* Activities associated with the Proposed Action would not have a significant radon effect. Radon occurs in low concentrations in the Hawaiian Islands below EPA's recommended action levels and has not been identified at any of the Proposed Action sites. Therefore, no impact is expected from radon, mitigation would not be required, and radon will not be addressed in the individual installation analyses in Chapters 5 through 8 of this EIS.

### Reduced Land Acquisition Alternative

#### Significant Impacts

Significant human health and safety hazard impacts associated with RLA would be largely identical to significant human health and safety hazard impacts associated with the Proposed Action.

#### Significant Impacts Mitigable to Less than Significant

Significant but mitigable human health and safety hazard impacts associated with RLA would be largely identical to significant but mitigable human health and safety hazard impacts associated with the Proposed Action, except as described below.

*Unexploded ordnance.* Construction of QTR2 at PTA would likely involve moving soils that could be contaminated with UXO from prior activities in the range area. This could present a significant adverse safety hazard. Mitigation for this impact would be the same as for the mitigation identified for UXO impacts under the Proposed Action.

*Lead.* The potential for lead contamination due to redistributing lead-contaminated soils at PTA Range 8 could cause additional soils to become contaminated due to vehicle and equipment movement and soil deposition. Additional contamination would increase the volume of soil that needs to be remediated in the future. Mitigation for this impact would be the same as the mitigation identified for lead impacts under the Proposed Action.

*Wildfires.* Construction of QTR2 at PTA would likely increase the amount of live-fire training at PTA, thereby resulting in the potential to increase the frequency of wildfires at PTA, presenting a significant adverse safety hazard. Mitigation for this impact would be the same as the mitigation identified for wildfire impacts under the Proposed Action.

#### *Less than Significant Impacts*

Less than significant human health and safety hazard impacts associated with RLA would be largely identical to human health and safety hazard impacts associated with the Proposed Action. However, the movement of QTR2 to PTA would increase the impacts of ammunition, training, and construction-related hazardous materials and hazardous waste management at PTA, while reducing those impacts at SBMR. Project-wide impacts would not change.

#### *No Impacts*

There would be no impacts associated with human health and safety hazards under RLA as pertaining to radon. This no impact discussion would be largely identical to that described under the Proposed Action.

### ***No Action Alternative***

Under the status quo of No Action, hazardous materials, hazardous waste, and wildfire impacts would continue at their current levels and are described below.

#### *Less than Significant Impacts*

*Hazardous materials management.* Hazardous materials would continue to be handled in accordance with existing regulations and installation-wide hazardous materials management and standard operating procedures. The Army follows strict SOPs for storing and using hazardous materials.

*Hazardous waste management.* Hazardous waste would continue to be handled according to existing federal, state, and Army protocol. The US Army follows strict regulations and SOPs for the temporary storage and disposal of hazardous waste.

*Ammunition.* Live-fire exercises would continue at current levels as a part of current force training. Continued use of munitions by current forces during training could affect the training lands. Neither ammunition handling, storage, nor disposal activities would change with No Action. Existing weapons would continue to be used as part of current force training. Range contamination would continue to accumulate until range closure and remedial cleanup, but there would be no increase in ammunition used, so there would be only consistent levels of ongoing increased contamination.

_Unexploded ordnance_. No new construction would take place on former ranges under No Action, so there would be no impacts from encountering UXO during construction. No new ranges would be introduced, and the quantity of ammunition used during training would not increase. Because UXO remains a potential presence on ranges, USARHAW EOD specialists would continue abatement procedures to minimize exposing current forces to UXO during training.

_General training_. Although there would be no SBCT forces training at the project installations under No Action, current forces would continue to train. It is not likely that general training would result in any significant impacts. Current force training would continue to follow existing USARHAW protocol.

_Installation restoration program sites._ Current force training would continue at current levels on all military installations. The IRP investigations on SBMR, SBER, and WAAF would continue under existing USARHAW protocol.

_Lead._ Current force would continue live-fire training with lead-containing ammunition at SBMR and PTA. Continued use could increase the volume of soil that needs to be remediated in the future. All live-fire activities that could present a source of lead contamination to the soils would be contained in the existing ordnance impact area, and no new ordnance impact areas would be introduced. Ordnance clearance and cleanup would follow existing federal, state, and Army protocols. There would be no change to training operations at these installations.

_Electromagnetic fields_. The general public is typically not allowed in areas that could contain EMF hazards from Army equipment and therefore would not be inadvertently exposed to EMF. Signs would continue to be posted around the perimeter of all potentially harmful EMF sources to warn people about the EMF source. DOD Instruction 6055.11 and Army Pamphlet 385-64, as well as other Army regulations pertaining to EMF, would continue to be followed under No Action to protect personnel. Only trained personnel would work with equipment emitting EMF.

_Petroleum, oils, and lubricants._ The Army would continue to follow federal, state, and Army protocol. Wheeled vehicles would continue to be used by current forces on SBMR, DMR, KTA, and PTA, but Strykers would not be used.

_Wildfires._ Although additional ranges would not be established and new training procedures would not be adopted under No Action, continued use of Army land for training under No Action would prolong the threat of wildfires. Similar to current activities, future Army activities would be guided by the 25th ID(L) and USARHAW Wildfire Management Program, which includes the IWFMP and its FMAs and wildland fire SOPs, all of which are designed to prevent and manage wildfires. Army personnel would continue to practice best management practices during operations. There would be no significant impacts involving wildfires, just the continued potential for wildfires.

*No Impacts*

There would continue to be no impacts from asbestos, PCBs, pesticides, biomedical waste, or radon under No Action.

# 4.13 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

## 4.13.1 Impact Methodology

The installation ROI was defined to include Hawai'i and Honolulu Counties because the vast majority of people potentially affected by changes at the installations reside within these two counties. Each of the project alternatives (Proposed Action, Reduced Land Acquisition, and No Action) are reviewed and evaluated to identify potential impacts (positive or negative) on conditions in the ROI. Potential disproportionate effects to low-income or minority populations and the potential for increased adverse health effects to children were assessed to evaluate environmental justice effects. To reach out to minority and low-income communities, numerous organizations were contacted to provide information about Army transformation, such as neighborhood boards and other special interest groups, such as the Malu Aina Group and Waiki'i Ranch Homeowners, the Office of Hawaiian Affairs, the Royal Order of Kamehameha, and Hawaiian civic clubs (see Chapter 1, Section 1.8, Public Involvement).

Impacts on population, employment, income, and business volume were evaluated both qualitatively and quantitatively using the Economic Impact Forecast System (EIFS), a computer-based economic tool that calculates multipliers to estimate the direct and indirect effects resulting from a given action. For each economic indicator the model produces a standard range of values, or rational threshold value (RTV) that is calculated on the basis of yearly historical fluctuations in population, employment, income, and business volume within the ROI. The historical extremes for the ROI (the calculated RTVs) become the thresholds of significance for social and economic change. If the estimated effect of an action falls above the positive RTV or below the negative RTV, the impact could be considered to be significant. Appendix L contains complete RTV tables and EIFS model results for the Proposed Action.

In addition this section qualitatively assesses potential impacts on schools, based on the number of schools, student population, potential increase in student population, and capacity of the schools that could be affected. This analysis also includes an assessment of anticipated changes to housing, environmental justice, and the protection of children. To determine whether low-income and minority populations could be disproportionately affected by the alternatives, the proportion of low-income people and minorities in the areas surrounding the proposed project were identified. If high percentages of low-income and minority populations were identified, the potential for these populations to be displaced, for their income or employment to be lost, or for adverse effects to their health or environmental condition from construction or operational activities was assessed. To evaluate whether children could encounter disproportionate environmental health or safety effects, the population under the age of 18 surrounding the proposed project areas was computed. The potential environmental health and public safety risks identified for each alternative was then evaluated for proximity to populations of children.

### 4.13.2 Factors Considered for Impact Analysis

Factors considered in determining whether an alternative would have a significant impact on socioeconomics and environmental justice include the extent or degree to which its implementation would result in any of the following:

- Change the unemployment rate for Hawai'i and Honolulu Counties;
- Change total income;
- Change business volume;
- Change the local housing market and vacancy rates, particularly with respect to the availability of affordable housing;
- Change any social, economic, physical, environmental, or health conditions so as to disproportionately affect any particular low-income or minority group; and
- Disproportionately endanger children in areas on or near the installations.

In addition to these factors, public concerns expressed during the scoping process were also considered in the impact analysis. These concerns included the impact of the Proposed Action on the local economy, increased military spending, and the potential impacts on schools. The public was also concerned about potential impacts on environmental justice.

### 4.13.3 Summary of Impacts

The Proposed Action would have beneficial effects on population, employment, income and business volume, resulting from new construction, staff additions, and the resultant increased expenditures that would stimulate the economy within Honolulu County. These beneficial impacts would be less than significant because the changes to these factors would be within the capacity of society and the economy to absorb. There could also be a significant but mitigable impact on sales volume in Hawai'i County from construction activities at PTA. The Proposed Action might create a high demand for certain goods and services that could result in short-term shortages and price increases.

The Proposed Action also would have significant but mitigable impacts on SBMR schools because of the addition of approximately 760 school age children to the ROI population. The No Action Alternative would have no impacts on socioeconomic factors and no disproportionate effects on minority or low-income populations or on the protection of children.

The Proposed Action is not expected to adversely affect tourism in Hawai'i. No documented evidence has been found to indicate that military operations and training in Hawai'i have had any adverse impact on visitation levels. The military installations are generally not in high tourist areas and therefore are not expected to affect activities associated with the tourism industry.

Table 4-13 lists the types of socioeconomic and environmental justice impacts associated with the Proposed Action and No Action at the relevant installations. General descriptions of the impacts are also provided.

**Table 4-13**
**Summary of Potential Socioeconomic and Environmental Justice Impacts**

| Impact Issues | SBMR | | | DMR | | | KTA | | | PTA | | | Project-wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA |
| Population | ⊙+ | ⊙+ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ⊙+ | ⊙+ | ○ |
| Employment | ⊙+ | ⊙+ | ○ | ⊙+ | ⊙+ | ○ | ⊙+ | ⊙+ | ○ | ⊙+ | ⊙+ | ○ | ⊙+ | ⊙+ | ○ |
| Income | ⊙+ | ⊙+ | ○ | ⊙+ | ⊙+ | ○ | ⊙+ | ⊙+ | ○ | ⊙+ | ⊙+ | ○ | ⊙+ | ⊙+ | ○ |
| Economy (business volume) | ⊙+ | ⊙+ | ○ | ⊙+ | ⊙+ | ○ | ⊙+ | ⊙+ | ○ | ⦸+ | ⦸+ | ○ | ⦸+ | ⦸+ | ○ |
| Housing | ⊙ | ⊙ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ⊙ | ⊙ | ○ |
| Schools | ⦸ | ⦸ | ○ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | ⦸ | ⦸ | ○ |
| Environmental justice | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ○ | ○ | ○ | ⊙ | ⊙ | ○ |
| Protection of children | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ○ | ○ | ○ | ⊙ | ⊙ | ○ |

This table summarizes project-wide impacts. For installation-specific impacts see Chapters 5 – 8.
In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⦸ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact

N/A = Not applicable
PA = Proposed Action
RLA = Reduced Land Acquisition
NA = No Action

### *Proposed Action (Preferred Alternative)*

*Significant Impacts Mitigable to Less Than Significant*

*Impact 1: Schools.* Long-term adverse effects on schools serving SBMR are expected as a result of the Proposed Action. SBMR is the only installation that would have a change in population, so only the schools servicing SBMR would be affected. The Proposed Action would result in 810 additional soldiers at SBMR, accompanied by 502 spouses and 1,053 children[1]. Of the estimated 1,053 children, approximately 760 would be of school age (between 5 years and 18 years of age), assuming the age distribution of Soldier dependents is similar to that of the rest of the nation. Approximately half of this dependent population would attend elementary schools, while the remaining children would be split between middle school and high school. Accordingly, this would equate to about 380 additional elementary school students, and approximately 190 middle school students and 190 high school students. As described in Chapter 5, Section 5.13.1, two elementary schools on SBMR Hale Kula and Solomon, with a current enrollment of approximately 1,430 students (640 at Hale Kula and about 790 at Solomon); one elementary school on WAAF, Wheeler Elementary School, with approximately 750 students; one middle school on WAAF, Wheeler Intermediate School, with about 670 students; and two off-post high schools (Leilehua with approximately 1,780 students and Mililani with about 2,280 students), are the primary providers of public school education for dependents of SBMR soldiers. A small number of

[1] These numbers are based on Army and planning standards.

students attend private schools or schools outside the local district. Nonetheless, the potential addition of 380 elementary school students would represent a 17 percent increase over current enrollment. Enrollment in the local middle schools and high schools would increase by about 28 percent and 5 percent, respectively.

The impact of the additional students would vary with the school. Currently, the Wheeler Intermediate School has an enrollment of less than 700 but has a physical capacity of about 1,000 (Matsukawa 2003). Similarly, Hale Kula Elementary School has an enrollment of about 540, significantly down from its peak enrollment of 1,200 (Ferreira 2003). Solomon Elementary School is at near capacity with its current enrollment (Matsukawa 2003). Wheeler Elementary School's current enrollment is about 750, but capacity is 800 (Terry 2003). Leilehua High School's current enrollment is below capacity (Toyota 2003). Mililani High School, with an enrollment of about 2,280, is already operating beyond capacity (Tamongdon 2003). Temporary classroom space has been added, but that space is also full. Some type of accommodation would be needed to serve any additional students attending Mililani High School. Another alternative would be for the new high school students to attend Leilehua High School, since Leilehua is operating below capacity.

*Regulatory and Administrative Mitigation 1.* Federal aid will be made available to local schools to compensate for the increased burden through the Impact Aid Program. Such aid may take the form of basic support payments or grants for construction of new facilities to house new students who are dependents of Soldiers at SBMR. Additional teachers would need to be hired to maintain the current student-to-teacher ratios.

*Additional Mitigation 1.* The Army proposes to notify the school districts as soon as possible before personnel increases to give the schools time to secure funding and hire new teachers and to assist in providing facilities. Although the local school districts receive additional funding for each military dependent attending public school, it is likely that the school districts would bear some of the costs for additional teachers and physical space, if needed. The Residential Communities Initiative (RCI) Office, as the lead department for planning Army Family Housing, closely coordinates future student requirements with the State Department of Education. To this end, the RCI Project Manager has been working with DOE District Superintendents. On behalf of the Army, the RCI Project Manager works with the DOE to generate school enrollment projections with as much accuracy as possible. The Development Partnership plans its facilities work years in advance, coordinating with the DOE. Depending on future enrollments and funding levels, the Proposed Action could still adversely affect school budgets, but the impact would be less than significant.

*Impact 2: Economy (Business volume) in Hawai'i County.* An additional significant and mitigable impact under the Proposed Action is expected only at PTA in Hawai'i County, not at SBMR, DMR, or KTA in Honolulu County. The significant and mitigable impact is on sales volume in Hawai'i County from construction activities at PTA. The percent change in sales volume for Hawai'i County is slightly above the RTV historical high for sales (7.38 compared to the RTV of 7.18 percent) (see Table 4-15). This could indicate that the proposed action might create a high demand for certain goods and services that could result in short-term shortages and price increases.

*Additional Mitigation 2.* Because a substantial amount of construction is proposed over the next several years, the Army plans to conduct long-range procurement planning to lessen excessive supply and demand issues on local and outside suppliers.

The Proposed Action would also have a beneficial impact by increasing business volume in Honolulu County because of construction projects at SBMR, DMR, and KTA. However, unlike the economic impact of construction activity at PTA on Hawai'i County, the changes related to the Proposed Action would be within the historic RTV range for Honolulu County and would not be considered significant (see Table 4-14).

### *Less than Significant Impacts*

Short- and long-term direct and indirect minor beneficial impacts are expected as a result of new construction, staff additions, and training associated with the Proposed Action. The EIFS model results for Honolulu County (see Table 4-14) indicate that the expenditures and employment associated with the construction of training ranges and associated facilities would increase sales volume, income, and employment in Honolulu County. The expenditures associated with these projects were spread out over a five-year period because the construction is scheduled for between 2004 and 2008, and possibly beyond. The economic benefits associated with the construction would last only for the duration of the construction period. These positive changes in sales, income, employment, and population would fall within historical fluctuations and would be considered minor.

**Table 4-14**
**EIFS Construction Model Output for Honolulu County**

| Indicator Variable | Projected Change | Percentage Change | RTV Range |
|---|---|---|---|
| Direct sales volume | $96,496,660 | | |
| Induced sales volume | $164,044,300 | | |
| Total sales volume | $260,541,000 | 1.87% | -3.17% to 5.33% |
| Direct income | $39,197,690 | | |
| Induced income | $26,286,210 | | |
| Total income | $65,483,900 | 0.29% | -2.73% to 5.37% |
| Direct employment | 1,506 | | |
| Induced income | 1,183 | | |
| Total employment | 2,690 | 0.47% | -2.02% to 3.28% |
| Local population | 2,017 | 0.23% | -0.42% to 3.25% |

Source: EIFS Model 2002

Long-term beneficial economic effects are associated with the addition of 810 military personnel and their families to SBMR. The additional population would generate a small increase in overall spending on goods and services, which in turn would stimulate further economic activity in the region (i.e., small additional increases in hiring by suppliers of these goods and services). Specifically, the added population would rent or purchase housing and spend money on food, clothing, and other types of goods and services in the ROI during the course of their residency. The overall impact of the additional population on the economy would be minor given that the Proposed Action would add much less than 1 percent to the current ROI population.

In Hawai'i County short-term beneficial effects are expected. The expenditures and employment associated with the construction of training ranges and associated facilities would increase the sales volume, income, and employment in Hawai'i County, as determined from EIFS model results (see Table 4-15). The changes in income, employment, and population would fall within historical fluctuations, which is considered minor. However, the economic benefits would last only for the duration of the construction period.

**Table 4-15**
**EIFS Construction Model Output for Hawai'i County**

| Indicator Variable | Projected Change | Percentage Change | RTV Range |
|---|---|---|---|
| Direct sales volume | $42,905,770 | | |
| Induced sales volume | $66,074,890 | | |
| Total sales volume | $108,980,700 | 7.38% | -5.21% to 7.18% |
| Direct income | $6,989,448 | | |
| Induced income | $10,763,750 | | |
| Total income | $17,753,200 | 0.73% | -10.91% to 16.43% |
| Direct employment | 364 | | |
| Induced income | 561 | | |
| Total employment | 924 | 1.31% | -3.14% to 5.82% |
| Local population | 0 | 0.00% | -4.57% to 9.72% |

Source: EIFS Model 2002

The Proposed Action would also involve the acquisition of up to 1,400 acres of land, of which approximately 600 acres are currently under cultivation for pineapples. Some portion of the land acquired would no longer be useable for pineapple production. The military would use this area as rangeland. Economic effects could include reducing crop production and decreasing taxes paid to local and state government entities by land owners. Some employment could be affected, but the impact would likely be minor, given the size of the parcel and the minimal role agricultural production plays in the ROI economy. For example, agriculture accounts for only 0.5 percent of employment and only 0.4 percent of earnings in Honolulu County, and 1.7 percent of employment and 0.8 percent of earnings statewide (BEA 2002a). Since World War II, the role of the pineapple industry in the state economy has declined in place of tourism and defense.

*Population.* Implementing the Proposed Action would result in a less than significant population impact. The proposed transformation would increase the Honolulu County population by 2,365 (810 soldiers, 502 spouses, and 1,053 children), a less than one percent change. This change would be within the historic RTV range for both Honolulu and Hawai'i Counties and is not considered significant. No mitigation would be required.

*Employment.* Implementing the Proposed Action would result in a less than significant impact on employment. Employment changes include both direct and indirect changes, as well as short- and long-term changes. The direct long-term change in local employment is the increase in soldiers to be based at SBMR, and employment associated with the construction of training ranges and associated facilities would result in a temporary increase in employment. Subsequent indirect increases in employment are produced by the multiplier effect resulting from increased spending by the additional staff and construction employees. Increased military employment and construction employment both would be within the historic RTV ranges for both Honolulu and Hawai‘i Counties and are not considered significant. No mitigation would be required.

*Income.* Implementing the Proposed Action would result in a less than significant impact on income. Changes in income represent the wage and salary payments made to construction workers and to the resident workforce. The Proposed Action would increase total income of Honolulu County by $65,483,900 and Hawai‘i County by $17,753,200, a change of 0.29 percent in Honolulu County and 0.73 percent in Hawai‘i County. This change would be within the historic RTV range and is not considered significant. No mitigation would be required.

*Economy (business volume).* Implementing the Proposed Action would result in a less than significant impact on business volume. Changes in local business activity include direct business volume and induced business volume. Direct business volume is the change in the dollar value of sales in the retail and wholesale trade sector and receipts in the service sector resulting from local purchases by civilian and military personnel, as well as construction and procurement expenditures. Induced business volume is the additional business activity generated as a result of the direct change in sales. Business volume related to the Proposed Action would be $260,541,000 (a 1.87 percent change) for Honolulu County. This change would be within the historic RTV range for Honolulu County and is not considered significant; no mitigation would be required.

*Housing.* Implementing the Proposed Action would result in a less than significant impact on housing. The increased military population at SBMR would create a small increase in the demand for housing. The vacancy rate was approximately 9.3 percent (29,538 units) in Honolulu County, about 41.3 percent (12,203 units) were for rent and 8.7 percent (2,572 units) were for sale (US Census Bureau 1990a, 2000b). The Proposed Action would increase the military population of SBMR and the surrounding housing market, and the available housing stock would accommodate the demand for housing; no mitigation would be required.

*Economic impacts on Environmental Justice.* Short-term and long-term minor adverse indirect effects on environmental justice populations could occur. No minority or low-income residences would be displaced by training modifications, new construction, or land acquisition for expanded training areas or road construction, but noise from construction project sites or vehicle maneuver areas could have minor adverse noise impacts on nearby schools or private residences (see Section 4.6, Summary of Noise Impacts). Noise from construction would last only for the duration of the construction project. Construction would be limited to daytime hours. Noise impacts from vehicle maneuver training would be long-term, but this type of training is currently occurring at the installations. Air quality impacts from fugitive dust emissions at SBMR could affect low-income and minority populations in Wahiawa and Mililani Town; however these impacts would be mitigated to a less than significant level by implementing a DuSMMoP and avoiding company-level training at SBER during extended dry spells.

*Protection of Children.* Short-term and long-term minor adverse indirect effects on the health and safety of children could occur. As described under environmental justice above, noise sources associated with proposed construction activities could result in less than significant adverse noise impacts on nearby schools or residences (see Section 4.6, Summary of Noise Impacts).

Note that construction would take place in areas that are off-limits to the general public. Restricted areas would continue to be posted with signs, enclosed by a fence, or stationed with guards. Strict adherence to applicable safety regulations and procedures would continue to protect the health and safety of children.

#### No Impacts

*Economic impacts to Environmental Justice.* There would be no significant Environmental Justice impacts on areas of traditional importance (ATIs) resulting from increased noise under the Proposed Action. Noise impacts described in Section 5.6 would not have an impact on potential ATIs at Mount Ka'ala and Kolekole Pass because the noise contour maps show no noise impacts in these areas, and public access to these locations would be limited to times when no ordnance would be firing. There would be no noise impacts on ATIs at Mauna Kea (adjacent to PTA) because the noise analysis shown in Section 8.6 indicates that noise contours relating to ordnance use and construction under SBCT would not extend much beyond the PTA boundaries.

### Reduced Land Acquisition Alternative

Socioeconomic impacts from the RLA Alternative would be roughly the same as under the Proposed Action, except as described below. Reduced Land Acquisition would have beneficial effects on population, employment, income, and business volume, resulting from new construction, staff additions, and the resultant increased expenditures that would stimulate the economy within the ROI. Reduced Land Acquisition would have less than significant adverse effects on these resources and on housing.

#### Significant Impacts Mitigable to Less Than Significant

*Impact 1: Economy (Business volume) in Hawai'i County.* As described under the Proposed Action alternative, there would be one significant and mitigable impact on sales volume in Hawai'i County from construction activities at PTA under Reduced Land Acquisition. The increase in business volume and, thus, the level of impact would be slightly greater under Reduced Land Acquisition than under the Proposed Action due to the shift in construction and construction expenditures (of QTR2) from SBMR to PTA.

*Additional Mitigation 1.* Mitigation measures for this impact would be the same as those for the Proposed Action.

*Impact 2: Schools.* As described under the Proposed Action Alternative, the increase in population at SBMR could have a significant adverse long-term effect on schools in the surrounding area. Because the estimated increase in number of soldiers and school-age children associated with Reduced Land Acquisition would be the same as for the Proposed Action, the impact on schools serving the SBMR population would be the same.

*Additional Mitigation 2.* Mitigation measures for this impact would be the same as those for the Proposed Action.

### *Less Than Significant Impacts*

Reduced Land Acquisition would involve converting fewer acres of land under cultivation for pineapples to military use than under the Proposed Action. This would represent a lower less than significant impact on the regional economy than the Proposed Action.

*Employment.* The shift in construction and construction expenditures from SBMR to PTA would likely result in slightly lower indirect employment increases in Honolulu County and slightly greater indirect income increases in Hawai'i County than under the Proposed Action. The effect on employment from Reduced Land Acquisition would be less than significant.

*Income.* The shift in construction and construction expenditures from SBMR to PTA would likely result in slightly lower indirect income increases in Honolulu County and slightly greater indirect income increases in Hawai'i County than under the Proposed Action. The effect of Reduced Land Acquisition on employment would be less than significant.

*Economy (business volume).* The shift in construction and construction expenditures from SBMR to PTA would likely result in slightly lower increases in business volume in Honolulu County and slightly greater indirect income increases in Hawai'i County than under the Proposed Action. The effect in Honolulu County of Reduced Land Acquisition on business volume would be less than significant.

## ***No Action Alternative***

Implementing No Action would not result in a change in the local economy or population, and no impacts on population, employment, income or the economy are anticipated. No effects on housing are expected because the number of people requiring housing on- or off-post would not change as a result of No Action. No effects on environmental justice are expected. No Action would not alter the existing health and safety, housing, or economic conditions of minority or low-income populations in Hawai'i or Honolulu Counties. No disproportionate effects on children are expected because No Action would not present any change in the public health or safety risk that could affect children. The Army would continue to provide measures to protect the safety of children, including the use of fencing, limitations on access to certain areas, and provision of adult supervision.

## 4.14 PUBLIC SERVICES AND UTILITIES

### 4.14.1 Impact Methodology

The public services and utilities sections analyze potential impacts on police, fire, and emergency medical services and infrastructure for water, wastewater, solid waste management, telephone, electricity, and natural gas. Potential infrastructure shortfalls, inconsistencies, inadequacies, or deficiencies identified between the existing infrastructure and the requirements of a project alternative would be impacts.

Population changes projected for the proposed project were used for forecasting utility and public services demands, based on average per capita values whenever available. These utility forecasts were compared to existing levels of use and infrastructure capacities to determine if capacities would be exceeded.

### 4.14.2 Factors Considered for Impact Analysis

Factors considered in determining whether an alternative would have a significant impact on public services and utilities include the extent or degree to which its implementation would result in the following:

- Interrupt or disrupt any public utility service, as a result of physical displacement and subsequent relocation of public utility infrastructure, to the extent that the result would be a direct, long-term service interruption or permanent disruption of essential public utilities; or
- Require an increase in demand for public services or utilities beyond the capacity of the utility provider to the point that substantial expansion, additional facilities, or increased staffing levels would be necessary.

In addition to these factors, public concerns expressed during the scoping process were also considered in the impact analysis. These concerns included the impact of the Proposed Action on increased demand for water, collection and treatment of wastewater, and the disposal of solid waste.

### 4.14.3 Summary of Impacts

#### *Proposed Action (Preferred Alternative)*

Less than significant long-term adverse effects are expected from implementing the Proposed Action, which would increase the number of personnel by 810 soldiers and would result in an overall potential increase of 2,365 individuals (which includes 502 spouses and 1,053 dependents). The additional population and the building space and facilities to be constructed, as well as any increases in training at new and existing facilities, would increase demand on utilities and services. Additional utilities would be provided for the projects that would require increased capacity; otherwise, the existing systems are expected to have adequate capacity to provide for these changes. Beneficial impacts on public services and utilities would occur at DMR, KTA, and PTA.

**Table 4-16**
**Summary of Potential Public Services and Utilities Impacts**

| Impact Issues | SBMR | | | DMR | | | KTA /KLOA | | | PTA | | | Project-wide Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA | PA | RLA | NA |
| Impacts on police, fire, and emergency medical services | ⊙ | ⊙ | ○ | ⊙+ | ⊙+ | ○ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Impacts on water distribution | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Wastewater and stormwater impacts | ⊙ | ⊙ | ○ | ○ | ○ | ○ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Solid waste management | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ |
| Impacts on communications | ⊙ | ⊙ | ○ | ○+ | ○+ | ○ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙+ | ⊙ + | ○ | ⊙ | ⊙ | ○ |
| Impacts on electricity and natural gas | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙/○ | ⊙/○ | ⊙/○ | ⊙ | ⊙ | ○ | ⊙+ | ⊙+ | ○ |

This table summarizes project-wide impacts. For installation-specific impacts see Chapters 5 – 8.
In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | | |
|---|---|---|---|---|
| ⊗ | = Significant | N/A | = | Not applicable |
| ⦸ | = Significant but mitigable to less than significant | PA | = | Proposed Action |
| ⊙ | = Less than significant | RLA | = | Reduced Land Acquisition |
| ○ | = No impact | NA | = | No Action |
| + | = Beneficial impact | | | |

*Significant Impacts*

There would be no significant and unmitigable impacts on public services or utilities under the Proposed Action.

*Significant Impacts Mitigable to Less Than Significant*

There would be no significant and mitigable impacts on public services or utilities under the Proposed Action.

*Less than Significant Impacts*

*Police, fire, and emergency medical services.* The Proposed Action would have minor long-term impacts on police, fire, and medical services at SBMR, DMR and PTA because of increased numbers of soldiers training on the installation. Moving military traffic to Dillingham Trail and PTA Trail would improve safety on public roads, which would be a beneficial effect.

*Communications.* Minor adverse impacts on telephone service would occur at SBMR because additional users would be added to existing lines, which are already in poor condition and scheduled for replacement. The road from SBMR to DMR would include provisions for new telecommunications lines for DMR, which would run along the side of Dillingham Trail, and would result in improved telephone service at DMR. Many of the projects proposed at PTA involve providing new telephone and data lines to support more technical training maneuvers and the use of additional buildings, and thus would create minor beneficial impacts. Construction activities at SBMR, DMR, and PTA could result in service interruptions in order to connect new lines and extend service. This impact would be temporary, and the length of disruptions would be minimized to the greatest extent possible during this period. Service would be returned to normal after construction.

Army staff conducted an electromagnetic compatibility study for the Proposed Action and considered over 65,500 frequency records from the civil sector and other federal government agencies. The results indicate no significant interference problems would be encountered on O'ahu or the island of Hawai'i by operating the FTI system (US Army Development Test Command 2003).

*Water distribution.* Minimal long-term adverse effects are expected from the Proposed Action because of increased demand for potable water at SBMR, DMR, and PTA. Additional potable water needed at KTA would continue to be trucked in as there is no water distribution system in operation.

Potable water demand would be somewhat greater at SBMR because of the increase in the residential population, but this impact would still be less than significant. Construction at SBMR, DMR, and PTA could result in service interruptions in order to connect new lines and extend service. This impact would be temporary, and the length of disruptions would be minimized to the greatest extent possible during this period. Service would be returned to normal after construction.

*Electricity.* The Proposed Action would result in minor adverse long-term effects because of increased electrical demands at SBMR, KTA, and PTA, but would also result in minor beneficial impacts on electrical service at KTA and PTA. Construction at SBMR, DMR, and PTA could result in service interruptions in order to connect new lines and extend service. This impact would be temporary, and the length of disruptions would be minimized to the greatest extent possible during this period. Service would be returned to normal after construction.

*Wastewater and stormwater.* No impacts would occur to wastewater and stormwater at DMR. No new staff would be added, and no additional training facilities would be constructed at DMR, and the road from SBMR to DMR would include drainage improvements, culverts at stream crossings, grass and concrete swales, and drainage structures and lines to manage stormwater runoff. Minor long-term adverse impacts would occur at SBMR and PTA because of new construction and facilities, and increased training volume and intensity. Impacts on wastewater would be somewhat greater at SBMR because of the increase in the residential population, but still less than significant. The wastewater and stormwater collection and treatment systems at SBMR and PTA are expected to have adequate capacity to handle increases in volume that could result from the Proposed Action.

*Solid waste.* Minor long-term adverse impacts on solid waste would occur at all installations as a result of demolition, construction, and increased intensity and frequency of training activities. Impacts on solid waste management would be somewhat greater at SBMR because of the increase in the residential population, but still less than significant.

### *Reduced Land Acquisition Alternative*

The public services and utilities impacts for Reduced Land Acquisition would be similar to those described in detail under the Proposed Action, except that QTR2 would be constructed at PTA rather than SBMR, and the potential impacts associated with it would occur at PTA.

### *No Action Alternative*

No Action is expected to have no long-term adverse impacts on public utilities because no new facilities would be constructed to add demands to utilities infrastructure. No changes to the provision of police, fire, and emergency services would occur.

# CHAPTER 5

# SCHOFIELD BARRACKS MILITARY RESERVATION/WHEELER ARMY AIRFIELD

# CHAPTER 5
# SCHOFIELD BARRACKS MILITARY RESERVATION AND WHEELER ARMY AIRFIELD

## 5.1 INTRODUCTION

This chapter is a discussion of the affected environment and environmental consequences of project activities at SBMR (which includes SBER and Schofield Barracks Main Post), WAAF, and the SRAA. Levels of analysis by resource area will vary within this chapter, as the sensitivity of resources and level of project activity vary from one area to another. For instance, biological impacts at WAAF are not discussed in as much detail as at SBMR because WAAF has little undisturbed habitat and the project activities proposed for WAAF would have limited impacts on biological resources.

The proposed project at SBMR would require the construction of various training and support facilities, the acquisition of the SRAA, and changes in the training activities and locations. The following text provides a description of these proposed activities; for detailed construction information and graphics, see Appendix D, Construction Details. Potential environmental impacts associated with these proposed activities are discussed in detail throughout the remainder of this chapter.

### 5.1.1 Proposed Action

#### *Construction*

*Construction of Qualification Training Range 1*

The facility's proposed location is on the SBMR range footprint on McCarthy Flats, approximately 1.25 miles (2.01 kilometers) north of the intersection of Beaver Road and Trimble Road. The construction of QTR1 is anticipated to disturb approximately 120 acres (48.6 hectares) (an estimated 100 percent receiving construction activities), with the new buildings and structures occupying 0.12 acre (0.05 hectare).

The nonstandard QTR1 at McCarthy Flats would include 12 lanes of a combat pistol/Military Police (MP) firearms qualification course, 24 lanes of a modified record fire range, 12 lanes of a multipurpose machine gun/sniper range, and 50 lanes of a basic 10/25-meter firing range. Primary facilities also include stationary infantry target emplacements, moving infantry target emplacements, and zero panel and standing silhouette emplacements. Supporting facilities within the perimeter of the range complex would consist of necessary information systems requirements, demolition, earthwork electrical service, limit markers, fencing, lighting, berms, parking, service roads, site drainage, erosion control, and other site improvements. Approximately 20 tons of air conditioning equipment would be provided in the instruction buildings and range control.

### *Construction of Qualification Training Range 2*

QTR2 would have a total of 22 firing points. Ten lanes would be used for modified record fire, and 12 lanes would be used for a standard automated combat pistol qualification course. This complex would support qualifications for pistol (38 cal., 9mm, 45 cal.) and shotgun and rifle (M16 and M4) Munitions would be limited to small arms, and tracers would not be authorized. This project would not require the demolition of any facilities in the real property inventory. The construction of QTR2 is anticipated to disturb approximately 120 acres (48.6 hectares) (a footprint of 1,574 feet [480 meters] by 3,280 feet [1,000 meters], with an estimated 100 percent receiving construction activities), with the new buildings and structures occupying 0.11 acre (0.045 hectare). This qualification range would be sited on existing agriculture fields within the proposed SRAA. There are no ranges currently in this area.

### *Construction of Battle Area Complex*

A BAX would be constructed at SBMR for company gunnery training and qualification weapons systems. The proposed BAX would be constructed on the west side of Beaver Road and north of Trimble Road, on the existing range complex and range impact area. Supporting facilities would include site improvements, erosion control, a bivouac area, electrical service, security fencing, and gates. The construction of the BAX would occupy approximately 600 acres (243 hectares) of disturbed land (an estimated 200 acres [81 hectares] receiving construction activities), with the new buildings and structures occupying 0.18 acre (0.07 hectare).

### *Construction of Urban Assault Course and Training Facility*

The UACTF would be positioned on what is now the MOUT assault course on the Kolekole Range at SBMR. The proposed range project would be 100 yards (91 meters) north of Trimble Road and oriented to the north in order to use the current range impact area. The construction of the UACTF is anticipated to disturb approximately 6 acres (2 hectares) (a footprint of 700 feet by 900 feet [213 meters by 274 meters], with an estimated 40 percent receiving construction activities), with the new buildings and structure occupying 0.04 acre (0.02 hectare). Construction would involve the removal of the MOUT assault course and support facilities at SBMR.

### *Construction of Range Control Facility*

A consolidated range control complex would be built to support consolidated command and control and other operations, including range maintenance operations, for range activities at all Army training areas on O'ahu. The proposed project would add 22,133 square feet (2,056 square meters) of new facilities on previously disturbed land and would involve demolishing eight buildings with a total area of 35,867 square feet (3,332 square meters). Supporting facilities would include water, sewer, and electrical service, paving, walks, parking, security fencing, information systems, and site improvements. The proposed facility would be constructed on the west side of Beaver Road on an open field, approximately half a mile (0.8 kilometer) north of Trimble Road intersection.

### *Construction of Virtual Fighting Training Facility*

The proposal is to construct an 11,496-square-foot (1,068-square-meter), single-story, state-of-the-art, virtual fighting training facility to house war-fighting simulation operations to support small arms marksmanship and dismounted weapons system training. Support facilities would include water, sanitary sewer, storm drainage, electric service, fire protection and alarm systems, telephone, paving, walks, curbs, gutters, parking, information systems, and state-of-the-art intracommunications and intercommunications systems and site improvements. The building would be constructed on the south side of Trimble Road, approximately half a mile (0.8 kilometer) west of the intersection of Beaver Road and Trimble Road on previously disturbed land.

### *Construction of Motor Pool Maintenance Shops*

The proposal is to construct a 167,775-square-foot (15,587-square-meter) motor pool facility, which would include new tactical equipment maintenance shops with repair bays, a separate administrative area, two arms rooms, two communication rooms, hazardous material storage facility, shop control, overhead cranes, petroleum, oil, and lubricants facilities, deployment equipment storage facilities, oil-water separators, a hardened parking area, and organizational vehicle parking areas, arms rooms, communication rooms, deployment storage facilities, hazardous material storage facility, telecom shelter, and oil water separator. Supporting facilities would include water, sanitary sewer, storm drainage, electric service, exterior lighting, fire protection and alarm systems, paving, walks, curbs and gutters, parking, roadways, information systems, and site improvements. There are no available lands at SBMR and WAAF to support these new facilities. The motor pool needs to be close as possible to SBMR and Soldiers who would be training in the Stryker. The only available lands near SBMR are agriculture fields within the proposed SRAA.

### *Construction of Tactical Vehicle Wash Facility*

The proposal is to construct a tactical vehicle wash facility with six wash stations. The bays would be sized to fit a 60-foot (18.3-meter) long by 12-foot (3.7-meter) wide vehicle. The primary facility would consist of the preparation area and wash stations. The wash stations would use a high-pressure wash system and would recycle water to minimize wastewater disposal. The water would flow through a water sediment basin, an equalization basin, and oil water separators and then would be deposited into a water supply reservoir. Treatment would include oil and grease and grit removal and organic control. A structure would be provided to house the mechanical secondary treatment units and the control panels necessary for the facility. The structure would be approximately 40 feet (12 meters) by 30 feet (9 meters). The structure would require louvers and would have a large door to install equipment and for maintenance. Supporting facilities include utilities, paving, fencing, curbing, and site improvements. The wash rack would be sited on previously disturbed lands on Higgins Road on SBER.

*Construction of Multiple Deployment Facility*

The proposal is to construct a multiple deployment facility (MDF) to support deployments from multiple airfields. The facility would include a deployment marshalling area, prefabricated guardhouses and document control station, wash rack, defueling shed, scale houses, joint inspection area, vehicle maintenance shelter, vehicle holding area, AHA, and a contingency warehouse. An additional ASP scale area would be provided to support Stryker vehicles that are processed through the MDF and are then directed to the ASP site to be loaded with ammunition. These vehicles would then be reweighed at the ASP scale area, and the information would be processed at Building 1551 and transmitted to the AHA facility. The AHA facility would be accessible to the disabled. Three buildings would be demolished as part of this project. Supporting facilities would include water, sanitary sewer, storm drainage, electric service, exterior lighting, fire protection alarm systems, telephone, paving, fencing, parking, information systems, and site improvements. Sustainable design elements would be incorporated into the facility design and would include air conditioning. This proposed facility would be on a previously disturbed site south of Airdrome Road, on an abandoned airstrip at WAAF.

*Upgrade Wheeler Army Airfield for C-130 Aircraft*

Under this proposal the 694-foot by 837-foot (212-meter by 255-meter) apron, the taxiway, and the parking pad would be strengthened to accommodate C-130 aircraft staging operations for the proposed life cycle of WAAF. This proposed project would be sited on the west side of WAAF, just north of Airdrome Road.

*Construction of Helemanō Trail*

A 15-foot-wide (5-meter-wide) gravel road would be constructed, with three-foot-wide gravel shoulders on both sides, to provide military vehicle access from SBMR to HMR. In conjunction with Drum Road, this project would provide a road network from SBMR to KTA. Work would include grading, paving, drainage improvements, culverts at stream crossings, guardrails, shotcrete, retaining walls, concrete swales, grass swales, signs, and storm drainage structures and lines. Work would also include provisions for telecommunication lines, which would run alongside the new paved road. Road grades steeper than 10 percent would be paved with asphalt or concrete. The project would be sited from SBMR to HMR for approximately seven miles (eight kilometers). It would be north of Wahiawā and would use as much of the existing agriculture roadways as possible. Until trail construction is complete, the Army would use public roads for travel from SBMR to DMR and KTA.

*Construction of Fixed Tactical Internet*

Vertical whip antennas would be strategically placed at seven locations at SBMR and at two locations at SBER so that radios in military vehicles could receive both voice and data signals. Of the 14 locations evaluated for construction of the Fixed Tactical Internet antennas on O'ahu, a maximum of eight will be selected from the locations represented in the EIS. Locations will be chosen based on the most suitable locations for communication logistics and avoidance of environmental concerns, such as cultural and biological resources. Four antennas would be installed at each proposed site on O'ahu, using existing tower sites when possible. Two of the antennas would be approximately four feet (1 meter) long and two inches (0.05 meter) in diameter, and the other two antennas would be approximately 10 feet (2.5 meters) long and two inches (0.05 meter) in diameter. All the antennas would be mounted on masts or existing utility poles, towers, or buildings, which would make each of the two SBER antennas a total of 102 feet tall; the total height of the SBMR antennas would range from 25 feet to 102 feet. Each site would have an area of 20 feet (6 meters) by 25 feet (7.6 meters), including a 15-foot (4.6-meter) by 20-foot (6-meter) concrete pad for the support structure and shed. Sites would be accessed via existing roads in all cases. No security lighting would be installed at the sites. Equipment sheds would house four radios and four batteries.

### Land Transactions

#### *South Range Land Acquisition*

The SRAA is south of SBMR, west of WAAF, and north of the Del Monte pineapple fields and the Honouliuli Preserve, which is a forested area managed by The Nature Conservancy. The SRAA is to the east of the Wai'anae Mountains. The proposed parcel acquisition would cover approximately 1,402 acres (567 hectares). The area would be used for mounted and dismounted maneuver training, and QTR2 and the motor pool would be constructed within this area.

#### *Land Easement for Construction of Helemanō Trail*

Approximately 13 acres (5.3 hectares) of land would be acquired in a perpetual easement for constructing Helemanō Trail. If the proposed trail alignment changes, the Army will negotiate with the property owners on a new alignment and will conduct appropriate analysis and documentation, in accordance with NEPA, ESA, and NHPA.

### Training

#### *Operation of Qualification Training Range 1*

In general, QTR1 provide improved, consolidated facilities to more efficiently and cost-effectively conduct live-fire range qualification training, as well as training necessary to detect, identify, engage, and defeat dismounted and mounted enemy forces. Range training would include familiarizing troops with and qualifying them for using individual and crew-served weapons, including combat pistols/MP firearms (M9, .38 caliber [cal.], and .45 cal.), shotguns and rifles (M16, M4, M14, M21, and M24), and machine guns (M60, M249, M240B, and M2). The proposed facilities would also provide a location for maneuver training required by proposed units. Additional details regarding training at the QTR1 are included in Chapter 2.

The training at QTR1 will take place on approximately 120 acres (48.6 hectares) of disturbed land and would be used between 180 and 242 days per year. No combat vehicles would be in service at the site, but between 5 and 10 support vehicles would be used per training episode.

*Operation of Qualification Training Range 2*

The training at the QTR2 is anticipated to take place on approximately 120 acres (48.6 hectares) of agricultural land. The proposed range would be used between 180 and 240 days per year. No combat vehicles would be used, but between 5 and 10 support vehicles would be used.

*Operation of Battle Area Complex*

The proposal is to construct a BAX at SBMR, designed for company gunnery training and qualification requirements of the weapons systems associated with the proposed SBCT. The complex would support qualification for graduated live-fire training from squad to company level and some battalion exercises. The complex would incorporate all weapons intrinsic to the SBCT Infantry Company (except the Javelin) and would allow a variety of live-fire exercise scenarios. The range would also support dismounted infantry platoon tactical live fire operations, either independently of or simultaneously with supporting vehicles. The range would include the following training objective features: 4 course roads with crossover capability, 30 stationary armor targets, 6 moving armor targets, 174 stationary infantry targets, 14 moving infantry targets, 17 machine gun/observation bunkers, 2 grenade/breaching obstacles, 3 helicopter landing zones, 13 mortar simulation devices, and 8 vehicle trenches and firing positions. Since the Draft EIS was written, the training objective features have been updated to include a change from the current inventory of twelve 105mm howitzers to eighteen 155mm howitzers. The Draft EIS included an analysis of twelve 155mm howitzers; the Army has updated the analysis in the Final EIS to address eighteen 155mm howitzers.

The training at the BAX is anticipated to affect 2,075 acres (840 hectares) of existing disturbed range lands. The BAX is anticipated to use combat vehicles for a maximum of 210 days a year and a minimum of 180 days a year and to support vehicles a maximum of 8 days a year and a minimum of 4 days a year. Combat vehicles consist of Stryker and HMMWV vehicles, while support vehicles consist of 2½-ton to 5-ton vehicles. The BAX is anticipated to use various types of ammunitions, mines, and pyrotechnics.

*Operation of the Urban Assault Course Training Facility*

The urban assault course training facility (UACTF) would include a breach facility, UACTF, and a live-fire shoothouse. The breach facility would be used to train Soldiers in the proper techniques to enter buildings through doors, windows, and walls. The UACTF would be used to train Soldiers in other techniques associated with urban combat, including underground training. The live-fire shoothouse would be used to train individuals, squads, and platoons on the proper techniques to enter and clear a building. This facility is required to support the combined arms urban operations training strategy for conducting full spectrum operations (offense, defense, stability and support). Since the Draft EIS was written, the training objective features have been updated to include a change from the current inventory of twelve 105mm howitzers to eighteen 155mm howitzers. The Draft EIS included an analysis of twelve 155mm howitzers; the Army has updated the analysis in the Final EIS to address eighteen 155mm howitzers.

The training at the UACTF is anticipated to affect 14 acres (5.7 hectares) of previously disturbed range lands. The UACTF is anticipated to be used a maximum of 210 days and a minimum of 75 days per year. The UACTF is anticipated to use various types of ammunitions, mines, and pyrotechnics.

*Use of Information Infrastructure Architecture*

These facilities are being constructed to meet requirements of the current mission of the 2nd Brigade. The environmental effects of this proposed construction are addressed in a separate NEPA document. Only the use of this project by SBCT forces will be addressed in this SBCT EIS. The facilities would include fiber optics and copper cables running from the cantonment area to the ranges, the motor pool, and other facilities within the installation. These telecommunications facilities would furnish digital information necessary for interconnections among various ranges on SBMR, WAAF, HMR, KTA, and other locations on O'ahu. Also included would be underground and aboveground cable to upgrade the e-mail system, the asset visibility system, the automated personnel processing system, and video teleconferencing capability.

*General SBCT Training*

Transformation activities include military training on lands outside of developed areas, such as the cantonment area. Such training would include nonlive-fire, mounted maneuver training (using vehicles such as the Stryker and HMMWV on 1,235 acres [500 hectares]) and other nonlive-fire military training on foot. Most of the nonlive-fire training by SBCT forces would be similar to that being conducted by current force light infantry brigades.

As discussed in Chapter 2, training includes establishing and using tactical and logistical operations and administrative centers, as well as smaller more dispersed activities, such as bivouac. As with current training, exercises would continue to be at the squad through company level, with some opportunities for battalion and above training. General SBCT training would likely occur between 180 and 242 days per year.

Field activities, or training exercises, can involve a variety of activities, such as vehicle movement, maneuvers, and convoys, foot maneuvers, bivouacking, limited aviation training, and staff training exercises. Field exercises can generally take place in all training areas outside of the designated cantonment areas. Currently, trafficable areas available for maneuver training exercises are undefined but are assumed to include sizable portions of all USARHAW training installations.

### ***Proposed Action Impacts***

Table 5-1 is a list of environmental impacts by specific SBCT project and resource category. This gives the public and reviewers a more detailed evaluation of impacts deriving from specific SBCT-related actions.

**Table 5-1**
**SBCT Project Impacts Under the Proposed Action at SBMR**

| 1391 Project # | SBCT Project Title | Location | Land Use | Visual Resources | Airspace | Air Quality | Noise | Traffic | Water Resources | Geology and Soils | Biological Resources | Cultural Resources | Human Health & Safety Standards | Socioeconomics/EJ | Utilities |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SBMR/WAAF** | | | | | | | | | | | | | |
| 58143 | Urban Assault Course and Training Facilities | Main Post | ⊙ | ⦸ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⦸ | ⊙+ | ⊙+ |
| 57404 | Virtual Fighting Training Facility | Main Post | ⊙ | ⦸ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙+ | ⊙+ |
| 56923 | Range Control Facility | Main Post | ⊙ | ⦸ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⊙+ | ⊙+ |
| 58144 | Battle Area Complex | Main Post | ⊙ | ⦸ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⊗ | ⦸ | ⊙+ | ⊙+ |
| 57421/ 58925 | Motor Pool Maintenance Shops | Main Post | ⊙ | ⦸ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⊙+ | ⊙+ |
| 57416 | Tactical Vehicle Wash Facility | East Range | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⊙ | ⊙+ | ⊙ |
| N/A | Fixed Tactical Internet | Main Post | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ○ | ○+ |
| 55270 | South Range Land Acquisition | SRAA | ⊙ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 57461 | Qualification Training Range, QTR1 | Main Post | ⊙ | ⦸ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⊗ | ⦸ | ⊙+ | ⊙+ |
| 57462 | Qualification Training Range, QTR2 | SRAA | ⦸ | ⦸ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⊗ | ⦸ | ⊙+ | ⊙+ |
| 57422 | Multiple Deployment Facility | WAAF | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⊙+ | ⊙ |
| 57405 | Upgrade Airfield for C-130 Aircraft | WAAF | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ○ | ⊙ | ⊙+ | ⊙ |
| N/A | SBCT Training | SBMR | ⊙ | ⊙ | ○ | ⦸ | ⦸ | ⊙ | ⦸ | ⊗ | ⊗ | ⊗ | ⦸ | ⦸ | ⊙ |
| 57406 | Road Construction, Schofield to Helemanō | Helemanō | ⊙ | ⦸ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⊙ | ⊙ | ⊙ | ⊙+ | ⊙ |
| 57802 | Land Easement, Schofield to Helemanō | Helemanō | ⊙ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

PA = Proposed Action
RLA = Reduced Land Acquisition
NA = No Action
⊗ = Significant impact
⦸ = Significant but mitigable to less than significant impact
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact
N/A = Not applicable

### 5.1.2 Reduced Land Acquisition

Under this alternative, the SRAA would be reduced and QTR2 would be constructed at PTA on the island of Hawai'i instead of on the SRAA. All other construction and training activities would be the same as the proposed action.

#### *Land Transactions*

South Range Land Acquisition

The proposed parcel acquisition would cover approximately 100 acres (40.5 hectares). The additional land is required for constructing new motor pool facilities and related infrastructure.

#### *Reduced Land Acquisition Impacts*

Table 5-2 is a list of environmental impacts by specific SBCT project and resource category. This gives the public and reviewers a more detailed evaluation of impacts deriving from specific SBCT-related actions.

### 5.1.3 Public Comments

Public scoping comments on SBCT project activities at SBMR and WAAF focused on potential impacts related to the following:

- Land use changes, including the conversion of agricultural lands to military use;
- Access to the Schofield-Waikane Trail and other open space areas;
- Biological resources at Honouliuli Preserve, especially rare and endangered species;
- Continued stewardship by The Nature Conservancy to manage Honouliuli Preserve;
- Air emissions from training activities to Kolekole Pass and other areas;
- Potential impacts to cultural resources at Honouliuli Preserve;
- Increased frequency of wildfires;
- Erosion of soils;
- Socioeconomic and environmental justice issues;
- Traffic along the Kamehameha Highway and other roads;
- Groundwater at SBMR and surrounding areas; and
- Remediation of hazardous materials and wastes.

During the DEIS public comment period, public comments on the SBCT project activities at SBMR and WAAF focused on the following:

- Impacts on recreation and land use from land acquisition and training activities;
- Impacts on conservation and Forest Reserve land;

**Table 5-2**
**SBCT Project Impacts Under the RLA Alternative at SBMR**

| 1391 Project # | SBCT Project Title | Location | Land Use | Visual Resources | Airspace | Air Quality | Noise | Traffic | Water Resources | Geology and Soils | Biological Resources | Cultural Resources | Human Health & Safety Standards | Socioeconomics/EJ | Utilities |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SBMR/WAAF** | | | | | | | | | | | | | |
| 58143 | Urban Assault Course and Training Facilities | Main Post | ⊙ | ⦸ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⦸ | ⊙+ | ⊙+ |
| 57404 | Virtual Fighting Training Facility | Main Post | ⊙ | ⦸ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙+ | ⊙+ |
| 56923 | Range Control Facility | Main Post | ⊙ | ⦸ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⊙+ | ⊙+ |
| 58144 | Battle Area Complex | Main Post | ⊙ | ⦸ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⊗ | ⦸ | ⊙+ | ⊙+ |
| 57421/ 58925 | Motor Pool Maintenance Shops | Main Post | ⊙ | ⦸ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⊙+ | ⊙+ |
| 57416 | Tactical Vehicle Wash Facility | East Range | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⊙ | ⊙+ | ⊙ |
| N/A | Fixed Tactical Internet | Main Post | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ○ | ○+ |
| 55270 | South Range Land Acquisition | SRAA | ⊙ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 57461 | Qualification Training Range, QTR1 | Main Post | ⊙ | ⦸ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⊗ | ⦸ | ⊙+ | ⊙+ |
| 57422 | Multiple Deployment Facility | WAAF | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⊙+ | ⊙ |
| 57405 | Upgrade Airfield for C-130 Aircraft | WAAF | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙+ | ⊙ |
| N/A | SBCT Training | SBMR | ⊙ | ⊙ | ○ | ⦸ | ⦸ | ⊙ | ⦸ | ⊗ | ⊗ | ⊗ | ⦸ | ⦸ | ⊙ |
| 57406 | Road Construction, Schofield to Helemanō | Helemanō | ⊙ | ⦸ | ○ | ⦸ | ⦸ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙+ | ⊙ |
| 57802 | Land Easement, Schofield to Helemanō | Helemanō | ⊙ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | | | |
|---|---|---|---|---|---|
| PA | = | Proposed Action | ⊙ | = | Less than significant |
| RLA | = | Reduced Land Acquisition | ○ | = | No impact |
| NA | = | No Action | + | = | Beneficial impact |
| ⊗ | = | Significant impact | N/A | = | Not applicable |
| ⦸ | = | Significant but mitigable to less than significant impact | | | |

- Loss of productive farmland;
- Impacts on scenic resources from facility and road construction;
- Aviation safety and increases in aviation training or helicopter use;
- Air quality and fugitive dust impacts on local populations;
- Noise impacts from ordnance use;
- Traffic impacts from SBCT-related military travel;
- Impacts from road construction and wear and tear on infrastructure from military use;
- Impacts on water supplies from water usage or soil contamination;
- Endangered and threatened species and critical habitat;
- Invasive species;
- Damage to cultural sites and the sacred nature of the land;
- Impacts on cultural practices or interference with access to the land;
- Remediation of hazardous materials;
- Superfund site cleanup;
- Impacts on wetlands from road construction;
- Wildfire risk from training activities;
- Public health effects from live-fire training;
- Impacts on schools as a result of increased personnel, noise, and fugitive dust; and
- Interference with communications and electronics from FTI antennas;
- Impacts relating to wastewater disposal from the tactical vehicle wash facilities;
- Increases in criminal activity locally from increased Army personnel and dependents; and
- Socioeconomic impacts on agriculture from loss of agricultural land.

## 5.2 LAND USE/RECREATION

### 5.2.1 Affected Environment

The land uses and recreational resources for SBMR/WAAF were identified by reviewing the installation master plans (Belt Collins 1993 and 1994), the state land use district designations (State of Hawai'i 2002a), the state designations for Agricultural Lands of Importance to the State of Hawai'i (State of Hawai'i 2002a), the City and County of Honolulu Land Use Ordinance zoning (City and County of Honolulu 2001), the Central O'ahu Sustainable Communities Plan (City and County of Honolulu 2002a), and the City and County of Honolulu Real Property Assessment Division data for Tax Map Key identifications and property boundaries (City and County of Honolulu 2003).

#### *Land Use*

*Schofield Barracks Military Reservation*

SBMR is the home station for the 25th ID(L) and USARHAW and is in the north-central area of O'ahu. It is on the plateau between the Ko'olau Mountain Range and the Wai'anae Mountain Range (Figure 5-1). SBMR consists of the Main Post and SBER.

*Main Post*

The Main Post is in central O'ahu and covers over 11,448 acres (4,633 hectares) of land. It shares boundaries with Kamehameha Highway and Wahiawa to the east, private agriculture land to the north and south, and WAAF to the southeast. The Main Post includes the cantonment area, maneuver training areas and ranges, impact areas, and areas unsuitable for maneuver. The cantonment area consists of 1,605 acres (650 hectares) and contains housing, operational facilities, warehouses, training areas, and community services and facilities (including a golf course) (Belt Collins 1993). The land designated to support maneuver training consists of 1,235 acres (500 hectares), and 1,506 acres (609 hectares) are designated to support ranges and indirect fire activities (Nakata Planning Group, LLC 2002a). The 2,780-acre (1,125-hectare) ordnance impact area is in the western portion of the Main Post.

The installation master plan identified land uses within the Main Post project areas, as shown on Figure 5-2 and listed in Table 5-3 (Belt Collins 1993). Current land uses at the Main Post are generally consistent with planned land uses, which include training, supply/storage, outdoor recreation, operations, and housing (Belt Collins 1993). The Main Post includes lands within the state-designated Urban, Agricultural, and Conservation Districts (Figure 5-3; State of Hawai'i 2002a). The mountainous areas of the Main Post are within the Conservation District Resource and Protective Subzones. The objectives of these subzones are defined in Table 5-4. Although the state ALISH map (Figure 5-4) shows Prime and Other agricultural lands at the Main Post, these lands are actually used for training, including ranges and the ordnance impact area. The City and County of Honolulu zoning for the urban and lower training areas of Main Post is F-1 Military and the mountainous areas are P-1 Restricted (City and County of Honolulu 2001).

**Figure 5-1**
Land Use at Schofield Barracks Military Reservation

**Figure 5-2**
Existing Land Use at Schofield Barracks Main Post

**Figure 5-3**
State Land Use District Map Schofield Barracks Military Reservation

**Figure 5-4**
Agricultural Lands of Importance to the State of Hawai'i Schofield Barracks Military Reservation

**Table 5-3**
**Main Post Project Areas and Land Uses**

| Project Title | Existing Land Use |
|---|---|
| UACTF | Training: current MOUT assault course and impact area |
| VFTF | Cantonment: supply/storage |
| Range control facility | Training: includes existing structures |
| BAX | Training: range complex and impact area |
| FTI | |
| Kolekole | Conservation District - Limited Subzone |
| Mount Kaʻala East | Conservation District - Protective Subzone |
| Mount Kaʻala West | Conservation District - Protective Subzone |
| MSTF/ISF, Schofield 1 | Cantonment |
| Schofield 2 | Conservation buffer |
| West Range MF201 | Training: McCarthy Flats range |
| West Range MF501 | Training: McCarthy Flats range |
| QTR1 | Training: ranges and impact area |
| Motor pool maintenance shops (new water tank) | Training |

Source: Belt Collins 1993

**Table 5-4**
**Conservation District Subzones at Main Post**

| Conservation District Subzone | Subzone Objective |
|---|---|
| Protective | Protect valuable resources in designated areas such as restricted watersheds, marine, plant, and wildlife sanctuaries, significant historic, archaeological, geological, and volcanological features and sites, and other designated unique areas. |
| Limited | Limit uses where natural conditions suggest constraints on human activities. |
| Resource | Develop, with proper management, areas to ensure sustained use of the area's natural resources. |

Source: State of Hawaiʻi 2002a

Recreation opportunities at the Main Post include the 18-hole Kalākaua golf course, archery, skeet shooting, and hiking (R. M. Towill Corp. 1997a). Recreational archery tournaments are occasionally held by the Army Archery Club behind Computer Range 2 Alpha on Pistol Range 3 (between the project areas for the Range Control Facility and the BAX). The Army Rod and Gun Club has permission for skeet shooting in the South Range Area 5.

Hiking trails on the Main Post include the 2-mile (3-kilometer) Puʻu Hāpapa (Kolekole) Trail, and the 2.5-mile (4-kilometer) Puʻu Kalena Trail, all of which the Army manages (R. M. Towill Corp. 1997a). Public access to these trails is restricted, and a biologist or botanist must accompany hikers on these trails, due to the environmental sensitivity of the areas. Permits are required from both Army Department of Public Works (DPW) Real Property and DPW Environmental. Hikers wanting to access the portion of the Puʻu Hāpapa Trail beyond the summit are required to obtain permission from TNC and the Estate of James Campbell.

There are no hunting areas at the Main Post (Char 2002).

*Schofield Barracks East Range*

SBER is east of the Main Post and extends up into the Koʻolau Mountain Range. The 5,154-acre (2,086-hectare) SBER includes 2,223 acres (900 hectares) of maneuver training land (Nakata Planning Group LLC 2002a). SBER is primarily used for infantry training and maneuvers. Training activities at SBER include rappelling, jungle survival, patrolling operations, air assault and airborne operations, and limited battalion and company-level ARTEP missions. No live-fire exercises are conducted at SBER. Other facilities at SBER include education facilities, the light infantry training command, a golf course, the US Army Non-Commissioned Officers Academy, warehouses, and a maintenance facility (USARHAW and 25th ID [L] 2001a). Other units of the Army and the Marines use SBER for similar training.

The installation master plan identified land uses within SBER project areas, as shown on Figure 5-5 and as listed in Table 5-5 (Belt Collins 1993). The master plan shows training land at SBER to considerably decrease in the long-term land use plan (Figure 5-5; Belt Collins 1993). SBER includes land within the state-designated Agricultural and Conservation Districts (Figure 5-6; State of Hawaiʻi 2002a). The training areas at SBER are within the Conservation District Resource and Protective Subzones (as described in Table 5-4).

Recreation opportunities at SBER include the 18-hole Leilehua golf course and hiking (R. M. Towill Corp. 1997a). The Schofield-Waikāne Trail is owned and managed by the state and the Army. This 3.5-mile- (6-kilometer) long trail extends along most of the northern boundary of SBER and ends on the Koʻolau Mountain Ridge. Written permission is required from Range Control to access Schofield-Waikāne Trail, as well as a permit from Army Support Command (Nā Ala Hele 2003).

**Table 5-5**
**SBER Project Areas and Land Uses**

| SBCT Project Title | Existing Land Use |
|---|---|
| Tactical Vehicle Wash | Supply/storage and conservation/buffer |
| FTI | |
| East Range 1 | Training |
| East Range 2 | Training |

Source: Belt Collins 1993

**Figure 5-5**
Existing Land Use at Schofield Barracks East Range

**Figure 5-6**
Master Plan Long Term Land Use at Schofield Barracks East Range

There are no hunting or fishing areas at SBER (Char 2002).

### *Wheeler Army Airfield*

WAAF, a subinstallation of SBMR, is southeast of SBMR across Kunia Road. WAAF provides administration, housing, maintenance, training, and flight facilities for peacetime mission requirements, including security and law enforcement support. The 1,369 acres (554 hectares) of WAAF consist of mostly developed areas. The undeveloped land designated for maneuver training consists of 494 acres (200 hectares) of gulches that support the smallest maneuver elements (Nakata Planning Group, LLC 2002a).

The installation master plan identified land uses in the WAAF project areas as shown on Figure 5-7 and listed in Table 5-6 (Belt Collins 1994). Current land uses are consistent with planned land uses in the project areas, which include operations/airfield, supply/storage, and training. The future land use plan indicates increased development with the addition of maintenance facilities located directly south of the western end of the airfield near one of the MDF sites (Figure 5-8; Belt Collins 1994). The other MDF site, an ammunition storage point, is in an existing ammunition supply storage area. WAAF includes lands within the state-designated Urban and Agricultural Districts (Figure 5-3; State of Hawai'i 2002a).

**Table 5-6**
**WAAF Project Areas and Land Uses**

| Project Title | Existing Land Use |
|---|---|
| Multiple Deployment Facility – both sites | Operations/airfield (abandoned airstrip), supply/storage, and training. |
| Upgrade Wheeler Airfield | Operations/airfield |

Sources: Belt Collins 1994

WAAF is not included in the Outdoor Recreation Plan Report for US Army Training Areas in Hawai'i, and no state hunting or hiking areas were identified in the State Department of Land and Natural Resources literature. The existing land use plan indicates outdoor recreation areas at WAAF that are outside the project areas (Figure 5-7).

### *South Range Acquisition Area*

The SRAA is immediately south of the Main Post, and land uses in the project areas are listed in Table 5-7. Under the Proposed Action, the acquisition area would consist of approximately 1,402 acres (561 hectares); under the RLA Alternative, the acquisition area would consist of approximately 100 acres (40.5 hectares). The SRAA is currently used for pineapple agriculture. The Proposed Action configuration also encompasses approximately 100 acres (40.5 hectares) of Forest Reserve land, which is included in the Honouliuli Preserve, a 3,962-acre (1,603-hectare) forest area managed by TNC since 1990.

**Figure 5-7**
Existing Land Use at Wheeler Army Airfield

**Figure 5-8**
Master Plan Long Term Land Use at Wheeler Army Airfield

**Table 5-7**
**SRAA Projects and Land Uses**

| Project Title | Existing Land Use |
|---|---|
| SRAA[1] | Pineapple agriculture and forest reserve |
| QTR2[2] | Pineapple agriculture |

[1]The Proposed Action SRAA consists of 1,402 acres (561 hectares), while the RLA SRAA consists of 100 acres (40.5 hectares).

[2]Construction and use of QTR2 on the SRAA is included in the Proposed Action only, and is not included in the RLA.

Source: City and County of Honolulu 2003

The SRAA includes land within the state-designated Agricultural District, and the Proposed Action configuration includes land within the Conservation District Resource Subzone (State of Hawai'i 2002a). The ALISH map (Figure 5-4) shows the SRAA as containing state-designated Unique and Other agricultural lands.

The Proposed Action configuration of the SRAA includes approximately 100 acres (40.5 hectares) of Forest Reserve land currently available for intensive natural resource management and hiking (Figure 5-1). Two segments of the Contour Trail are included in the Proposed Action configuration of the SRAA. This trail is open for monthly interpretive organized hikes and access to TNC work areas (LaPierre 2002).

#### *Helemanō Trail*
Helemanō Trail would connect the Main Post with an HMR access road (Pa'ala'a Uka Pūpūkea Road). The trail alignment uses existing agricultural roads (USGS 1999a). The trail alignment is in an Agricultural District and the ALISH map shows the land as state-designated Prime and Other agricultural land (Figure 5-4 State of Hawai'i 2002a). The Central O'ahu Sustainable Communities Plan also shows the trail alignment in agricultural land (City and County of Honolulu 2002a). Once constructed, the trail would be joint use. The Army would coordinate with land owners to minimize impacts on agricultural operations.

### ***Ownership***

#### *Main Post*
The federal government owns most of the Main Post, which includes a few state-owned parcels. Figure 5-9 shows the land parcels, and Table 5-8 lists Tax Map Keys of the affected land parcels and the associated landowners and lessees.

#### *Schofield Barracks East Range*
The SBER land, shown on Figure 5-9 (Tax Map Key 76001001), is owned by the federal government (City and County of Honolulu 2003).

**Figure 5-9**
Affected Parcels Map Schofield Barracks Military Reservation

**Table 5-8**
**Main Post Landowners and Lessees**

| Tax Map Key | Landowner (Lessee) |
|---|---|
| **Main Post** | |
| 73010002 | United States of America |
| 73011002 | United States of America |
| 77001001 | United States of America |
| 77001002 | State of Hawaiʻi |
| 77001003 | State of Hawaiʻi |
| 77001004 | United States of America |
| 77001005 | United States of America (First Hawaiian Bank); parcel location not provided |
| 77001007 | United States of America (State of Hawaiʻi) |
| 77001008 | United States of America (GTE Hawaiian Telephone Co.); parcel location not provided |
| 77001009 | United States of America (Central Oʻahu Community Federal Credit Union); parcel location not provided |
| **Antenna Locations outside of Main Post**[1] | |
| Kolekole | |
| 88001001 | United States of America (Naval Ammunition Depot Lualualei) |
| Mount Kaʻala West | |
| 84002065 | State of Hawaiʻi |

Source: City and County of Honolulu 2003

[1]Locations of these FTI sites outside of Main Post are shown on Figure 2-7.

### *Wheeler Army Airfield*

The federal government owns most of WAAF. Figure 5-9 shows the land parcels, and Table 5-9 lists Tax Map Keys (as defined in Chapter 3) of the affected land parcels and the associated landowners and lessees.

**Table 5-9**
**WAAF Landowners and Lessees**

| Tax Map Key | Landowner (Lessee) |
|---|---|
| 77001001 | United States of America |
| 77001002 | State of Hawaiʻi |
| 94012008 | United States of America |

Source: City and County of Honolulu 2003

### *South Range Acquisition Area*

There are two configurations of the SRAA, one for the Proposed Action and one for the RLA Alternative. Land parcels for both configurations are shown on Figure 5-9, and Table 5-10 lists Tax Map Keys (defined in Chapter 3) of the affected land parcels and the associated landowners and lessees.

**Table 5-10**
**SRAA Landowners and Lessees**

| Tax Map Key | Landowner (Lessee) |
|---|---|
| **Proposed Action** | |
| 92005002 | James Campbell Trust Estate (Del Monte Corp.) (portion of parcel) |
| 92005004 | James Campbell Trust Estate (Del Monte Corp.) |
| 92005013 | James Campbell Trust Estate (portion of parcel) |
| **Reduced Land Acquisition** | |
| 92005002 | James Campbell Trust Estate (Del Monte Corp.) (portions of parcel) |

Source: City and County of Honolulu 2003

### *Helemanō Trail*

The federal government, Dole Food Co., Inc., and the George Galbraith Trust Estate own the land for the proposed Helemanō Trail. Affected parcels are shown on Figure 5-9, and associated landowners and lessees are listed in Table 5-11.

**Table 5-11**
**Helemanō Trail Landowners and Lessees**

| Tax Map Key | Landowner (Lessee) |
|---|---|
| 64003001 | Dole Food Co., Inc. |
| 65002001 | Dole Food Co., Inc. (Wahiawā Water Co., Inc.) |
| 65002010 | George Galbraith Trust Est.; Hawaiian Trust Co., Ltd-Trustee (Del Monte Fresh Produce) |
| 65002025 | George Galbraith Trust Est.; Hawaiian Trust Co., Ltd-Trustee (Del Monte Fresh Produce) |
| 71001002 | George Galbraith Trust Est.; Hawaiian Trust Co., Ltd-Trustee (Del Monte Fresh Produce) |
| 71001003 | George Galbraith Trust Est.; Hawaiian Trust Co., Ltd-Trustee (Del Monte Fresh Produce) |
| 71001022 | George Galbraith Trust Est.; Hawaiian Trust Co., Ltd-Trustee (Wahiawa Water Co., Inc.) |

Source: City and County of Honolulu 2003

## *Surrounding Land Use*

### *Main Post*

Land uses surrounding the Main Post include agriculture, forest, urban, and military. Land north of the Main Post is used for agriculture and the Ka‘ala Natural Area Reserve (Figure 5-1). The Ka‘ala Natural Area Reserve is located on the highest point on O‘ahu. The reserve can be accessed from the Waiʻanae area on the western side of the island; however, the area is not open to the public and volunteers must be accompanied by the reserve_manager (DLNR 2003a). The town of Wahiawā is located east of the Main Post, with WAAF to the southeast. Land to the south of the Main Post includes the military's Field Station Kunia, Del Monte pineapple fields, and the Honouliuli Preserve, which TNC manages as a refuge for rare and endangered plants and animals. TNC leads monthly interpretive hikes in the preserve. Land uses to the west of the Main Post include Naval Magazine Pearl Harbor Lualualei Branch and the Waiʻanae Kai Forest Reserve, which includes a remnant native forest (DLNR 2003b).

Table 5-12 presents conditions associated with the hunting area northwest of the Main Post in the Waiʻanae Mountains (Figure 5-10).

#### *Schofield Barracks East Range*

Land uses surrounding SBER include urban, military, forest, and agriculture. The town of Wahiawā is situated along the northwestern border of SBER and includes Wahiawā Intermediate School, Leilehua High School, and Wahiawā State Freshwater Park (Figure 5-1). The Wahiawā State Freshwater Park includes Lake Wilson, the largest freshwater sport fishery in the state (DLNR 2003c). KLOA is located along the northeastern border and includes the ʻEwa Forest Reserve. The eastern slope of the Koʻolau Mountain Range and the Ahupuaʻa O Kahana State Park are to the east of SBER. The Ahupuaʻa O Kahana State Park (formerly Kahana Valley State Park) was established as a living park with the primary purpose to nurture and foster Native Hawaiian culture and spread knowledge of its values and ways (DLNR 2003d). Land south of SBER includes forest, agricultural lands, and Mililani Town.

Table 5-12 presents conditions associated with the hunting area north of SBER, in the ʻEwa Forest Reserve (Figure 5-10).

#### *Wheeler Army Airfield*

Land uses surrounding the project areas on WAAF include open space/conservation, utilities, storage/supply, and agriculture. Land uses surrounding WAAF include urban, military and agriculture. Urban areas include the town of Wahiawā to the north and Mililani town to the east-southeast of WAAF. Military facilities include the Main Post and Field Station Kunia to the west of WAAF and SBER to the east of WAAF. Land to the south of WAAF is used for agriculture.

#### *South Range Acquisition Area*

Land uses surrounding the SRAA include military, agriculture, and forest. Surrounding military land uses include the Main Post to the north and Field Station Kunia and WAAF to the east (Figure 5-1). Land to the south is used for pineapple agriculture. The forest reserve land to the west of the acquisition area is part of the Honouliuli Preserve. Farther west, beyond the forest reserve is Naval Magazine Pearl Harbor Lualualei Branch.

**Figure 5-10**
Hawai'i State Hunting Areas

**Table 5-12**
**Hunting Near the Main Post and SBER**

| Conditions | Near the Main Post | Near SBER |
|---|---|---|
| Game to be taken | Wild pigs and wild goats | |
| Permitted hunting methods | Rifles, shotguns, handguns, knives, spears, bows and arrows; dogs permitted but must be kept under physical restraint and control, except when actually hunting. | |
| Open hunting periods | February through April, archery only; May through July, firearms; August through October, use of dogs permitted. | Year-round |
| Open hunting days | Daily | Saturdays, Sundays, and state holidays |
| Special conditions and restrictions | Access through military land subject to military activities. | |
| Hunters | Persons who have the appropriate hunting licenses, tags, permits, or permit tags on their persons and who have signed in at the state hunter checking station. | |

Source: DLNR 1999a

*Helemanō Trail*
Land surrounding the Helemanō Trail alignment is military (the Main Post) and agricultural.

### *Surrounding Land Ownership*

*Main Post*
Owners of land surrounding the Main Post include Dole Food Co. Inc., Theodore J. P. Lopez Trust, George Galbraith Trust, State of Hawai'i, United States of America, and the Estate of James Campbell.

*Schofield Barracks East Range*
Owners of land surrounding SBER include the State of Hawai'i, the Department of the Interior O'ahu Forest National Wildlife Refuge, Castle & Cooke, Inc., the United States of America, and various landowners in Wahiawā town.

*Wheeler Army Airfield*
The United States of America owns most of the land surrounding WAAF. The land to the north is owned by various landowners in Wahiawā, and the land to the south is owned by the State of Hawai'i.

*South Range Acquisition Area*
Owners of land surrounding the Proposed Action configuration of the SRAA include the United States of America to the north, the State of Hawai'i to the east, and the Estate of James Campbell to the south. Owners of land surrounding the RLA configuration of the

SRAA include the United States of America to the north, the State of Hawai'i to the east, and the Estate of James Campbell.

*Helemanō Trail*

Owners of land surrounding the proposed Helemanō Trail are the same as those listed in Table 5-11.

### 5.2.2 Environmental Consequences

#### *Summary of Impacts*

Table 5-13 provides a summary of impacts associated with land use and recreation at SBMR. Significant but mitigable to less than significant impacts on land use occur with respect to access to the Honouliuli Preserve. Less than significant impacts on land use would occur under conversion of agricultural land to training land, construction of FTI sites in a Conservation District, during the temporary construction of the projects, and due to SBCT training on lands currently used for training. There would be no impacts under No Action.

**Table 5-13**
**Summary of Potential Land Use/Recreation Impacts at SBMR/WAAF**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Conversion of agricultural land to training land | ⊙ | ⊙ | ○ |
| Impacts on natural resources management and recreational land use | ⃠ | ○ | ○ |
| Construction of FTI in a Conservation District | ⊙ | ⊙ | ○ |
| Impacts on land use during construction activities | ⊙ | ⊙ | ○ |
| SBCT training on lands currently used for current force training | ⊙ | ⊙ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | |
|---|---|---|---|
| ⊗ = Significant | | + | = Beneficial impact |
| ⃠ = Significant but mitigable to less than significant | | N/A | = Not applicable |
| ⊙ = Less than significant | | | |
| ○ = No impact | | | |

#### *Proposed Action (Preferred Alternative)*

Environmental impacts discussed in this section are the result of the construction and operation of new training areas and ranges, the acquisition of additional land, and additional training associated with SBCT.

### Significant Impacts Mitigable to Less than Significant

*Impact 1: Impacts on natural resources management and recreational land use.* Approximately 100 acres (40.5 hectares) within the SRAA are part of the TNC-managed lands, which are available for intensive natural resource management and hiking. As initially designed and portrayed in the Draft EIS, training on and operation of the proposed QTR2 on the SRAA would have affected land use within a portion of the Honouliuli Preserve.

*Additional Mitigation 1:* The Army reoriented QTR2 so that the SDZ would no longer affect any lands within the Honouliuli Preserve.

The Army will implement the following:

- Grant TNC personnel and TNC-sponsored personnel daily controlled access to the TNC-managed lands, along a route to be determined by the Army, in consultation with TNC for as long as TNC has a legal right to use of the affected property for conservation/stewardship purposes;
- Develop and implement access controls to ensure the safety of all personnel;
- Receive notification from TNC before it enters Army lands;
- Notify TNC of any unusual activities that may present or appear to present a danger to TNC personnel in the area; and
- Post signs on the boundary to prevent unauthorized use/trespass.

### Less Than Significant Impacts

*Conversion of agricultural land to training land.* The additional 1,402-acre (561-hectare) SRAA would be used for constructing roadway easements, new motor pool facilities and QTR2, control of the Clear Zone and APZ Number One for WAAF, and general SBCT training. The proposed acquisition would convert approximately 535 acres (217 hectares) of cultivated pineapple land to training land. Under the Proposed Action, military activities, training and restriction areas would be confined within the SRAA boundaries and would not affect land use outside of the SRAA. The acquisition area would serve as an additional buffer to the existing training lands, including the range impact area.

The proposed training use of agricultural land at SRAA is not consistent with the land use set forth in the Hawai'i State Plan (HDBEDT 1991), the Central O'ahu Sustainable Communities Plan (City and County of Honolulu 2002a), and the City and County of Honolulu Land Use Ordinance zoning (City and County of Honolulu 2001). However, the use of disturbed areas (agricultural fields and roads) would not change from pedestrian and vehicle transportation. The ITAM program would be used to identify and mitigate potential impacts on the land.

The Army coordinated this conversion with NRCS in light of the objectives and guidelines of the Farmland Protection Policy Act. The estimated 535 acres (217 hectares) of cultivated pineapple land is 0.67 percent of the total USDA-designated agricultural land on O'ahu and 2.8 percent of the total area in pineapple production in the state (USDA 2004). In addition, this land is adjacent to existing urban areas and support services, will not result in the indirect conversion of existing farmland or farm support services off-site (i.e. irrigation systems), and will not jeopardize the farm support services on remaining areas. Therefore the impact of this conversion to overall land use is considered less than significant.

The Army is considering establishing a cooperative relationship with the landowner and lessee to allow continued agricultural use in conjunction with training on the land, subject to constraints posed by training activities.

*Construction of FTI in a Conservation District*. Construction of three antennas outside of SBMR would affect minimal areas within the Conservation District. Neither of the Mount Ka'ala antenna locations is within the Ka'ala Natural Area Reserve. New antenna facilities would reuse existing sites, where possible, and when these are not available, the new antennas would be constructed on relatively small areas (500 square feet [46.45 square meters]). New facilities will also be located, where possible, close to existing access roads or trails. Both existing and new antenna locations will be sited, painted, and landscaped to minimize their impacts on surrounding areas and users. As required in a Conservation District, endemic or indigenous plants will be used to renaturalize project areas where natural vegetation plant cover has been disturbed. Construction would be scheduled, where possible, to minimize conflicts with recreation activities. In addition, antenna sites are available for emergency efforts for aiding or rescuing stranded or lost hikers and hunters.

*Impacts on land use during construction activities.* Land uses may be affected due to construction activities. This action would have short-term, less than significant impacts, limited to the localized and temporary nature of construction activities.

*SBCT training on lands currently used forcurrent force training*. Most of the land area within SBMR that would be used for general SBCT training is currently being used for training. The primary land use difference between current training and SBCT training is the introduction of the Stryker vehicle. This would result in the land being more intensively used under the Proposed Action. On the SRAA, the Stryker would use only the existing agricultural roads for driving between locations. To prevent land degradation and to allow for the continued use of training lands, the Army incorporates all training lands into its ITAM program.

### Reduced Land Acquisition Alternative

#### Less Than Significant Impacts

The less than significant impacts associated with the RLA Alternative are similar to those described for the Proposed Action.

*Conversion of agricultural land to training land.* The 100-acre (40.5 hectare) SRAA would be used for constructing a new motor pool and related infrastructure. The proposed acquisition would convert approximately 98 acres (39.7 hectares) of actively cultivated pineapple land to training land. Under the RLA Alternative, the entire SRAA would be used for construction and use of a motor pool; none of the area would be available for continued agriculture, and conversion of the land would be a permanent land use change. The ITAM program would be used to identify and mitigate potential impacts on the land. The Army coordinated this conversion with NRCS in light of objectives and guidelines of the Farmland Protection

Policy Act. The estimated 98 acres (39.7 hectares) of cultivated pineapple land is 0.1 percent of the total USDA-designated agricultural land on O'ahu and is 0.5 percent of the total area in pineapple production in the state (USDA 2004). As with the Proposed Action, this land is adjacent to existing urban areas and support services, will not result in the indirect conversion of any existing farmland or farm support services off-site, and will not jeopardize the farm support services on remaining areas. Therefore, the impact of this conversion to overall land use is less than significant.

*Construction of FTI in a Conservation District*. Impacts from constructing the FTI would be the same as those for the Proposed Action.

*Land use during construction.* Impacts on land use during construction would be the same as those for the Proposed Action, except QTR2 would be constructed on PTA instead of SRAA.

*SBCT training on lands currently used for training*. The training impacts associated with the RLA Alternative are identical to those described for the Proposed Action, except for training on the SRAA, where the Stryker would not maneuver in the acquisition area but would only be parked and maintained at the motor pool facilities.

*No Impacts*

*Impacts on natural resources management and recreational land use.* Under the RLA Alternative, the access to natural resources management and recreation resources, including TNC access to the Honouliuli Preserve, would not change from the current conditions.

### No Action Alternative

*No Impacts*

Under No Action, transformation would not occur, so no major changes to training areas would take place in Hawai'i. The Army would continue to operate and maintain its range, training areas, and support facilities in order to meet its current force training mission requirement. However, the level of training would change occasionally in response to this requirement, and as a result, the land uses of these areas may change. If future changes could affect the environment, NEPA documentation would be prepared.

## 5.3 VISUAL RESOURCES

### 5.3.1 Affected Environment

The ROI includes all areas within the line of sight of all proposed SBCT activities or changes at SBMR. Because SBCT activities at SBMR would be within or adjacent to the lands there, the ROI is limited to areas on the installation, adjacent valley areas, and adjacent forest preserve areas. Within the ROI are areas of high population density (Wahiawā) and major roadways (Kunia Drive, Wilikina Drive, and Kaukonahua Highway).

SBMR is within the planning area of the Central O'ahu Sustainable Communities Plan of the General Plan for the City and County of Honolulu. The Central O'ahu Sustainable Communities Plan states that visual landmarks and significant vistas should be preserved and that for lands designated as military in the planning area, including SBMR, "the visibility of security fencing and utilitarian military facilities from off-base should be minimized through the planting of a landscape screen, consisting of trees and hedges, along highway frontages" (City and County of Honolulu 2000b, 3-77).

#### *Landscape Character*

*Schofield Barracks Military Reservation*

The visual landscape on SBMR is largely characterized by developed features in the valley, with the rugged Wai'anae and Ko'olau Mountains dominating the background.

The western portion of SBMR, where proposed SBCT development would occur, is devoted to military training activities (Belt Collins 1993, IV-33). This area extends from the valley floor into the rugged portions of the Wai'anae Range. This area has been highly modified to support training and includes scattered structures, roads, and other support facilities. It is devoid of vegetation in large areas, while other areas consist of mixed grassland, low shrubs, and trees that have a random arrangement, a coarser texture and an overall pattern of subtle color variation. This area is bounded on the east by the developed urban features of the cantonment area, including housing and administrative, maintenance, and supply facilities. The area is heavily disturbed but from a distance it provides little contrast with the surrounding area. Although this area offers panoramic views of the surrounding mountains, the overall visual quality of the areas proposed for development is low due to extensive modification to the landscape.

The Wai'anae and Ko'olau Ranges are distinct background features in all views. Notable landforms found in the Wai'anae Range include Pu'u Kānehoa, Pu'u Hāpapa, Maunauna, Pu'u Kūmakali'i, Pu'u Kalena, and Pu'u Pane. These features have rugged angular forms, and, because they are nearby and steeply sloping, they dominate the view from the valley below. The pu'u and ridges of the Ko'olau Range are background features to the east and are visually similar to the Wai'anae Range; however, the Ko'olau Range is at a greater distance from SBMR, and most of the visual detail is lost.

Lands surrounding SBMR are also highly developed. Buildings, roads, agricultural features, power lines, and other human-made features associated with Wahiawā or other developments are dominant features in the foreground and middle ground views. Pineapple plantations occupy most of the surrounding valley, including lands south of the installation, where proposed expansion and development would occur, and give the landscape a fine uniform texture due to a lack of variation. Agricultural roads through the area expose dark red soil, creating visually distinct lines that draw the eye across the valley and up toward the sky or surrounding mountains.

### *South Range Acquisition Area*

The SRAA is mostly in agricultural production and is characterized by a series of vegetated terraces transected by several drainage courses. These terraces typically include a series of parallel roads, between which are planted rows of pineapples. The visual characteristics of these areas are rather muted, as there is no significant visual change throughout. The drainage courses typically meander, vary in width and depth, and contain varying degrees of vegetative cover. This vegetation cover extends out toward the periphery of the area in various locations. Terrain and vegetation effectively screen most of the foreground and middle ground views. Slopes that transition into the surrounding mountains to the south and west dominate the remainder of this area. These slopes are generally covered with vegetation similar to that found in the areas below.

Views of the training area from surrounding areas are largely middle ground or background features that lack a high degree of detail. Most westerly views of the project area are completely or intermittently obstructed by vegetative screening. South of the installation, views are obstructed by topography. The ridges south of the installation offer more complete views of the proposed area of development but also may be intermittently affected by vegetation and topography, as well as by distance, depending on the viewing location.

### *Wheeler Army Airfield*

WAAF is characterized by urban development, including an aircraft runway and parking aprons, support structures, and other infrastructure. Landscape vegetation provides buffering between functional portions of the installation and provides extensive screening of views either into or out of the installation. Historic structures at WAAF are located in the historic district north of the runway (Belt Collins 1994, 4-71), within the viewshed of proposed SBCT modifications.

Predominantly developed features associated with the other units of SBMR and the town of Wahiawā characterize surrounding areas. The overall visual quality of WAAF is low.

### *Helemanō Trail*

The proposed Helemanō Trail would follow a route northeast from SBMR, across the broad rolling valley into the foothills of the Koʻolau Mountain Range. The trail would connect with Drum Road near HMR. Pineapple plantations occupy most of this area and their lack of variation gives the landscape a fine uniform texture. Roads through this area expose the dark red soil and create visually distinct lines that tend to draw the eye across the valley and up toward the sky or surrounding mountains. Although this area offers panoramic views of the Koʻolau and Waiʻanae Mountain Ranges and is unified in some cases by the consistency of the agricultural land use, the landscape where the trail would be constructed has been extensively modified, and, based on the criteria outlined in Section 4.3.1, the overall visual quality is considered to be moderate.

### *Sensitive Views*

Sensitive view locations on SBMR include recreational facilities along the southern boundary of the installation and adjacent to the proposed expansion, such as the Kalākaua Golf Course and Leader Field, and housing areas on the Main Post and along the southern boundary, adjacent to the SRAA.

The Central O'ahu Sustainable Communities Plan designates a number of sensitive views in the view shed of SBMR and Helemanō Trail, including the following:

- Westerly views from Kunia Road, between Kunia Drive and Kunia Army Station;
- Northerly views from Kamananui Road, between Kaukonahua Highway and Wilikina Drive; and
- Westerly views from Kaukonahua Highway, from the intersection with Wilikina Drive to Thompson Corner (City and County of Honolulu 2000b, A-14).

In addition, sensitive views may occur on surrounding preservation lands, including the Mount Ka'ala Natural Area Reserve to the north, the Wai'anae Kai Forest Reserve to the west, and the Nature Conservancy's Honouliuli Preserve to the south. Portions of the Contour Trail through the Honouliuli Preserve are open for organized hikes and for access to The Nature Conservancy work areas. Sensitive views at WAAF are limited to views from the historic district in the northern portion of the installation.

The North Shore Sustainable Communities Plan designates continuous scenic views along the Kamehameha Highway, between Hale'iwa and Waiale'e, and intermittent views on both sides of the Kamehameha Highway, between the Poamoho Stream channel and Hale'iwa (City and County of Honolulu 2000a, 3-15).

## 5.3.2 Environmental Consequences

### *Summary of Impacts*

Visual impacts related to the SBCT Transformation at SBMR vary, depending on location and the nature of the proposed change. A summary of impacts is found in Table 5-14. Significant but mitigable impacts would result from temporary impairment of some views during the construction phase of SBCT-related projects and from the alteration of the landscape character of the SRAA. Existing views throughout SBMR area would be less than significantly affected by SBCT-related training activities, changes in the configuration of range and training area facilities, or construction of other training or communication facilities.

**Table 5-14**
**Summary of Potential Visual Resources Impacts at SBMR/WAAF**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Impairment of view during the construction phase | ⦸ | ⦸ | ○ |
| Modification of existing view | ⦸ | ⦸ | ○ |
| Alteration of the landscape character | ⦸ | ⦸ | ○ |
| Consistency with visual resource policies | ⊙ | ⊙ | ○ |
| Impairment of views to visible fugitive dust | ⊙ | ⊙ | ○ |
| Alteration of nighttime light and glare | ⊙ | ⊙ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⦸ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
+ = Beneficial impact
N/A = Not applicable

Significant but mitigable impacts to existing views would occur as a result of construction of Helemanō Trail. The proposed Helemanō Trail would traverse a large area of open space and agricultural land. Although the proposed trail would not substantially alter the landscape due to previous disturbance and active agricultural use, it would result in significant but mitigable impacts to existing views along the route.

### *Proposed Action (Preferred Alternative)*

*Significant Impacts Mitigable to Less than Significant*

*Impact 1: Impairment of view during the construction phase.* Construction of SBCT-related projects in the SRAA and McCarthy Flats areas of SBMR (i.e., QTR1 and QTR2, the BAX, the UAC, a range control facility, and motor pool maintenance shops) would result in the temporary impairment of existing views from a number of locations in and adjacent to the installation. This impairment would result from a change in the general appearance of each of these areas due to the use of earth-moving equipment, the transportation and storage of materials on-site, the erection of temporary fencing and erosion-control measures, and the construction of new buildings and target systems at project sites. This temporary impact is considered significant but mitigable.

Portions of the southern perimeter of SBMR, particularly along Lyman Road, would be subject to the visual impacts associated with construction activities in the SRAA. Along Lyman Road, these impacts would occur primarily in either the foreground or middle ground area of each view. Vegetative cover limits the view of many areas of the proposed project site. Photo 5-1 depicts a view from the Lyman Road area. A significant portion of the foreground and middle ground view is not clearly visible at ground level. The proposed areas of SBCT-related construction on the site would remain hidden by the vegetation cover. Photo 5-2 depicts the view of the SRAA from Kalākaua Golf Course.

Photo 5-1. View of the SRAA from the intersection of Lyman Road and Kolekole Road looking south.

Photo 5-2. View of the SRAA from Kalākaua Golf Course looking southwest.

The view into the site from the east, particularly along Kunia Road, is screened by terrain in the foreground as depicted in Photo 5-3. The proposed SBCT-related project sites are beyond the area visible from the highway.

Certain other viewpoints in or around SBMR are either at a particular angle or elevated in comparison to the proposed project sites so as to render it impossible to screen all construction activity. Examples of these viewpoints include portions of Pu'u Kalena and Wai'anae Mountain Contour Trails to the west, especially near Kolekole Pass and points to the east, along Kamananui Road, Kaukonahua Highway and Wilikina Drive. Photo 5-4 depicts a view along the Pu‘u Kalena Trail. Vegetation and terrain tend to obscure much of these views. SBCT-related construction in the McCarthy Flats area, where visible, would be in the middle ground and background areas of the view and would be at such a distance that little detail would be discernable. Interceding terrain from this location would largely obstruct the SRAA, which lies further to the south.

Photo 5-3. View of the SRAA from Kunia Road looking northwest.

The viewpoints to the east of SBMR are in areas generally characterized by low rolling hills with low vegetative cover. A large portion of this area is in agricultural production. From certain viewing points in these areas, the visual impact would occur primarily in the middle ground area of the view. Photo 5-5 depicts such a view. As with the viewpoints to the west, the distance between these and the SBCT-related construction sites at McCarthy Flats is such that little detail would be discernable. Most construction would occur on land already occupied by training ranges. The background area of each of the documented views is typically dominated by the surrounding mountain ranges. No construction is planned in these areas, so little or no impact to that portion of the existing view is anticipated.

Photo 5-4. View of SBMR from the Pu‘u Kalena Trail in the Kolekole Pass Area looking northeast.

*Regulatory and Administrative Mitigation 1.* Existing natural features, including terrain and vegetative cover, will be conserved where practicable to screen the proposed project sites. Where practicable, permanent screening will be achieved with native tree and shrub plantings that complement existing natural and ornamental plantings, earthen berms that mimic the color and texture of the surrounding area, fencing designed to fit in with the surrounding area, or some combination of these measures in accordance with the Installation Exterior Architectural Plan.

Photo 5-5. View of SBMR from the Kaukonahua Highway and Wilikina Drive Area looking west.

*Additional Mitigation 1.* None identified.

*Impact 2: Alteration of landscape character.* SBMR can be characterized as a heavily developed landscape surrounded in part by a series of mountain ridges to the south, west, north, and at a greater distance to the east, as well as expansive plateau areas to the east. The areas within SBMR where projects are proposed are largely used for military purposes at present. Many of the proposed projects in the training area would replace existing facilities, while projects constructed in the cantonment area would be within areas of similar development. The projects would not significantly alter the character of these areas. The training exercises conducted on the training lands would expand their use, but are not considered a permanent change to the landscape. Construction projects in the SRAA are the only exception.

Construction of QTR2 and the motor pool maintenance shops would alter the landscape character of the SRAA. Current agricultural and open space land uses would be replaced in part by the proposed facilities. This impact would affect certain foreground and middle ground views from the Lyman Road corridor, the Kālakaua Golf Course, and adjacent housing areas (Photos 5-1 and 5-2). The new facilities would be constructed in the general proximity of existing training and maintenance functions on SBMR. These proposed facilities would be similar in character to other facilities already visible from the golf course and residential areas. They would replace primarily those areas currently under agricultural production, and would remain partially screened from view by existing site conditions (e.g., vegetation and terrain). The impact of the projects on the visual character of the SRAA would be significant but mitigable.

*Regulatory and Administrative Mitigation 2.* Existing site conditions will be enhanced where practicable to help screen SBCT-related projects from the surrounding area. Where practicable, mitigation measures will be designed to complement the existing view. Existing natural features, including terrain and vegetative cover, will be conserved where practicable. Screening will be constructed of materials that mimic the color and/or texture of the surrounding area where practicable. Where practicable, USARHAW will use tree and shrub plantings that complement existing natural and ornamental plantings, earthen berms that mimic the color and texture of the surrounding area, and fencing materials designed to fit in with the surrounding area, or some combination of these measures in accordance with the Installation Exterior Architectural Plan.

*Additional Mitigation 2.* None identified.

*Impact 3: Modification of the existing views—Construction of Helemanō Trail.* Although the proposed Helemanō Trail would be within an area disturbed by agricultural practices and containing a number of existing agricultural roads, the trail would be visible from a number of major roadways and from portions of these roadways that are designated as scenic.

Segment one of the trail from SBMR to Wilikina Drive would be visible from Wilikina Drive looking west (Photo 5-6). Although Wilikina Drive is a highly traveled route, this section is not designated as a scenic view. The foreground is heavily disturbed by agricultural use while the middle ground view is predominantly of SBMR or vegetation. Based on the criteria

Photo 5-6. View from Kaukonahua Highway looking northeast.

outlined in Section 4.3.1, the visual sensitivity along this segment of the trail is considered low. Construction of the trail in this segment would follow the western side of the Kaukonahua Stream channel, along the margin between the natural vegetation of the channel and the agricultural area. The impact on views along this segment of the trail would be minor.

Segment two of the trail from Wilikina Drive to Kamehameha Highway would be visible from Wilikina Drive looking northeast, Kaukonahua Highway looking southwest and northeast (Photo 5-7), and Kamehameha Highway looking southwest (Photo 5-8). The views from Kamehameha Highway are designated as scenic. Although the foreground and middleground views from these locations have been altered by agricultural practices, this area is considered to be of medium sensitivity due to the expansive views and the scenic view designations. The impact on views along this segment of the trail would be moderate to substantial.

Segment three of the trail from its intersection with Kamehameha Highway to HMR would be visible to the east and west of Kamehameha Highway (similar to the view shown in Photo 5-8). These views from Kamehameha Highway are designated as intermittently scenic. As described for previous segments, the foreground and middleground views from the Kamehameha Highway have been altered by agricultural practices. This area is considered to be of medium sensitivity due to the expansive views and the scenic designations. Because the trail would be constructed adjacent to the Kamehameha Highway, the duration and level of impact on the view by motorists traveling along the highway would be extended. The impact on views along this segment of the trail would be substantial.

Photo 5-7. View from Wilikina Drive looking west.

Photo 5-8. View from Kamehameha Highway looking southwest.

*Regulatory and Administrative Mitigation 3.* None identified.

*Additional Mitigation 3.* The Army proposes to construct military vehicle trails to conserve existing natural features, including terrain and vegetative cover, to the extent practicable. Use of roadbed materials that contrast sharply with existing conditions will be avoided to the extent practicable. To avoid creating a discordant linear feature, the road alignment would, where possible, follow the natural contours of the land. Cut slopes would be minimized or avoided, where practicable. Cut slopes would be blended into the landscape by rounding the edges of the slope, differential orientation of the slope and the road bed alignments where practicable. Use of these techniques would be varied based on the specific conditions, including depth of the cut, orientation of the slope, and type of material (e.g., dirt slope and rock slope).

### *Less than Significant Impacts*

*Modification of the existing view.* SBMR is a significant visual entity within the central Oʻahu area. The physical setting of the installation and the various military training activities thereon directly affect the visual quality of the surrounding area. Views of the installation vary immensely, depending on the vantage point of the viewer. Any combination of factors, including terrain, vegetation, weather conditions and/or human-made obstacles, could either help frame or obstruct the view. The following discussion describes the visual impacts resulting from SBCT-related projects in each of the different areas of the installation.

The primary viewing points into the SRAA are along Lyman Road to the north, along Kunia Road to the southeast, and from portions of the Waiʻanae Mountain Contour Trail above the site. Except for the background view, which is dominated by the upper slopes of the Wai'anae Range, views from Lyman Road are generally restricted by vegetation in the foreground area. The view into the area from Kunia Road is generally restricted to the foreground and upper portions of the background view. Those areas of the SRAA where the SBCT-related projects are proposed are not visible from Kunia Road due to interceding terrain. Views from the Wai'anae Mountain Contour Trail are sporadic due to terrain and vegetation screening and generally are at such a distance that specific site details are poorly discernable. Two SBCT-related projects, the QTR2 and the motor pool maintenance shops, would be constructed on portions of the site currently in agricultural production. Because the proposed SBCT-related projects would be constructed on agricultural land, in areas adjacent to other developed portions of SBMR, these would be effectively screened by existing site conditions.

Those areas of McCarthy Flats where SBCT-related projects are proposed are generally found on the lower slopes and would replace facilities already there. The views into these areas, from viewing points primarily along Wilikina and Kaukonahua Roads to the east and the Kolekole Pass area to the west, are at such a distance that little detail is discernable. From the east, many of the lower slopes of McCarthy Flats are hidden by the trees bordering Kaukonahua Stream that define the eastern edge of the area (Photo 5-5). From the west, the viewpoints tend to be elevated, so the viewer is looking down and across the area. In such cases, the views of McCarthy Flats are obstructed by vegetation. Because QTR1, the BAX, and the UACTF are replacing existing training ranges, little impact to the view from these areas is anticipated.

Additional construction within or adjacent to the cantonment area of SBMR would occur in the lower sloping portion of the installation and within or adjacent to similarly developed areas. These facilities would be visible from Trimble Road and surrounding residential areas but would be constructed in an area of mixed use in which they would not have a significant visual impact. These facilities would not be visible from sensitive view points adjacent to SBMR due to terrain, vegetation, and screening around the perimeter of SBMR (Photos 5-3 and 5-5). The facilities may be nominally visible from the Wai'anae Mountain Contour Trail, but, as discussed above, the facilities would not be visually distinct or discernable from this area (Photo 5-4).

Similarly, construction at WAAF (airfield upgrade and multiple deployment facility) would occur in developed areas that are almost entirely screened from views from the surrounding area by topography, vegetation, and fencing. The proposed airfield upgrade would occur adjacent to the WAAF historic district, but these improvements would not alter any view to or from the district. The proposed multiple deployment facility would be across the airfield from the historic district, substantially removed from the district such that the visual integrity of the district would not be affected.

The proposed antenna support structures at SBMR would either be visible but at such a distance from any sensitive view points that they would not be distinguishable, or they would be constructed in the lower areas of the developed portions of the post where they would be visually compatible with surrounding features.

Expanded training activities may result in additional, temporary visual impairment from dust or smoke generation during training due to the additional training time at the ranges required to train the additional Soldiers under SBCT, as well as use of the Stryker for maneuver training within the SRAA. Training at McCarthy Flats would be similar to existing levels. Generation of dust or smoke would be most prominent at the point of origin and would dissipate relatively quickly. From most sensitive viewpoints on or off the installation, any releases would be a minor middle or background feature and would not substantially affect panoramic views in the area.

*Alteration of landscape character*. Construction of Helemanō Trail would occur in an area that is heavily disturbed and contains a large number of features associated with agricultural use of the area (row crop patterns, roads, buildings). Construction of the trail in this area would not substantially alter the landscape character.

*Impairment of view during the construction phase.* Helemanō Trail would be constructed within the viewshed of several sensitive view corridors, but because these areas are intensively farmed, road construction activities would not be substantially inconsistent with existing agricultural practices in the area.

*Consistency with visual resource policies.* Construction and training at SBMR would occur in areas that would not alter views from public roadways or sensitive view areas designated in the Central O'ahu Sustainable Communities Plan. Existing screening, as well as additional screening as mentioned previously, would minimize views of SBCT-related activities at SBMR and would therefore ensure consistency with the visual preservation objectives stated in the Central O'ahu Sustainable Communities Plan. Measures described above for construction of Helemanō Trail to minimize potential impacts on sensitive views would ensure consistency of the road construction with the visual resource preservation policies of the Central O'ahu Sustainable Communities Plan policies.

*Impairment of views from visible fugitive dust.* As discussed in Section 5.5, training at SBMR and SBER would increase fugitive dust. Vehicle travel on unpaved roads and in off-road maneuver areas would be an ongoing intermittent source of increased fugitive dust emissions. Most of the net increase in fugitive $PM_{10}$ emissions would be associated with vehicle travel on unpaved roads, with the remaining increase representing potential emissions from off-road vehicle maneuver activity, mostly at SBER. This would be similar to dust generated during agricultural plowing. Because of prevailing winds the visible dust will likely disperse within minutes. The assumption is that the fugitive dust and soil mitigation identified in Sections 5.5 and 5.9 would be implemented to keep soil erosion and compaction to a minimum. As a result, visual impacts would be less than significant with respect to visible fugitive dust.

*Alteration of nighttime light and glare.* Under the Proposed Action, the use of nighttime lighting devices, such as flares, during training might increase slightly. The use of these devices is not expected to increase dramatically because training with night vision goggles would be conducted. Also, any new lighting will be shielded to minimize glare. Visual impacts would be less than significant with respect to altering nighttime light and glare.

### *Reduced Land Acquisition Alternative*

#### Significant Impacts Mitigable to Less than Significant

*Impact 1: Impairment of view during the construction phase.* Under Reduced Land Acquisition, less of the SRAA would be subject to visual alteration. Existing views from the southern portions of SBMR and surrounding areas would be less impaired during the construction phase of SBCT-related projects. Under this alternative the landscape character of the SRAA would remain more intact because the motor pool complex would be constructed in an area already highly disturbed near the installation boundary and QTR2 would not be constructed at SBMR. Fewer disturbances of the upland areas would provide a greater buffer between remaining SBCT-related project sites and surrounding natural areas. A larger percentage of site characteristics (e.g., terrain and vegetative cover) could be used to effectively screen the construction of proposed facilities. Reduced Land Acquisition would result in a lower but still significant visual impact as a result of visual impairment during construction at SBMR. The mitigation measures below would reduce the impact to less than significant.

*Regulatory and Administrative Mitigation 1.* Visual impacts would be mitigated as described above for the Proposed Action alternative.

*Impact 2: Alteration of landscape character.* As described above, Reduced Land Acquisition at SBMR would result in fewer disturbances of the upland areas and would provide a greater buffer between remaining SBCT-related project sites and surrounding natural areas. Alteration of the landscape character would be less than under the Proposed Action but would nevertheless be a significant but mitigable impact due to the change in views from Lyman Road corridor, the Kālakaua Golf Course, and adjacent housing areas. The mitigation measures below would reduce the impact to less than significant.

*Regulatory and Administrative Mitigation 2.* Visual impacts would be mitigated as described above for the Proposed Action alternative.

*Impact 3: Modification of the existing view – Construction of Helemanō Trail.* The visual impacts of modifying the existing views from the construction of the Helemanō Trail would be the same as those discussed under the Proposed Action. The mitigation measures below would reduce the impact to less than significant.

*Additional Mitigation 3:* Visual impacts would be mitigated as described above for the Proposed Action alternative.

#### Less than Significant Impacts

*Modification of the existing view.* Modification of existing views under Reduced Land Acquisition would be similar to that described for the Proposed Action, although not constructing QTR2 at this location would result in slightly less modification of existing views in the SRAA. More of the views along the southern boundary of SBMR would remain intact, and a lessening of temporary visual impacts during training activities would also be expected.

*Consistency with visual resource policies.* Consistency with visual resource policies would be similar to that described above for the Proposed Action.

*Impairment of views from visible fugitive dust.* Impairment of views from visible fugitive dust would be similar to that described above for the Proposed Action.

*Alteration of nighttime light and glare.* Alteration of nighttime light and glare would be similar to that described above for the Proposed Action.

### *No Action Alternative*

*No Impacts*

Under No Action, training exercises would continue at SBMR. The Army would continue to operate and maintain its range and training area facilities in order to meet its training mission requirement. Invariably, the level of training would change occasionally in response to this requirement and consequently, the visual impact of these changes may alter as well. The level of use of the installation's training assets is not anticipated to alter the physical character of the landscape itself.

## 5.4 AIRSPACE

### 5.4.1 Affected Environment

The affected airspace environment is described below in terms of its principal attributes, namely controlled and uncontrolled airspace, special use airspace, military training routes, en route airways, airports and airfields, and air traffic control. Jet routes, all above 18,000 feet (549 meters), are well above the activities proposed and are not considered as part of the region of influence. The maximum height of each individual FTI antenna will be 100 feet or the FAA-approved height, whichever is lower. Before the design is finalized, the Army will coordinate with the FAA to ensure that each antenna does not obstruct air navigation, including approach and departure clearance near any runway or airfield.

#### *Controlled and Uncontrolled Airspace*

The airspace in the SBMR ROI is composed of Class D airspace above WAAF, extending from the surface to a ceiling of 3,300 feet (1,006 meters), surrounded on its southern, southeastern, and eastern edges by a Class E airspace extension area, with a floor 700 feet (213.4 meters) above the surface. Elsewhere, the airspace not designated as Class D is Class G (uncontrolled) airspace from the surface to a ceiling of either 700 or 1,200 feet (213.4 or 385.8 meters). Class E, or special use, airspace is discussed separately below. (Appendix F provides a full definition of the different classes of airspace and an explanatory diagram.)

#### *Special Use Airspace*

The R-3109 A & B and R-3109 B & C restricted areas lie to the west of the Class D airspace above WAAF. To the east, over the East Range, is the A-311 alert area. (The effective altitudes, time of use, and controlling agencies for the airspaces are given in Table 5-15.) During the published hours of use, the agency using the airspace is responsible for controlling all military activity within a restricted area and for determining that its perimeters are not violated. When the airspace is scheduled to be inactive, the agency releases it back to the controlling agency or center, and, in effect, the airspace is no longer restricted.

**Table 5-15**
**Special Use Airspace in the SBMR Airspace ROI**

| Number/Name | Effective Altitude (in feet) | Time of Use | Controlling Agency |
|---|---|---|---|
| A-311 | To 500 AGL (To 152 meters) | 0700-2200 | No A/G |
| R-3109A | To 9,000[1] (To 2,743 meters) | Intermittent[2] | Honolulu ATCT |
| R-3109B | 9,000 to 19,000[1] (2,732 to 5,791 meters) | Intermittent[2] | Honolulu ATCT |
| R-3109C | To 9,000[1] (to 2,732 meters) | Intermittent[2] | Honolulu ATCT |

Source: NACO 2002

Notes:
A = Alert area; AGL = Aboveground level; ATCT = Air traffic control tower; No A/G = No air to ground communications R = Restricted

[1]To but not including the indicated altitude
[2]By Notice to Airmen

### *Military Training Routes*

Although there are no formal, published military training routes in the SBMR airspace ROI, the A-311 Alert Area is used for helicopter training exercises, with an average of 3,500 helicopter movements per month. Movements are defined as arrivals, departures, or overflights. WAAF experiences an average of 6,500 movements per month, 90 percent of which involve helicopters. The movement statistics cover all DOD branches, including the Hawai'i Air National Guard (Ahching 2002a, 2002b).

### *En Route Airways*

No low altitude en route airways enter or transect the SBMR ROI, but general aviation aircraft use the airspace in the ROI. This includes all civil aviations operations, other than scheduled air services and unscheduled air transport for hire.

### *Airports and Airfields*

WAAF is the only airport in the airspace ROI. WAAF's runway is oriented west-southwest to east-northeast. The preferred arrival and departure tracks to and from the north skirt the eastern edge of the R-3109 restricted area or the western edge of the A-311 alert area to the east. Arrival and departure tracks from and to the south lie to the west of Miulani and Kunia towns (NACO 2003). These tracks are subject to change.

### *Air Traffic Control*

Air traffic in the SBMR ROI is managed by the Honolulu Control Facility and the WAAF tower.

## 5.4.2 Environmental Consequences

### *Summary of Impacts*

Table 5-16 summarizes impacts on airspace in SBMR ROI. Neither the Proposed Action nor No Action would have impacts on airspace at SBMR.

No Impacts

*Reduction in Navigable Airspace*. Other than the proposed establishment of a controlled firing area (CFA) above QTR2, there would be no requirement for new or modified special use airspace associated with the Proposed Action. CFAs pose no problem for either VFR or IFR flights because activities within a CFA, even though potentially hazardous, must be suspended immediately when radar, spotter aircraft, or ground lookout positions detect an approaching aircraft. Because of this feature there is no requirement for imposing any flight restrictions, thus no reduction in the ROI's navigable airspace.

### *Proposed Action (Preferred Alternative)*

*New or Modified Special Use Airspace.* Other than the proposed CFA above QTR2, no new or modified special use airspace would be required. CFAs, although established to contain activities that, if not conducted in a controlled environment, would be hazardous to nonparticipating aircraft, pose no problem for either VFR or IFR flight, as mentioned above.

**Table 5-16**
**Summary of Potential Airspace Impacts at SBMR/WAAF**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Reduction in navigable airspace | ○ | ○ | ○ |
| New/modified special use airspace | ○ | ○ | ○ |
| Change to a military training route | ○ | ○ | ○ |
| Change in en route airways or IFR procedure | ○ | ○ | ○ |
| Restriction of access to airport/airfield | ○ | ○ | ○ |
| Obstruction to air navigation | ○ | ○ | ○ |
| Aviation safety | ○ | ○ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | | | |
|---|---|---|---|---|---|
| ⊗ | = | Significant | + | = | Beneficial impact |
| ⃠ | = | Significant but mitigable to less than significant | N/A | = | Not applicable |
| ⊙ | = | Less than significant | | | |
| ○ | = | No impact | | | |

The proposed UAV flights would normally be conducted within the R-3109 and R-3110 restricted area complex northwest of SBMR or within the W-189 warning area off the northern coast of O'ahu; thus, the UAV flights would use existing special use airspace. Although the nature and intensity of use varies over time and by individual special use airspace area, the proposed UAV flights represent precisely the kinds of activities that the special use airspace was created for. Restricted areas contain airspace within which the aircraft flight, while not wholly prohibited, is subject to restrictions. Activities within these areas must be confined because of their nature, or limitations are imposed on aircraft operations that are not part of these activities, or both. Warning areas contain activity that may be hazardous to nonparticipating aircraft, and pilots are warned of the potential danger and must abide by the operating rules of Federal Aviation Regulations, Part 91. As such, the UAV flights would not represent an adverse impact on special use airspace and would not conflict with any airspace plans, policies, or controls.

*Change to a Military Training Route.* There are no published military training routes in the ROI. Consequently, no changes to military training routes from an increase in C-130 operations would result.

*Change in En Route Airways, or IFR Procedures.* There are no low altitude en route airways in the SBMR airspace use ROI. All traffic into and out of WAAF would be subject to air traffic control clearances and instructions, and air traffic control separation service is provided to IFR aircraft. Consequently, no changes to existing or planned IFR minimum flight altitudes, published or special instrument procedures, or IFR departure procedures would be required, and VFR operations would not be required to change from a regular flight course or altitude.

Establishing a CFA above QTR2 would pose no problem for either VFR or IFR flights because activities within a CFA, even though potentially hazardous, must be suspended immediately when radar, spotter aircraft, or ground lookout positions detect an approaching aircraft. Because of this feature pilots of nonparticipating aircraft need not alter their flight routes.

*Restriction of Access to Airports/Airfields.* The proposed increase in C-17 and C-130 operations at WAAF would not affect access to, or the use of, airports/airfields available for public use, nor affect commercial or private airport/airfield arrival and departure traffic flows. IFR traffic into and out of WAAF is limited to one aircraft at a time. Should two of these aircraft require an IFR arrival into WAAF, the second aircraft would have to hold while the first aircraft is on approach. While this may affect sequencing into Honolulu International or Kalaeloa Airports, it would not ultimately restrict access to them. Upgrading WAAF for C-17 and C-130 aircraft operations by strengthening the aircraft parking apron would have no impact on airspace because these activities would not restrict a clear view of runways, helipads, taxiways, or traffic patterns from the air traffic control tower, nor would it decrease airport capacity of efficiency. Strengthening the parking apron would have no impacts on the airspace ROI.

*Obstructions to Air Navigation.* The proposed FTI antennas at SBMR would be mounted on towers with a maximum total height of 102 feet and therefore would be well below the 500-foot aboveground level threshold for an obstruction to air navigation specified by the FAA (FAA 2001). The antennas would also be at sufficient distance from the WAAF runway to be well below the military airport imaginary surface thresholds (FAA 2001). The antennas would be designed so as not to penetrate the approach-departure clearance surface. Thus, this would not constitute an obstruction to air navigation.

*Aviation Safety.* Increased air traffic at WAAF as a result of C-17 and C-130 aircraft operations in support of SBCT training, given the Army's excellent aviation safety record in Hawai'i, make future adverse impacts on public health and safety extremely unlikely. WAAF lies in Class D airspace, and, consequently, all C-17 and C-130 aircraft operations would be subject to air traffic control clearances and instructions, thus obviating any adverse direct impacts on air traffic. In addition, the strict procedures and rules in place governing flight operations in both controlled/uncontrolled navigable airspace and special use airspace, make future adverse impacts on public health, and safety extremely unlikely.

For those UAV flights that could not be contained wholly within restricted areas or warning areas, operations would be conducted in accordance with well-defined FAA procedures for remotely operated aircraft. At least 60 days prior to the proposed commencement of UAV operations, a certificate of authorization would be sought from the FAA regional office in Honolulu. Approval would be contingent on the demonstration of a method that provides a level of safety, equivalent to see-and-avoid requirements for manned aircraft. Methods include, but are not limited to, radar observation, forward or side-looking cameras, electronic detection systems, visual observation from one of more ground sites, or a combination thereof (FAA 2001). In addition, coordination, communications, route and altitude procedures, and lost link/mission abort procedures would all have to be identified.

Consequently, authorized UAV flights would have no impact to aviation safety and thus public health and safety.

### *Reduced Land Acquisition Alternative*

Impacts associated with the RLA Alternative would be identical to those described for the Proposed Action.

### *No Action Alternative*

*No Impacts*

The current baseline of existing conditions at SBMR would continue under No Action. Flight support for current training would continue to have the same level of impact on airspace. WAAF lies in Class D airspace, so all aircraft operations are subject to air traffic control clearances and instructions. Air traffic control separation service is provided to instrument flight rules aircraft only, but all aircraft are given traffic advisories and, on request, conflict resolution instructions. Flight support for current training out of WAAF would continue to have no impacts on controlled and uncontrolled navigable airspace, special use airspace, military training routes, en route airways, or airports/airfields, nor would it create obstructions to air navigation in the airspace ROI because none of the factors considered in determining impacts are applicable.

## 5.5 AIR QUALITY

### 5.5.1 Affected Environment

No air quality monitoring stations are close to the Main Post or SBER. The closest ambient air quality monitoring station is about six miles from SBMR at Pearl City. The Pearl City monitoring station has, in recent years, reported a few instances in which $PM_{10}$ levels exceeded the state 24-hour standard, but not the federal 24-hour standard. These instances of high $PM_{10}$ levels have been attributed to fireworks use during New Year celebrations. The instances of high $PM_{10}$ levels at Pearl City are not representative of conditions at SBMR.

Existing emission sources at SBMR include the following:

- A small quarry with gravel processing equipment;
- Boiler systems in various buildings;
- Generator systems in various buildings for backup power;
- Two incinerators for document destruction;
- Personal and government vehicle traffic;
- Aircraft and helicopter flight operations;
- Warehousing and related equipment operations;
- Equipment maintenance activities;
- Ordnance firing and detonations during training exercises;
- Controlled burning of ranges to restrict vegetative fuel growth; and
- Unplanned wildfires.

The Army operates three automated weather stations at SBMR that are used for monitoring and predicting fire hazard conditions at the SBMR range areas. Weather data from these stations has not been fully summarized. Historical data from WAAF show that average daily minimum temperatures range from 60 degrees F (15 C) in January to 69 degrees F (21 C) in August. Average daily maximum temperatures range from 75 degrees F (24 C) in March to 83 degrees F (28 C) in September. Precipitation averages 37.9 inches (96 cm) per year, with monthly average precipitation ranging from 1.38 inches (4 cm) in July to 5.22 inches (13 cm) in December (WeatherDisc Associates 1990). Wind speeds recorded at SBMR generally are light. Wind speeds at the Main Post generally average between 1 and 7 mph; wind speeds at SBER generally average between 1 and 8 mph. Maximum wind speeds seldom exceed the 15 mph (24 kph) threshold commonly associated with wind erosion processes.

### 5.5.2 Environmental Consequences

#### *Summary of Impacts*

One significant air quality impact has been identified at SBMR under the Proposed Action and the RLA Alternative. Vehicle travel on unpaved roads and in off-road maneuver areas would be a permanent source of increased fugitive dust emissions. Fugitive dust from military vehicle use on unpaved roadways and off-road areas would increase by 780 tons (708 metric tons) per year at SBMR under the Proposed Action and by 826 tons (749 metric tons) per year under the RLA Alternative, based on USEPA 1998 methodologies for estimating $PM_{10}$ generated by vehicles traveling on unpaved roads (USEPA 1998). Dispersion modeling analyses indicate that fugitive dust emissions from vehicle travel on unpaved roads and from vehicle operations in off-road maneuver areas could violate the federal 24-hour $PM_{10}$ standard at off-post locations. The substantial increase in fugitive $PM_{10}$ emissions from military vehicle use at SBMR, the potential for exceeding the federal 24-hour $PM_{10}$ standard and the potential impacts on quality of life to surrounding communities result in a significant air quality impact at SBMR under the Proposed Action. The impact from fugitive dust emissions would be reduced to a less than significant level through mitigation programs that include using washed gravel on military vehicle trails; periodically applying dust control chemicals; monitoring ambient $PM_{10}$ concentrations; and implementation of the DuSMMoP to ensure compliance with federal air quality standards.

**Table 5-17**
**Summary of Air Quality Impacts at SBMR/WAAF**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Emissions from construction activities | ⊙ | ⊙ | ○ |
| Emissions from ordnance use | ⊙ | ⊙ | ⊙ |
| Engine emissions from military vehicle use | ⊙ | ⊙ | ⊙ |
| Fugitive dust from military vehicle use | ⊘ | ⊘ | ⊙ |
| Wind erosion from areas disturbed by military vehicle use | ⊙ | ⊙ | ⊙ |
| Emissions from increased aircraft operations | ⊙ | ⊙ | ⊙ |
| Emissions from wildfires | ⊙ | ⊙ | ⊙ |
| Other emissions from personnel increases | ⊙ | ⊙ | ⊙ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
+ = Beneficial impact
N/A = Not applicable

Construction activities under either the Proposed Action or the RLA Alternative would result in an increase of nitrogen oxide emissions of 100 tons (91 metric tons) in 2004 and 126 to 149 tons (114 to 135 metric tons) in 2005, the first two years of construction. Nitrogen oxide emissions would be less than 58 tons (53 metric tons) per year for the remainder of the construction period. Nitrogen oxide emissions are of concern primarily as an ozone precursor. These annual emissions of ozone precursors from construction activities associated with the Proposed Action or the RLA Alternative would produce too small a net increase in ozone precursor emissions to have a measurable effect on ozone levels and would not change the attainment status of the area. The higher emissions would also be limited to the first two years of a six-year construction schedule. Consequently, construction-related emissions would have a less than significant air quality impact under the Proposed Action or the RLA Alternative.

Compared to No Action, ordnance use quantities at SBMR would increase by about 25 percent under the Proposed Action and by about 11 percent under the RLA Alternative. Because emission quantities from ordnance use are very small and include only trace quantities of hazardous components they pose very little risk of creating adverse air quality impacts. Consequently no significant air quality impacts would occur. Vehicle use and resulting vehicle engine emissions would increase at SBMR under the Proposed Action or Reduced Land Acquisition because of the addition of Strykers to the tactical and support vehicle inventory. The increase in military vehicle engine emissions would be too small a net increased in ozone precursor emissions to have a measurable effect on ozone levels and would not affect the attainment status of the area

Increased off-road vehicle use under the Proposed Action or RLA could increase the size of areas disturbed by vehicle use, resulting in a minor increase in dust from wind erosion. The low frequency of strong winds and the high frequency of precipitation events would prevent significant air quality impacts from wind erosion. Improvements to WAAF under the Proposed Action or RLA Alternative would better accommodate C-130 aircraft operations. Any increase in C-130 aircraft operations at WAAF would result in a small increase in overall aircraft emissions associated with that facility.

Increased use of tracers and pyrotechnics under the Proposed Action or RLA Alternative would result in a small increase in the potential for wildfires on training range areas, with a resulting increase in emissions from those wildfires. Other emission sources associated with the increase in personnel numbers at SBMR under the Proposed Action or RLA would include personal vehicle use and increased use of existing stationary emission sources such as boilers at some buildings. The net increase in personnel numbers would be about 5.5 percent, resulting in comparable increases in personal vehicle use and fuel use at buildings serving the added personnel and their families.

Table 5-17 summarizes the significance of air quality impacts at SBMR under the Proposed Action, RLA, and No Action. Although fugitive dust from vehicle travel on unpaved areas would be a significant impact in the absence of mitigation, the Army will implement mitigation programs sufficient to avoid violating the federal $PM_{10}$ standard or having substantial adverse health consequences for the public.

### *Proposed Action*

#### *Significant Impacts Mitigable to Less Than Significant*

*Impact 1: Fugitive dust from military vehicle use.* $PM_{10}$ emissions would be approximately 1,640 tons (1,488 metric tons) per year, an increase of almost 780 tons (708 metric tons) per year. Visible dust is a clear indication of airborne $PM_{10}$ concentrations that are typically in the range of several thousand micrograms per cubic meter. It takes only a few hours of such concentrations to produce a 24-hour average that exceeds the state and federal 24-hour average $PM_{10}$ standard of 150 micrograms per cubic meter. $PM_{10}$ represents the size fractions of suspended particulate matter that are likely to penetrate into the lower respiratory tract, creating potential adverse health effects.

Approximately 62 percent of the net increase in fugitive $PM_{10}$ emissions would be associated with vehicle travel on unpaved roads, with the remaining 38 percent representing potential emissions from off-road vehicle maneuver activity, mostly at SBER. The amount of fugitive dust generated by off-road vehicle maneuver activity would depend in part on the extent to which the affected areas can maintain a relatively dense vegetation cover.

Dispersion modeling analyses discussed below indicate that fugitive dust emissions from vehicle travel on unpaved roads and from vehicle operations in off-road maneuver areas could violate the federal 24-hour $PM_{10}$ standard at off-post locations. The substantial increase in fugitive $PM_{10}$ emissions from military vehicle use at SBMR, the potential for exceeding the federal 24-hour $PM_{10}$ standard, and the potential impacts on quality of life in surrounding communities result in a significant air quality impact at SBMR under the Proposed Action. The fugitive dust emissions would be reduced through mitigation programs that include using washed gravel on military vehicle trails; periodically applying dust control chemicals; monitoring ambient $PM_{10}$ concentrations; and/or developing an adaptive management program to manage training area lands and modify training procedures as necessary to ensure compliance with federal air quality standards.

Dispersion modeling analyses have been performed to better evaluate the potential for the federal $PM_{10}$ standard to be violated due to fugitive dust emissions associated with military vehicle use. The modeling analyses used five particle size categories to account for particle settling and deposition. The particle size categories used in the analysis are equivalent to the conventional soil survey categories of clay, very fine silt, fine silt, medium silt, and coarse silt. Meteorological conditions assumed in the modeling analysis included Class D (neutral) and Class E (mild temperature inversion) conditions. Given the minimal diurnal and seasonal variations in air temperature and the predominance of high humidity levels, these atmospheric stability assumptions provide a conservative analysis. Wind speed assumptions used in the modeling analyses were based on site-specific estimates of the wind speed exceeded 75 percent of the time. Emission estimates used in the dispersion modeling assumed a dry surface. Additional details regarding the modeling procedures are presented in Appendix G. The modeling analyses for SBMR included vehicle convoys on Helemanō Trail and company-level vehicle maneuver exercises at SBER.

Vehicle convoys on Helemanō Trail would vary considerably in size, ranging from just a few vehicles to as many as 216 for a major exercise at KTA. The largest convoys probably would not return to SBMR on the same day. Nevertheless, total traffic volumes on the Helemanō Trail might be as high as 300 vehicles per day if large convoys travel to and return from KTA on the same day. If road surfaces are dry and winds are light, even relatively modest numbers of vehicles can create sufficient dust to cause downwind $PM_{10}$ concentrations of more than 150 micrograms per cubic meter. In the absence of any dust control measures, daily traffic volumes of about 100 vehicles per day have the potential for causing $PM_{10}$ problems at locations within 2,000 feet (610 meters) of the roadway. Lower daily traffic volumes could cause $PM_{10}$ problems over shorter distances, and higher daily traffic volumes could cause $PM_{10}$ problems over larger distances.

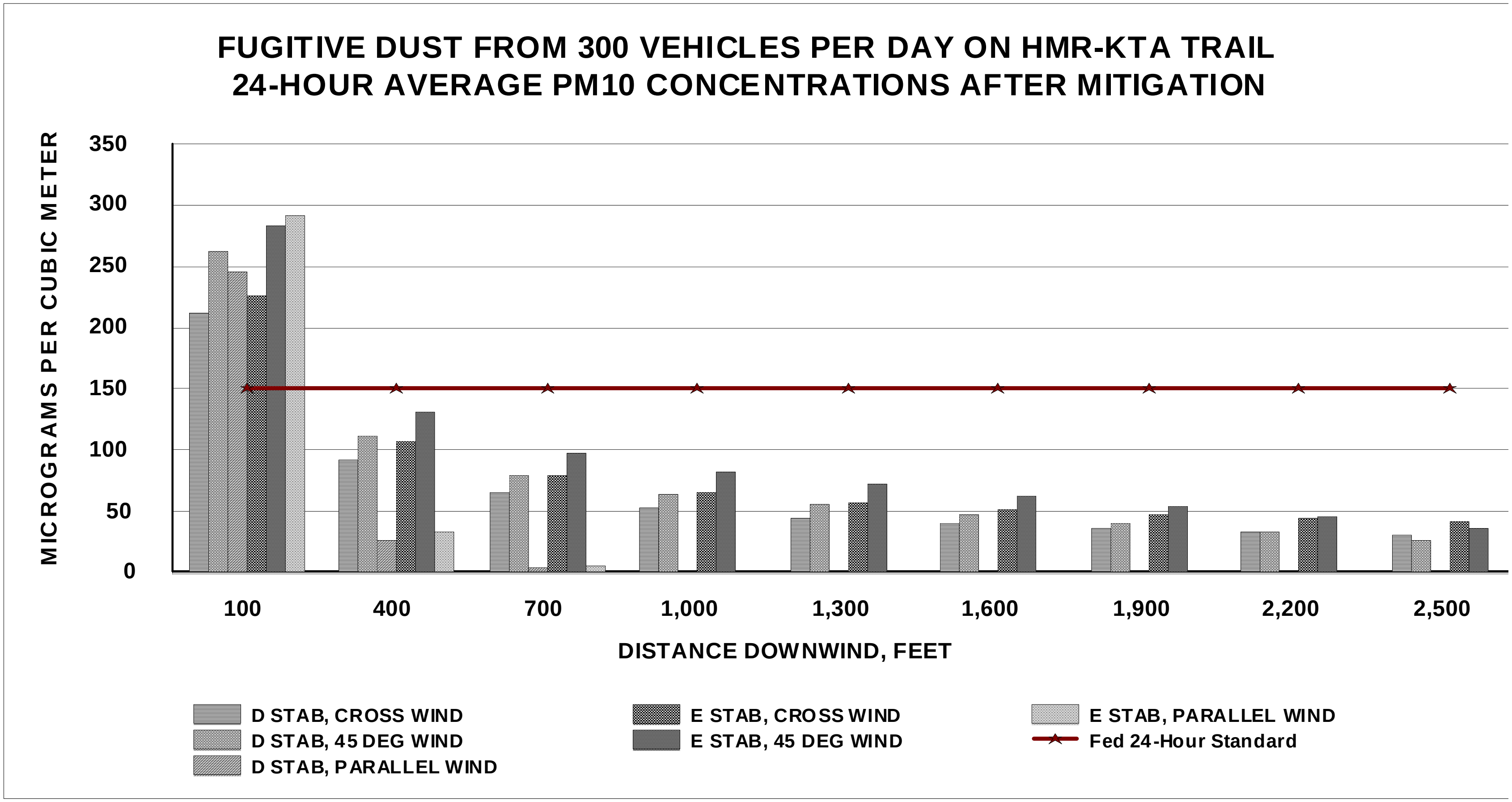
Potential $PM_{10}$ problems from vehicle traffic on Helemanō Trail can be reduced substantially by a combination of feasible mitigation measures, including using washed gravel for surfacing military vehicle trails and/or implementing a dust management program that may include road paving or periodic application of chemical dust suppressants. Alternative dust control compounds include hygroscopic salts (such as calcium chloride or magnesium chloride solutions) and synthetic polymer compounds (such as polyvinyl acetate and vinyl acrylic). If properly applied, dust control measures for unpaved roads would achieve at least 90 percent control of fugitive dust under the weather conditions and roadway use levels prevalent at USARHAW installations.

Expected $PM_{10}$ concentrations downwind of Helemanō Trail on a maximum use day are illustrated in Figure 5-11. The assumed daily traffic volume of 300 vehicles per day would occur infrequently. Most days would have significantly less vehicle traffic and thus would have lower fugitive dust impacts than indicated in Figure 5-11. Because there is no easy way to estimate road surface moisture conditions during dry periods, the modeling analysis effectively assumes a dry surface. In reality, road surface conditions would often have sufficient moisture to substantially reduce fugitive dust emissions.

In addition to Helemanō Trail, there are numerous gravel and dirt roads within the SBMR boundaries. While dirt roads have a higher per-vehicle emission rate than gravel roads, approximately 75 percent of the on-post unpaved roads have a gravel surface. Dirt roads generally carry much smaller traffic volumes than do the gravel roads. Mitigation measures applied to Helemanō Trail generally would be applicable to on-post unpaved roads. Consequently, the fugitive dust modeling for Helemanō Trail is considered representative of conditions for on-post gravel and dirt roads.

Given the anticipated effectiveness of feasible mitigation measures, fugitive dust from vehicle travel on unpaved roads at SBMR is considered a significant but mitigable to less than significant impact.

SBER provides limited areas suitable for off-road vehicle maneuver training. As indicated in Figure 2-3, available maneuver areas occur as multiple noncontiguous parcels. Most vehicle maneuver training at SBER is likely to involve small unit training. As a practical matter,




Note: Chart shows potential $PM_{10}$ concentrations under varied weather conditions: three wind directions relative to the local trail alignment, and two atmospheric stability conditions (neutral D stability and mild inversion E stability).

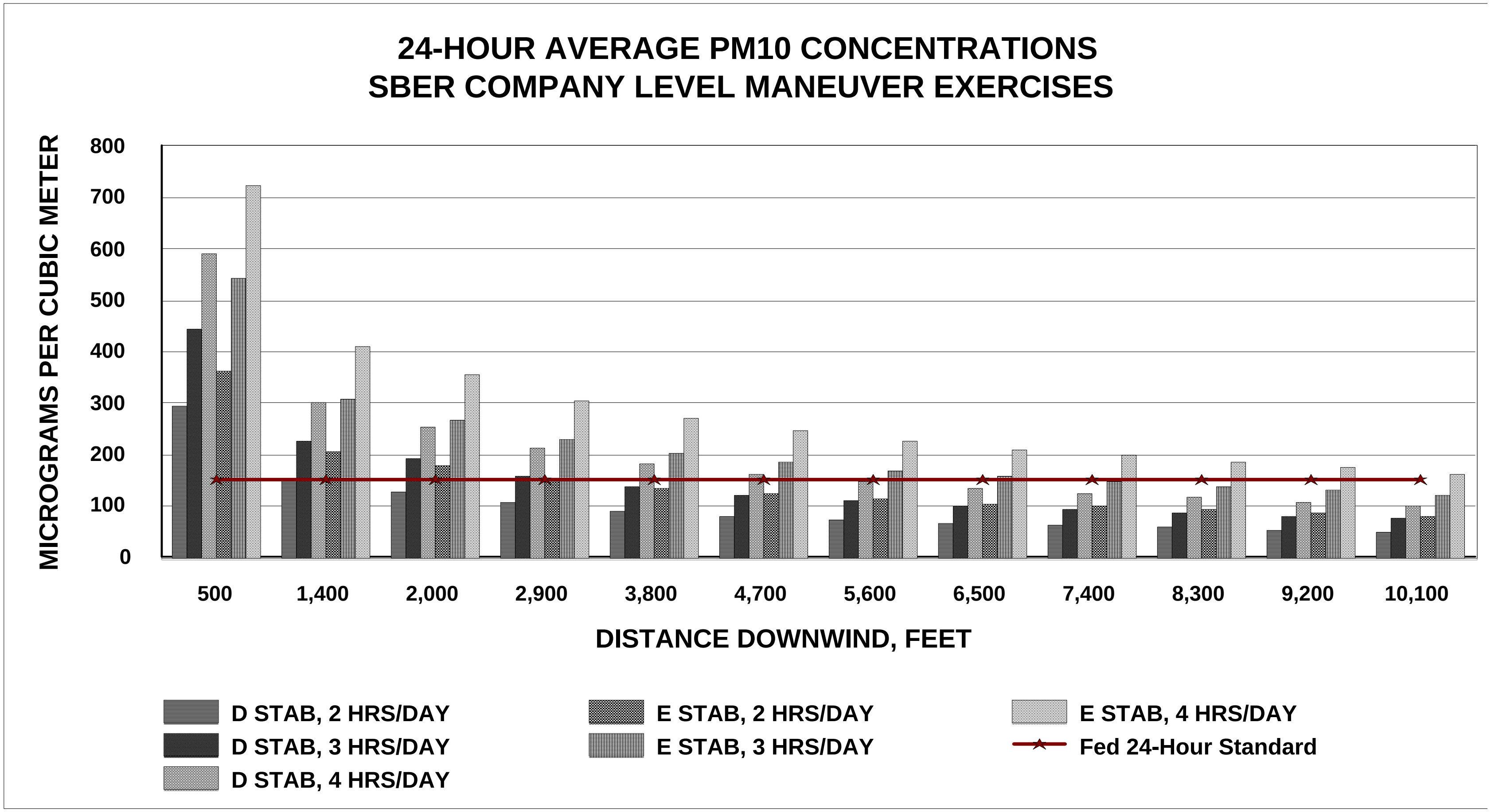
Figure 5-11. Potential $PM_{10}$ Concentrations Along HMR Trail With Proposed Dust Control Mitigation Program company level exercises are likely to be the largest vehicle maneuver events that would occur with any regularity at SBER. Modeling results for a company level exercise are presented in Figure 5-12. Small unit maneuvers are not expected to involve sufficient vehicle activity to create off-post $PM_{10}$ problems.

As was the case for the military vehicle trail modeling, the analysis assumes that ground surface conditions are dry. In reality, ground surface conditions are likely to have sufficient moisture to substantially reduce fugitive dust emissions. If a full company level exercise were conducted when ground surface conditions were dry, then there would be a strong probability that $PM_{10}$ concentrations would exceed the level of the state and federal $PM_{10}$ standards in nearby off-post residential areas. Mitigation of this potential impact would require developing management programs through DuSMMoP that adjust the size and design of vehicle maneuver training at SBER to prevailing soil moisture conditions. Full company level training exercises might have to be deferred or moved to other installations during extended periods of dry weather at SBER. Implementing such a management program would reduce fugitive dust impacts from vehicle maneuver training exercises to a less than significant level.

Helemanō Trail already is planned as a gravel road, with paved sections where necessary to control erosion problems. The gravel surface has been taken into account in the fugitive dust emission estimates. Asphalt or concrete paving of the entire trail would further reduce dust generation from vehicle travel, but might involve unacceptable costs.

*Regulatory and Administrative Mitigation 1.* The Army will develop and implement a DuSMMoP for the training area. The plan will address measures such as, but not limited to, restrictions on the timing or type of training during high risk conditions, vegetation monitoring, dust monitoring, soil monitoring, and buffer zones to minimize dust emissions in populated areas. The plan will determine how training will occur in order to keep fugitive dust emissions below CAA standards for $PM_{10}$ and soil erosion and compaction to a minimum. The Army will monitor the impacts of training activities to ensure that emissions stay within the acceptable ranges as predicted and environmental problems do not result from excessive soil erosion or compaction. The plan will also define contingency measures to mitigate the impacts of training activities which exceed the acceptable ranges for dust emissions or soil compaction.

The Army will continue to implement land restoration measures identified in the INRMP. Mitigation measures include, but are not limited to, implementing the ITAM program to identify and inventory land condition using a GIS database; coordinating between training planners and natural resource managers; implementing land rehabilitation measures identified in the INRMP; monitoring the effectiveness of the land rehabilitation measures; evaluating erosion modeling data to identify areas in need of improved management; and implementing education and outreach programs to increase user awareness of the value of good land stewardship.




Note: Chart shows potential $PM_{10}$ concentrations under two atmospheric stability conditions (neutral D stability and mild inversion E stability) and varied durations of vehicle maneuver activity during one or two company level exercise events in a single calendar day.

Figure 5-12. Potential $PM_{10}$ Concentrations Downwind of Company Level Vehicle Maneuver Exercise Activity at SBER

To reduce fugitive dust associated with the use of military vehicle trails, the Army will implement dust control measures, such as applying dust control chemicals, using washed gravel for surfacing, spraying water, or paving sections of trails. The extent of gravel washing would have to balance dust reduction goals with engineering requirements for achieving a stable roadway surface. The appropriate dust control products would be selected based on testing alternative products on dirt and gravel road segments. Based on general characteristics and performance elsewhere, environmentally friendly synthetic polymers (such as polyvinyl acetate and vinyl acrylic) and hygroscopic salt solutions (such as calcium chloride or magnesium chloride) appear to be the most promising groups of dust control agents. The Army will monitor road surface conditions and will apply palliatives as necessary. If moisture levels are adequate to suppress dust, then application of dust palliatives would not be necessary. To the extent possible, the Army would plan dust suppressant applications to be scheduled to immediately precede periods of significant convoy traffic.

### *Less than Significant Impacts*

*Emissions from construction activities.* The Proposed Action would include 12 construction projects at SBMR, with construction activities occurring from 2004 into 2009. Construction projects would include four training range facilities, a military vehicle trail between SBMR and HMR, and seven building or infrastructure facility construction projects. New training range facilities would include a BAX, QTR1 and QTR2, and a UACTF. UXO cleanup would be required at the BAX, QTR1, and UACTF sites prior to the start of facility construction. Building and infrastructure construction projects would include a range control building, virtual fighting facility, motor pool facility, vehicle wash facility, nine FTI towers, and apron improvements and a multiple deployment facility at WAAF.

Construction contractors will comply with the provisions of Hawai'i Administrative Rules, Sec. 11-60.1-33, on fugitive dust as part of the requirements of construction contracts.

Most individual construction projects would be completed in a one or two year time frame, although some would occur over three calendar years. Figure 5-13 summarizes estimated emissions from the 12 construction projects according to current construction schedules. Nitrogen oxide emissions from construction equipment would be 100 tons (91 metric tons) in 2004, 149 tons (135 metric tons) in 2005, and less than 58 tons (53 metric tons) per year from 2006 through the end of the construction period in 2009. This increase associated with the Proposed Action would produce too small a net increase in ozone precursor emissions to have a measurable effect on ozone levels and would not change the attainment status of the area. Consequently, construction-related emissions under the Proposed Action would have a less than significant air quality impact.

*Emissions from ordnance use.* Ordnance use at SBMR under the Proposed Action would occur at new training range facilities (BAX, QTR1, QTR2, and UACTF) as well as at other range facilities. The total estimated ordnance use by the 25th ID(L) at all USARHAW installations would increase by about 25 percent under the Proposed Action, from about slightly less than 16 million rounds per year to slightly less than 20 million rounds per year. Approximately 96

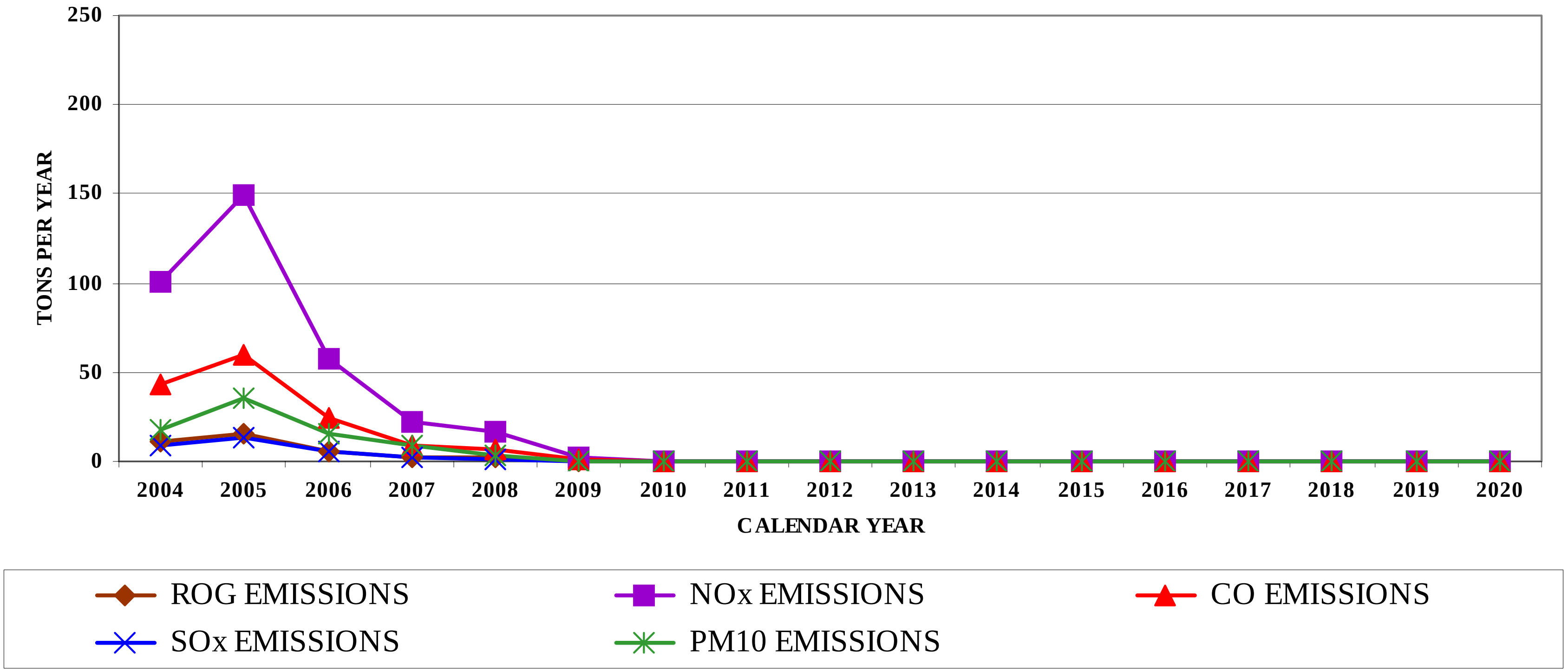



Figure 5-13. Annual Construction Emissions, Schofield Barracks, Proposed Action

percent of the annual ordnance use would consist of small arms ammunition, each item of which has only a very small propellant charge. Ordnance items with explosive or pyrotechnic components (such as mortars, artillery, mines, demolition charges, smoke devices, flares, or blast simulator) would represent about four percent of the annual ordnance use.

Emissions from ordnance use have not been quantified. However, the literature on emissions from ordnance firing and detonations clearly establishes that the detonation process is fundamentally different from normal combustion processes in terms of generating air pollutant emissions. Unconfined detonations are essentially a decomposition process in which molecular constituents are broken down into simpler byproducts, and few if any molecules more complex than the starting molecules are formed (Mitchell and Suggs 1998). Instead, most of the energetic material is converted into simple gaseous products such as carbon dioxide, carbon monoxide, water vapor, nitrogen gas, nitric oxide, and nitrogen dioxide. Very small quantities of simple hydrocarbons are generated, with the most commonly detected compounds being ethane, propane, butane, acetylene, ethylene, propane, benzene, and toluene. Trace quantities of undetonated energetic materials and small quantities of particulate matter also are released. Most of the metal content in airborne particulate matter released by detonations comes from the energetic material itself rather than from volatilization of the metal casing of the ordnance item. Pyrotechnic materials generally have a higher metals content than do explosive materials or propellants, as well as a higher chlorine content. Most of the chlorine is converted initially to hydrogen chloride, which may subsequently react with other compounds in the air.

Based on the general nature of detonation processes and the very low emission rates that have been published in studies of munitions firing and open detonations, emissions associated with ordnance use at SBMR pose very little risk of creating adverse air quality impacts. Consequently, air quality impacts from munitions use under the Proposed Action are considered less than significant.

*Engine emissions from military vehicle use.* The Proposed Action would increase the number of tactical and support vehicles at SBMR from 659 to 1,005. Vehicle use would be distributed among different installations, but all vehicles would be based at SBMR. Estimated annual use of military vehicles at SBMR would increase by 47 percent in vehicle miles traveled (VMT) and by 50 percent in vehicle operating hours. Annual military vehicle emissions would increase by 86.5 percent, compared to No Action, but would result in too small a net increase in ozone precursor emissions to have a measurable effect on ozone levels and would not affect the attainment status of the area. Figure 5-14 summarizes the estimated net increase in annual engine emissions from military vehicle use at SBMR under the Proposed Action. The net increase in military vehicle engine emissions would be 3 tons (2.7 metric tons) per year for reactive organic compounds, 28.5 tons (25.9 metric tons) per year for nitrogen oxides, 8.8 tons (8 metric tons) per year for carbon monoxide, 0.3 ton (0.3 metric ton) per year for sulfur oxides, and 2.6 tons (2.3 metric tons) per year for $PM_{10}$. Because the increase in emissions for any pollutant would result in too small a net increase in ozone precursor emissions to have a measurable effect on ozone levels they would not affect the attainment status of the area. Therefore, emissions from increased military vehicle use at SBMR would be a less than significant impact.

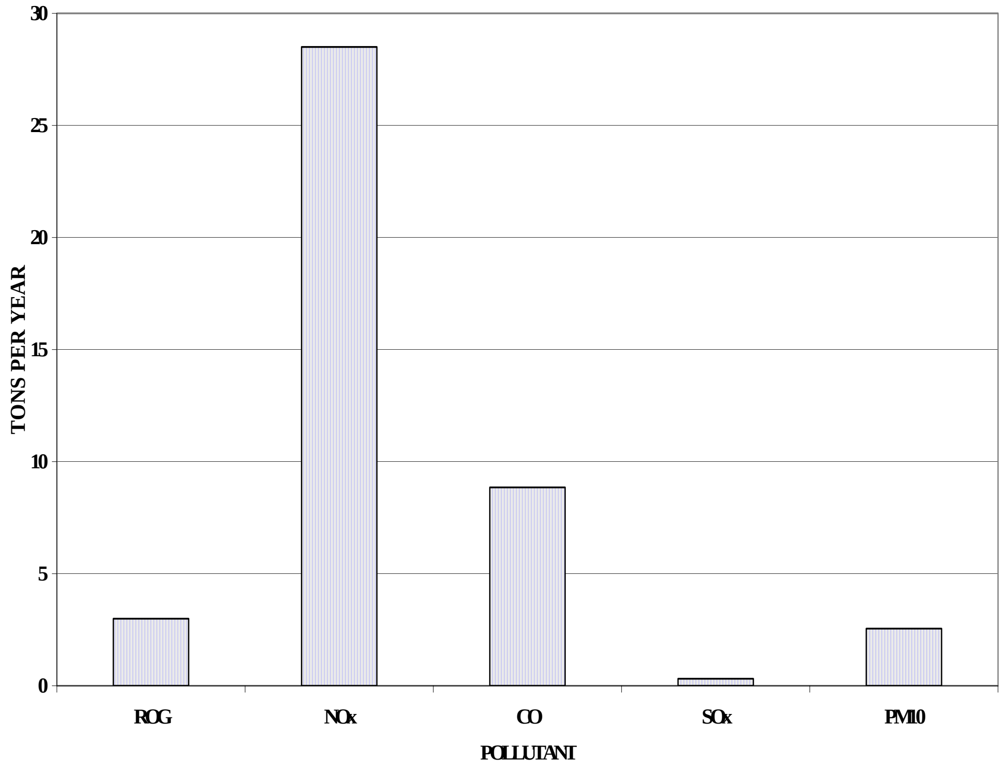



Figure 5-14. Net Change in Military Vehicle Emissions for the Proposed Action: Schofield Barracks

Wind erosion from areas disturbed by military vehicle use. Off-road vehicle activity can reduce or eliminate vegetation cover in affected areas, resulting in increased susceptibility to wind erosion. The amount of off-road vehicle activity at SBMR would increase by 64 percent under the Proposed Action. This increase in off-road vehicle activity would reduce vegetation cover in the affected maneuver areas. However, because wind speeds above the wind erosion threshold of 15 mph (24 kph) are very infrequent, there would not be any substantial wind erosion from affected areas. An estimated 0.5 ton (0.5 metric ton) per year of $PM_{10}$ would be generated by wind erosion from the affected areas, a net increase of about 0.2 ton (0.2 metric ton) per year. Consequently, wind erosion from disturbed areas would be a less than significant impact.

Emissions from increased aircraft operations. Under the Proposed Action, WAAF would be upgraded to better accommodate C-130 use of the airfield, but no substantial change to helicopter flight operations at WAAF would occur. Flight operations at WAAF are dominated by helicopter activity; fixed wing aircraft use (C-130 and C-17 aircraft) is a very small fraction of flight operations. Modest increases in fixed wing flight activity at WAAF would not have a substantial effect on total annual aircraft emissions. Consequently, the increase in aircraft emissions at WAAF under the Proposed Action would be a less than significant impact.

Emissions from wildfires. Tracers, flares, and pyrotechnics have the potential for starting wildfires on training range areas. It is difficult to predict the frequency and size of wildfires on training areas with any accuracy, since weather conditions are an important controlling factor. For purposes of this EIS, wildfire emissions have been estimated by assuming 150 acres (61 hectares) burn each year at SBMR, with a fuel density of 19 tons (17 metric tons) per acre. Resulting emissions would be as follows:

- 0.44 ton carbon monoxide (0.40 metric ton);
- 0.01 ton nitrogen oxide (0.01 metric ton); and
- 0.05 ton $PM_{10}$ (0.05 metric ton).

These emission quantities would not produce any significant air quality impacts in the ROI. Consequently, emissions from wildfires on range areas are considered a less than significant impact.

In addition to accidental wildfires on training areas, controlled burns are sometimes used to manage vegetation on range areas or to prepare areas for UXO clearance. Controlled burns are not frequent events, and so the resulting emissions have not been estimated. These emissions would be considered in the prescribed burn plans prior to the actual burns.

Other emissions from personnel increases. The Proposed Action would increase the number of military personnel at SBMR by 810. This represents a 5.5 percent increase in combined military and civilian personnel. Estimated annual personal vehicle emissions associated with the net increase in commute vehicle traffic would include approximately the following:

- 8.2 tons (7 metric tons) of reactive organic compounds;
- 67 tons (61 metric tons) of carbon monoxide;
- 7.5 tons (7 metric tons) of nitrogen oxides;
- 0.05 ton (0.05 metric ton) of sulfur oxides; and
- 11.3 tons (10.3 metric tons) of $PM_{10}$.

These emissions would create too small a net increase in ozone precursor emissions to have a measurable effect on ozone levels and would not affect the attainment status of the area. Consequently, emissions from increased commute traffic at SBMR would be a less than significant impact under the Proposed Action.

Existing stationary emission sources at SBMR would remain in use under the Proposed Action. Existing incinerators are being phased out and replaced with other methods of document destruction. The change in personnel numbers at SBMR would be too small to affect other stationary source operations. Because diesel and jet propulsion fuels have a low volatility, there would not be a substantial change in emissions associated with fuel storage and handling under the Proposed Action. No significant air quality impacts are anticipated from continued operation of stationary sources.

### *Reduced Land Acquisition*

Reduced Land Acquisition would result in the same impacts on air quality as the Proposed Action, with minor differences as discussed below.

#### Significant Impacts Mitigable to Less Than Significant

*Impact 1: Fugitive dust from military vehicle use.* Vehicle numbers for the 2nd Brigade would be the same under Reduced Land Acquisition as discussed for the Proposed Action. Vehicle maneuver activities would occur on fewer acres. The resulting increase in relative intensity of vehicle disturbance would produce greater impacts on vegetation and a slight increase in fugitive dust generation. Resulting $PM_{10}$ emissions would be approximately 1,686 tons (1,529 metric tons) per year, an increase of almost 826 tons (749 metric tons) per year compared to No Action. Approximately 59 percent of the net increase in fugitive $PM_{10}$ emissions would be associated with vehicle travel on unpaved roads, with the remaining 41 percent from off-road vehicle maneuver activity. Dispersion modeling analyses discussed under the Proposed Action indicate that fugitive dust emissions from vehicle travel on unpaved roads and from vehicle operations in off-road maneuver areas have the potential for violating the federal 24-hour $PM_{10}$ standard at off-post locations. The substantial increase in fugitive $PM_{10}$ emissions from military vehicle use at SBMR, the potential for exceeding the federal 24-hour $PM_{10}$ standard, and the potential impacts on quality of life to surrounding communities result in a significant air quality impact at SBMR under the RLA Alternative. The impact from fugitive dust emissions would be reduced to a less than significant level through mitigation programs that include using washed gravel on military vehicle trails; periodically applying dust control chemicals; monitoring ambient $PM_{10}$ concentrations; and/or developing an adaptive management program to manage training area lands and modifying training procedures as necessary to ensure compliance with federal air quality standards.

*Regulatory and Administrative Mitigation 1.* The mitigation measures for fugitive dust from off-road vehicle maneuver activity would be the same as those discussed under the Proposed Action.

#### Less than Significant Impacts

*Emissions from construction activities.* Reduced Land Acquisition would require most of the same construction projects as discussed under the Proposed Action. QTR2, however, would be constructed at PTA instead of at SBMR. Even without construction of QTR2 at SBMR, nitrogen oxide emissions from construction equipment would increase by 100 tons (91 metric tons) in 2004 and 126 tons (114 metric tons) in 2005 (Figure 5-15). Nitrogen oxide emissions are of concern primarily as an ozone precursor. Even though the construction emissions would increase, annual emissions of ozone precursors from construction activities associated with the RLA Alternative would be too small a net increase to have a measurable effect on ozone levels and would not change the attainment status of the area. Consequently, construction-related emissions under the RLA Alternative would have a less than significant air quality impact.

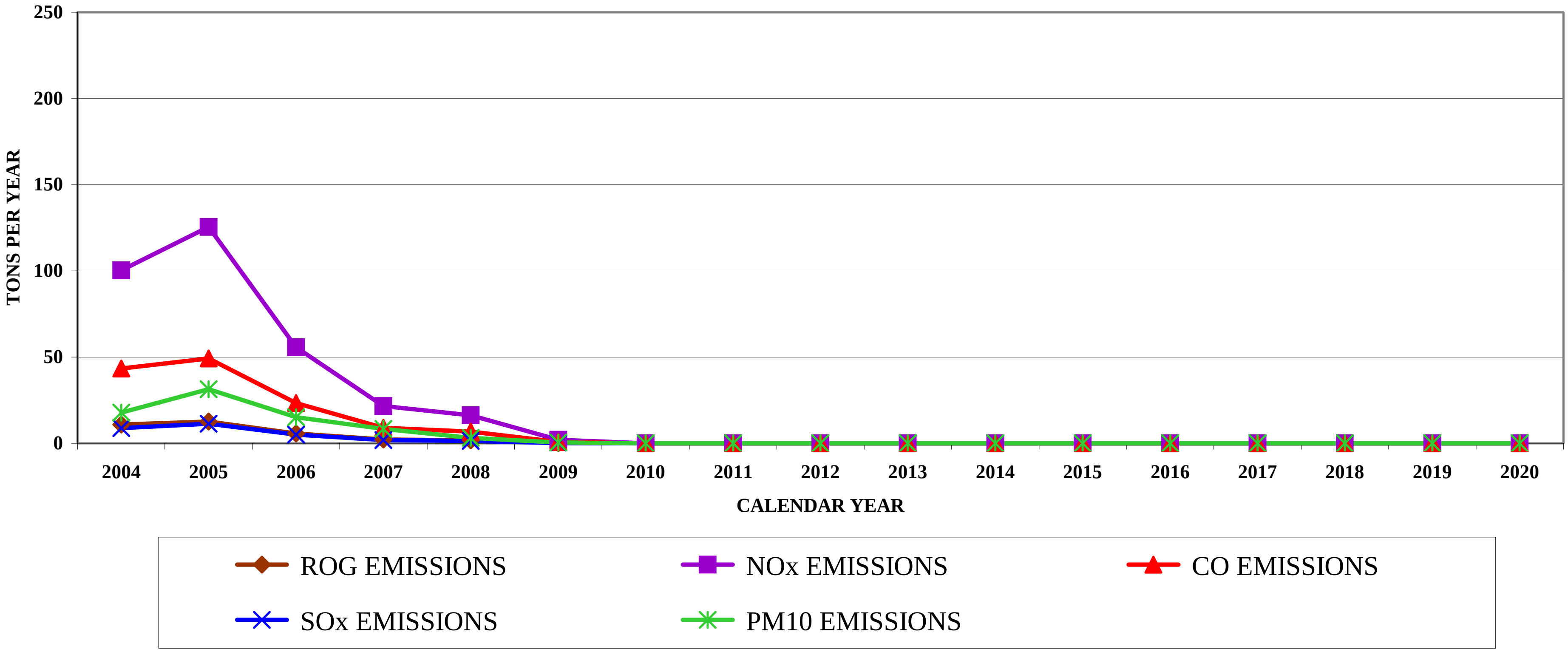



Figure 5-15. Annual Construction Emissions, Schofield Barracks, Reduced Land Acquisition

Emissions from ordnance use. Ordnance use at SBMR under Reduced Land Acquisition would be somewhat less than under the Proposed Action because QTR2 would be constructed at PTA rather than at SBMR. Annual munitions use at SBMR would increase by about 11 percent, compared to No Action (from about 10.1 million rounds per year to about 11.3 million rounds per year). Approximately 95 percent of the annual munitions use would be small arms ammunition. As discussed for the Proposed Action, emissions associated with ordnance use pose very little risk of creating adverse air quality impacts. Consequently, air quality impacts from munitions use under Reduced Land Acquisition are considered less than significant.

Engine Emissions From Military Vehicle Use. Military vehicle use at Schofield Barracks under Reduced Land Acquisition would be essentially the same as discussed for the Proposed Action. As illustrated previously in Figure 5-12, the net increase in military vehicle engine emissions would be 3 tons (2.7 metric tons) per year for reactive organic compounds, 28.5 tons (25.9 metric tons) per year for nitrogen oxides, 8.8 tons (8 metric tons) per year for carbon monoxide, 0.3 ton (0.3 metric ton) per year for sulfur oxides, and 2.6 tons (2.3 metric tons) per year for $PM_{10}$. These emissions would create too small a net increase in ozone precursor emissions to have a measurable effect on ozone levels and would not affect the attainment status of the area. Consequently, emissions from military vehicle use at Schofield Barracks would be a less than significant impact under the Proposed Action.

Wind Erosion From Areas Disturbed by Military Vehicle Use. Wind erosion from vehicle maneuver areas at Schofield Barracks would be slightly higher under the RLA Alternative than discussed for the Proposed Action. An estimated 0.6 tons (0.5 metric tons) per year of $PM_{10}$ would be generated by wind erosion from the affected areas, a net increase of about 0.3 tons (0.3 metric tons) per year compared to No Action. Consequently, wind erosion from disturbed areas would be a less than significant impact under Reduced Land Acquisition.

Emissions From Increased Aircraft Operations. Reduced Land Acquisition would have the same minimal effect on emissions from aircraft operations at WAAF as discussed for the Proposed Action. Consequently, the increase in aircraft emissions at WAAF under Reduced Land Acquisition would be a less than significant impact.

Emissions From Wildfires. Wildfire and controlled burn conditions at Schofield Barracks would be the same under Reduced Land Acquisition as under the Proposed Action. As discussed for the Proposed Action, emissions from wildfires and controlled burns would be a less than significant impact.

Other Emissions From Personnel Increases. Changes in personnel numbers would be the same under Reduced Land Acquisition as under the Proposed Action. Emissions from added commute traffic would be the same as discussed under the Proposed Action. These emissions would create too small a net increase in ozone precursor emissions to have a measurable effect on ozone levels and would not affect the attainment status of the area. Consequently, emissions from increased commute traffic at Schofield Barracks would be a less than significant impact under the Proposed Action. Existing stationary emission sources at Schofield Barracks would remain in use under Reduced Land Acquisition. No significant air quality impacts are anticipated from continued operation of existing stationary sources.

### *No Action*

#### Less than Significant Impacts

*Emissions from ordnance use.* Overall ordnance use under No Action would be about 19 percent less than under the Proposed Action. Based on the general nature of detonation processes and the very low emission rates that have been identified in studies of munitions firing and open detonations, emissions associated with ordnance use at SBMR pose very little risk of creating adverse air quality impacts. Consequently, air quality impacts from current munitions use under No Action are considered less than significant

*Engine emissions from military vehicle use.* The military vehicle fleet would remain at 659 vehicles under No Action. Estimated annual emissions from vehicle engine operations would be approximately the following:

- 3.5 tons (3.1 metric tons) of reactive organic compounds;
- 33 tons (30 metric tons) of nitrogen oxides;
- 10 tons (9.3 metric tons) of carbon monoxide;
- 0.4 ton (0.3 metric ton) of sulfur oxides; and
- 2.9 tons (2.7 metric tons) of $PM_{10}$.

These emission quantities would create too small a net increase in ozone precursor emissions to have a measurable effect on ozone levels and would not affect the attainment status of the area. Consequently, military vehicle engine emissions would have a less than significant impact under No Action.

*Fugitive dust from military vehicle use.* Vehicle numbers and estimated annual use levels would remain unchanged under No Action. Fugitive dust $PM_{10}$ emissions from military vehicle use at SBMR would remain at the current level of about 877 tons (796 metric tons) per year. Because conditions at SBMR have not led to any known violations of state or federal ambient air quality standards, fugitive dust from military vehicle use at SBMR would have a less than significant impact under No Action.

*Wind erosion from areas disturbed by tactical vehicle use.* Vehicle maneuver activity at SBMR would remain the same under No Action. An estimated 0.2 ton (0.2 metric ton) per year of $PM_{10}$ would be generated by wind erosion from the affected areas. Consequently, wind erosion from disturbed areas would be a less than significant impact under No Action.

*Emissions from increased aircraft operations.* Aircraft operations at WAAF would not change under No Action. Consequently, there would be no increase in aircraft emissions. Because there would be no change in conditions that have not created any known violations of state or federal ambient air quality standards, emissions from aircraft operations under No Action would have a less than significant impact on air quality.

*Emissions from wildfires.* The use of tracer rounds or pyrotechnics and the resultant risk of wildfires on training ranges at SBMR would not change under No Action. Emissions from wildfires under No Action are unlikely to produce significant air quality impacts in the ROI. Consequently, emissions from wildfires on range areas are considered a less than significant impact under No Action.

*Other emissions from personnel increases.* Personnel numbers at SBMR would not change under No Action. Emissions from commute traffic under No Action would remain the same. Stationary emission sources at SBMR would remain in use under No Action. Existing incinerators are being phased out and replaced with other methods of document destruction. Because there would be no change from conditions that have not created any known violations of state or federal ambient air quality standards, emissions from these sources would have a less than significant impact under No Action.

### *No Impact*

*Emissions from Construction Activities.* No construction projects are associated with No Action, so there would be no air quality impact from construction under No Action.

## 5.6 NOISE

### 5.6.1 Affected Environment

The dominant noise sources at SBMR include military and personal vehicle traffic, small arms and heavy weapons firing, and helicopter flight activity. Noise from heavy weapons firing affects most of the Main Post. No live-fire training occurs in SBER, and there are no firing ranges or ordnance impact areas there. The 65 dBA Ldn contour around WAAF extends onto Leilehua Golf Course, but not into any residential area (USAEHA 1993B; US Army CHPPM 1999). Individual detonations from heavy weapons firing are readily audible in residential areas near the boundaries of the base. Noise from aircraft and helicopter flight activity at WAAF also affects on-post housing areas and residential areas beyond the base boundaries.

The noise complaint program for Army installations in Hawai'i is managed through the Public Affairs Office, Community Relations Department at Schofield Barracks (phone number 808 655-2919 or at http://www.25IDL.army.mil/). Noise and other complaints are logged with a brief checklist form to summarize the nature of the complaint and the activity or equipment that appears to be generating the complaint. Complaints regarding aircraft or helicopter operations are referred to the Aviation Division for investigation and follow-up. Complaints related to other noise sources or activities are referred to the appropriate unit or office for investigation and follow-up.

Low altitude aircraft and helicopter flight activity are a source of periodic noise complaints from communities surrounding SBMR. Small arms firing, heavy weapons firing, use of simulators, use of demolition charges, and vehicle traffic also generate occasional noise complaints. Most complaints are about discrete events rather than about overall average noise conditions.

Estimated noise contours from existing artillery firing and other high explosives use are shown in Figure 5-16. Noise zones are based on Army land use compatibility and CHPPM guidelines. These guidelines are used to determine the best locations for varying activities when planning expansion into areas currently not exposed to any noise levels. Zone I (Ldn levels below 62 dBC) Are considered compatible with all residential land use. Approximately 15 percent of the population would be annoyed with these levels. Zone II conditions (Ldn levels of 62 to 70 DbC) are considered normally unacceptable for noise-sensitive land uses such as housing areas, educational facilities, and medical facilities. Approximately 15-39 percent of the population would be annoyed with these levels. Zone III conditions (Ldn levels over 70 dBC) are considered incompatible with residential and educational land uses. Forty percent or more of the population would be annoyed by these levels. Studies conducted by EPA found that people living in noisy areas have acclimated to those noise levels and are less affected by the increased noise levels than people living in relatively quite locations.

**Figure 5-16**
Existing Noise Levels at Schofield Barracks Military Reservation

The existing noise contours in Figure 5-16 represent a weighted average of annual noise conditions, not a constant average noise level. Noise levels at any time can be significantly lower or somewhat higher than the values indicated by the noise contours, since weighted average noise levels are disproportionately influenced by the loudest events. The Ldn noise contours shown in Figure 5-16 incorporate a 10 dB penalty factor for nighttime noise. Approximately 10 percent of large ordnance item use occurs during nighttime hours (from 10:00 PM to 7:00 AM).

Noise contours representing existing noise levels indicate that Zone II conditions affect all but the easternmost portion of the cantonment area and Zone III conditions (with an Ldn above 70 dBC) affect the western edge of the cantonment area (US Army CHPPM 2003). Off-post residential areas in the Wahiawa, Mililani Mauka, and Mililani Town areas are considered Zone I areas and therefore not impacted by present ordnance firing noise conditions. Zone II noise conditions (Ldn levels of 62 to 70 dBC) encompass most of the cantonment area on the Main Post, reaching to the vicinity of Heard Avenue in the eastern portion of the cantonment area and extend off-post into undeveloped areas north and south of the cantonment area. Solomon Elementary School and Hale Kula Elementary School are presently within the Zone II noise exposure area. However, because the elementary schools are not in use during nighttime hours, noise levels without the nighttime noise penalty factor are more representative of conditions during daytime use periods. In the absence of the nighttime noise penalty factor, Solomon Elementary School is currently exposed to Zone II conditions and Hale Kula Elementary School is currently exposed to Zone I conditions. Zone III conditions affect some of the western-most housing areas at SBMR. The Zone III contour extends east of Kahoolawe Avenue in the northwestern portion of the cantonment area and east of Beaver Road in the southwestern portion of the cantonment area.

Short-term noise monitoring in the western part of the cantonment area was conducted as part of the EA for the Mission Support Training Facility and the Information Services Facility (Y. Ebisu & Associates 2002). Noise levels along portions of Trimble Road and Beaver Road were measured for intervals of about one to one-and-a-half hours during daytime hours on two days in May 2002. Monitoring locations were on the north side of Trimble Road east and west of Beaver Road, and on the east side of Beaver Road north of Trimble Road. Average noise levels at distances of 50 to 66 feet (15 to 20 meters) from the centerline of the roadway ranged from 57.5 dBA to 61.7 dBA along Trimble Road. The average noise level at one location increased to 69.4 dBA when a fire truck with its siren going passed through the area. The fire truck siren produced a brief peak noise reading of about 100 dBA. The average noise level at a distance of 69 feet (21 meters) from Beaver Road was 59 dBA. Noise sources identifiable during these monitoring periods included vehicle traffic, helicopter flight activity, and artillery firing. Noise levels generally varied from slightly under 50 dBA to about 70 dBA, with occasional noise events exceeding 70 dBA. Maximum noise levels for the loudest vehicles and helicopters were typically between 70 and 80 dBA. Maximum noise levels from artillery firing were generally less than 70 dBA at these locations.

The noise study for the Mission Support Training Facility and the Information Services Facility (Y. Ebisu & Associates 2002) also summarizes data from an April 1993 noise monitoring program at the nearby DPW 4 site. During periods of 155 mm howitzer firing, peak noise levels at the DPW 4 site were typically between 89 and 96 dBC, with a maximum of about 108 dBC. Fifteen of 154 events were measured at or above 100 dBC, and 30 events were measured at less than 85 dBC. The peak noise levels measured during the 1993 study do not indicate any blast noise exposure problems, since the measured C-weighted peak levels indicate that unweighted peak dB levels were under the 115 dB threshold normally associated with a moderate rate of complaints about blast noise (US Army CHPPM 2001).

### 5.6.2 Environmental Consequences

#### *Summary of Impacts*

Noise sources associated with project alternatives at SBMR include construction activity, ordnance use, military vehicle traffic, aircraft operations, and personal vehicle traffic. Of these sources, changes in ordinance use from the Proposed Action and the Reduced Land Acquisition (RLA) Alternative primarily affect the noise levels. Other sources have little to no effect on existing noise levels. Noise from ordnance use has been evaluated using computer modeling to develop estimated annual average Ldn contours. Ldn noise levels are a day-night average noise level, with a 10 dB penalty factor added to nighttime noise levels to account for the higher annoyance associated with nighttime as opposed to daytime noise conditions. Noise conditions are categorized into three noise exposure zones for evaluating land use compatibility conditions: Zone I - compatible for all uses, Zone II - normally unacceptable for noise sensitive land uses such as housing areas, educational facilities and medical facilities unless buildings have been constructed with Noise Level Reduction (NLR) features to lower interior noise levels, and Zone III - generally incompatible with residential, educational and medical land uses.

Noise contours are based on the following factors:

- Total decibel levels produced based on total rounds of ammunition fired
- Total duration of exposure
- Time of exposure with a penalty for nighttime exposure

Construction projects at SBMR would be far enough from noise-sensitive areas to avoid significant noise impacts under both the Proposed Action and Reduced Land Acquisition. There would be no construction noise impacts under No Action.

Based on the information discussed above under affected environment, existing impacts from ordinance use under the No Action would be considered significant due to the presence of noise-sensitive land uses in Zone III and the possibility that some of the noise-sensitive land uses in Zone II have not been constructed with high enough Noise Level Reductions to ensure compatibility (see Figure 5-16).

The Proposed Action and Reduced Land Acquisition (RLA) Alternative would only slightly expand the existing Zone II and Zone III noise contours. The Zone II noise contour would expand eastward by about 985 to 1,300 feet (300 to 400 meters). The Zone III noise contour would stay relatively the same as existing conditions, except for a contraction westward by about 650 to 820 feet (200 to 250 meters) in an area outside the northern boundary of SBMR west of the cantonment area and an expansion eastward by about 325 to 490 feet (100 to 150 meters) in the southwestern portion of the cantonment area. Some additional on-post housing would be encompassed by the expanded Zone II and Zone III noise contours. No change would occur to on-post schools – with one elementary school, Solomon Elementary School remaining exposed to Zone II noise conditions during its hours of operation. The slight increase of the Zone II and Zone III noise exposure to on-post housing areas would be due to an increase in the number of 155mm artillery rounds fired and an increase in nighttime artillery and mortar firing under the Proposed Action and the RLA Alternative. The increase in training may result in an increase in noise complaints from surrounding communities. The Proposed Action and RLA Alternative would only slightly increase existing noise conditions as discussed under the No Action – thereby remaining a significant impact to persons residing on or working at SBMR (see Figure 5-17).

Tactical and support vehicles would continue to travel within SBMR and between SBMR and other installations during military training exercises under all alternatives. The size of the military vehicle fleet assigned to the 2nd Brigade would increase from 659 vehicles to 1,005 vehicles under the Proposed Action and the RLA Alternative. The expansion of the vehicle fleet based at SBMR would include introduction of the Stryker. Despite increased numbers of vehicles, traffic volumes and vehicle speeds typically would be too low to cause noise problems for areas surrounding roadways and vehicle trails. Consequently, noise from military vehicle traffic would be a less than significant impact under all alternatives.

The Proposed Action and the RLA Alternative would not result in any meaningful changes in helicopter flight operations at WAAF, and therefore there would be no significant noise impacts from helicopter flights. Improvements to WAAF under the Proposed Action and the RLA Alternative would improve facilities for C-130 aircraft operations. Increased use of WAAF by C-130 aircraft would produce only minor changes in airfield vicinity noise levels, since airfield operations would continue to be dominated by helicopter flight activity. Changes in airfield vicinity noise levels would be less than significant under the Proposed Action and the RLA Alternative. There would be no changes to airfield vicinity noise levels under No Action.

The Proposed Action and the RLA Alternative would both introduce UAV operations into military air space over SBMR. Because most UAV flight activity is expected to be at flight altitudes providing separation from other aircraft flight activity, there would be no significant change in aircraft noise levels over SBMR or SBER.

Total military and civilian personnel based at SBMR would increase by 5.5 percent under the Proposed Action or the RLA Alternative. This would not produce a significant noise impact from added personal vehicle traffic along off-post or on-post roadways. No Action would not produce any change in personnel numbers at SBMR; consequently, there would be no noise impact from increased personal vehicle traffic under No Action.

**Figure 5-17**
Proposed Action Noise Levels at Schofield Barracks Military Reservation

Table 5-18 summarizes the significance of noise impacts under the Proposed Action, the RLA Alternative, and No Action.

**Table 5-18**
**Summary of Potential Noise Impacts at SBMR/WAAF**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Noise from construction activities | ⊙ | ⊙ | ○ |
| Noise from ordnance use | ⊗* | ⊗* | ⊗ |
| Noise from military vehicle use | ⊙ | ⊙ | ⊙ |
| Noise from aircraft operations | ⊙ | ⊙ | ⊙ |
| Noise from added personnel vehicle traffic | ⊙ | ⊙ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

* The PA and RLA would have a minor increase in noise over No Action. The determination of significance is based on existing No Action noise levels.

LEGEND:

| | | | | |
|---|---|---|---|---|
| ⊗ | = Significant | + | = | Beneficial impact |
| ⊘ | = Significant but mitigable to less than significant | N/A | = | Not applicable |
| ⊙ | = Less than significant | | | |
| ○ | = No impact | | | |

### *Proposed Action*

The Army was concerned about the accuracy of significant adverse noise impacts that had been identified in the Draft EIS. As such, the noise model input parameters that were used for the Draft EIS were more closely evaluated, and it was found that certain incorrect assumptions had been made, namely that two noise model input parameters were incorrect, as follows:

- For the SBMR blast noise model input parameters used in the Draft EIS, it was assumed that approximately 33 percent of the overall volume of large-caliber weapons fire would occur between 10:00 PM and 7:00 AM. Under closer evaluation, it was determined that a more accurate estimate of weapons firing volumes for the 10:00 PM to 7:00 AM time period was approximately 10 percent of the overall firing volume.
- The blast noise modeling efforts were found to reference a slightly outdated and inaccurate equipment package; the input parameters were corrected to include the correct SBCT equipment package.

Correction of these blast noise model input parameters reduced the lateral noise contours slightly, but did not change the overall determination of a significant adverse impact on the local noise environment at SBMR.

### *Significant Impacts*

*Impact 1: Noise from ordnance use.* Noise levels from weapons firing and ordnance detonations are quite variable, with noise levels at long distances influenced in part by weather conditions. Small arms firing can produce relatively high peak noise levels at localized areas around the range. Equations for estimating noise from small arms firing typically predict the peak unweighted dB value (Lpk). Because human hearing does not respond as rapidly as do noise monitoring instruments to impulse noise events, the 1/8 second Lmax noise level measurement is a better indicator of how people perceive impulse noise than the unweighted peak dB measurement is. The 1/8 second Lmax value typically will be about 15 to 20 dB less than the Lpk measure. Limited studies of annoyance from noise near civilian shooting ranges have found that the A-weighted 1/8 second Lmax value is the most useful predictor of annoyance (Sorensen and Magnusson 1979). For most small arms types, the A-weighted decibel value will be about 3.5 dB less than the unweighted decibel value. Thus, the A-weighted Lmax for small arms firing is about 20 dB less than the peak unweighted dB value. Lmax noise levels from small arms firing are typically about 94 to 101 dBA at 500 feet and 86 to 93 dBA at 1,000 feet. Noise levels from small arms firing typically drop below levels that cause significant annoyance at distances of about 3,500 feet (1,066 meters). Most blank ammunition for small arms and machine guns has a smaller propellant charge than that used for live ammunition. Consequently, noise from small arms blank ammunition typically generates noise levels about 4 to 5 dB below the noise level from live ammunition firing. Noise levels from firing blank small arms ammunition typically drop below levels that cause significant annoyance at distances of 2,500 to 3,000 feet (760 to 915 meters). Detonations of large caliber ordnance, such as a shell from a 155mm howitzer, can produce high peak noise levels at distances of up to two miles (three kilometers) and will be audible over longer distances, depending on weather conditions.

Future noise contours under the Proposed Action are illustrated in Figure 5-17. These noise contours are based on large caliber weapons firing and explosives use (US Army CHPPM 2004). The types of ordnance accounted for in the modeling analysis included 105mm and 155mm artillery, 60mm, 81mm, and 120mm mortars, antipersonnel mines, 40mm grenades, hand grenades, rockets and anti-tank missiles, and demolition charges. The modeling of noise contours for high explosive ordnance use is based on the expected annual amount of ordnance firing and ordnance detonations, taking into account the following factors:

- The locations of weapons firing points, target areas, and demolition training facilities on each training range;
- The types of weapons fired from each firing point on each range facility;
- The number of ordnance rounds of different types (including propellant charge differences) fired from each type of weapon at each firing point, with separate consideration of daytime firing events and nighttime firing events;
- The number and types of explosive ordnance items detonated at target areas or demolition training facilities on each range, with separate consideration of daytime and nighttime detonation events.

The Proposed Action noise contours reflect the following changes in munitions use at SBMR:

- 28 percent decrease in 105mm high explosive artillery rounds;
- 41 percent increase in other types of 105mm artillery rounds;
- 110 percent increase in 155mm high explosive artillery rounds;
- 227 percent increase in other types of 155mm artillery rounds;
- 0.3 percent decrease in high explosive mortar rounds;
- 128 percent increase in other types of mortar rounds;
- 20 percent increase in grenades;
- 53 percent decrease in mines;
- 488 percent increase in rockets; and
- 56 percent decrease in demolition charges.

Based on these modeling results, there would be a modest expansion of Zone II conditions and some small changes in the location of Zone III conditions within the SBMR ROI under the Proposed Action. Zone II conditions would expand eastward by about 985 to 1,300 feet (300 to 400 meters) to encompass additional troop and family housing areas on the eastern side of the Main Post. Zone II conditions would affect some undeveloped areas north and south of SBMR, but would not expand into existing off-post residential areas. Solomon Elementary School and Hale Kula Elementary School would remain under the Zone II noise contour (see Figure 5-17). However, as discussed under Section 5.6.1, in the absence of the nighttime noise penalty factor, Hale Kula Elementary is within Zone I conditions versus Zone II. Zone III conditions would remain unchanged or actually contract slightly in the northern portion of the Main Post, but would expand eastward by about 325 to 490 feet (100 to 150 meters) in the southwest corner of the cantonment area. Some additional family housing units would be encompassed by the Zone III contour in this area. The Zone II and Zone III noise contours would affect a larger portion of the developed cantonment area than occurs under existing conditions. Although the numerical increase in noise levels within the cantonment area at SBMR would be small, existing noise levels already represent a significant impact. Therefore, noise from increased ordnance use under the Proposed Action would remain a significant impact on people residing on or working at SBMR.

The primary factor resulting in the slight expansion of Zone II and Zone III noise exposure areas would be due to an increase in the number of 155mm artillery rounds fired and an increase in nighttime artillery and mortar firing. As with the existing condition, only about 10 percent of the total artillery and mortar firing would occur during nighttime hours (10:00 PM to 7:00 AM), although the number of individual ordnance items fired or detonated at night would increase by about 35 percent under the Proposed Action. The 10 percent nighttime training factor at SBMR is less than the more typical 15 percent factor that occurs at most Army installations. The increase in nighttime noise generation may result in an increase in noise complaints from surrounding communities. Because noise conditions would change only slightly from the No Action, the Proposed Action and RLA Alternative would continue to have a significant but only slightly increased noise impact from ordnance use.

*Mitigation 1.* The Army proposes to evaluate training techniques, scheduling and location to reduce overall noise impacts at SBMR. In this evaluation, the Army would consider, as feasible, the benefit of timing restrictions on training and moving certain training activities to PTA.

The Army proposes to provide noise-insulating measures whenever new buildings are constructed or existing buildings are renovated, such as modifications to window materials and cooling systems to noise sensitive land uses that are or that may become exposed to Zone II and Zone III noise conditions.

### *Less than Significant Impacts*

*Noise from construction activities.* The Proposed Action would require 11 construction projects at SBMR and WAAF, plus construction of a military vehicle trail between SBMR and HMR. Construction activities would occur from 2004 through early 2009. Individual items of construction equipment typically generate noise levels of 80 to 90 dBA at a distance of 50 feet (15 meters). With multiple items of equipment operating concurrently, noise levels can be relatively high during daytime periods at locations within several hundred feet of active construction sites. The zone of relatively high construction noise levels typically extends to distances of 400 to 800 feet (122 to 244 meters) from the site of major equipment operations. Locations more than 1,000 feet (305 meters) from construction sites seldom experience significant levels of construction noise.

Table 5-19 summarizes the estimated minimum distance between the sites for proposed construction projects and the nearest noise-sensitive land uses.

Construction noise levels would vary throughout the duration of each construction project. Typical construction site noise levels have been estimated for the different major construction stages of selected projects that are relatively close to noise-sensitive land uses. The noise levels estimated for these projects provide a reasonable estimate of construction noise levels expected for other construction projects.

Figure 5-18 illustrates noise levels expected from the noisiest stage of construction (foundation excavation and paving) for the VFTF. Construction activities would generate average daytime noise levels of about 55 dBA at the closest noise-sensitive area. Because incremental Ldn contributions from construction activities would be less than 65 dBA at the nearest noise-sensitive areas (1,950 feet distant), construction noise would be a less than significant impact.

**Table 5-19**
**Estimated Minimum Distance Between Construction Sites and Noise-Sensitive Land Uses**

| Proposed Project | Distance to Closest Noise-Sensitive Receptor | Noise-Sensitive Land Use Type |
|---|---|---|
| S1. Urban Assault Course and Training Facility | 9,150 feet (2,789 meters) | family housing |
| S2. Virtual Fighting Training Facility | 1,950 feet (594 meters) | family housing |
| S3. Range Control Facility | 1,050 feet (320 meters)<br>1,050 feet (320 meters) | troop housing<br>family housing |
| S4. Battle Area Complex | 1,500 feet (457 meters)<br>4,350 feet (1,326 meters) | troop housing<br>family housing |
| S5. Motor Pool Maintenance Shops | 450 feet (137 meters)<br>1,050 feet (320 meters) | family housing<br>Solomon Elementary School |
| S6. Tactical Vehicle Wash | 900 feet (274 meters) | Wahiawā Middle School |
| S7. Fixed Tactical Internet | not evaluated | construction activities too limited to create noise issues |
| S9. QTR1 Qualification Training Range | 1,500 feet (457 meters)<br>4,350 feet (1,326 meters) | troop housing<br>family housing |
| S10. QTR2 Qualification Training Range | 4,800 feet (1,463 meters) | family housing |
| S11. Multiple Deployment Facility | 2,250 feet (686 meters) | family housing |
| S12. Upgrade WAAF Apron for C-130 Aircraft | 1,500 feet (457 meters)<br>3,000 feet (914 meters) | family housing<br>Wheeler Elementary and Intermediate School |
| S13. Helemanō Military Vehicle Trail | 1,200 feet (366 meters)<br>1,000 feet (305 meters) | family housing<br>Hale Kula Elementary School |

Source: Tetra Tech staff analyses 2003

Figure 5-19 illustrates noise levels expected from the noisiest stage of construction (completion of the building shell) for the Range Control Facility. Construction activities would generate average daytime noise levels of about 63 dBA at the closest noise-sensitive area, which is 1,050 feet distant. Because incremental Ldn contributions from construction activities would be less than 65 dBA at the nearest noise-sensitive areas, construction noise would be a less than significant impact.

Figure 5-20 illustrates noise levels expected from the noisiest stage of construction (paving operations) for the Motor Pool Maintenance Shops. Most of the large vehicle parking area would be a substantial distance from family housing areas north of Lyman Road, but the closest portion of the area to be paved is about 450 feet (137 meters) from the housing area. When construction activity is closest to the housing area, daytime average noise impact

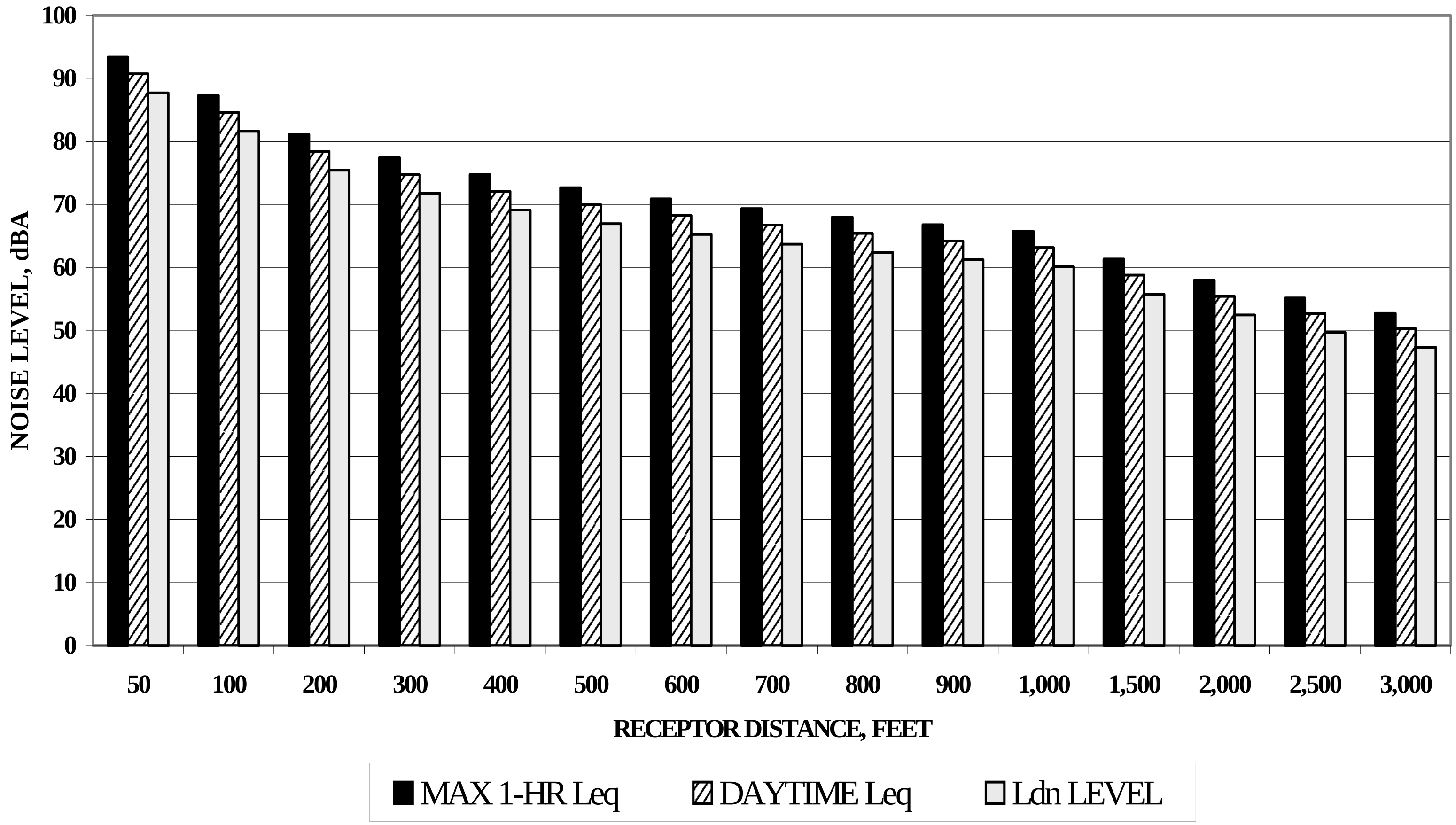



Figure 5-18 Construction Noise Impacts for Virtual Fighting Facility: Foundations & Paving

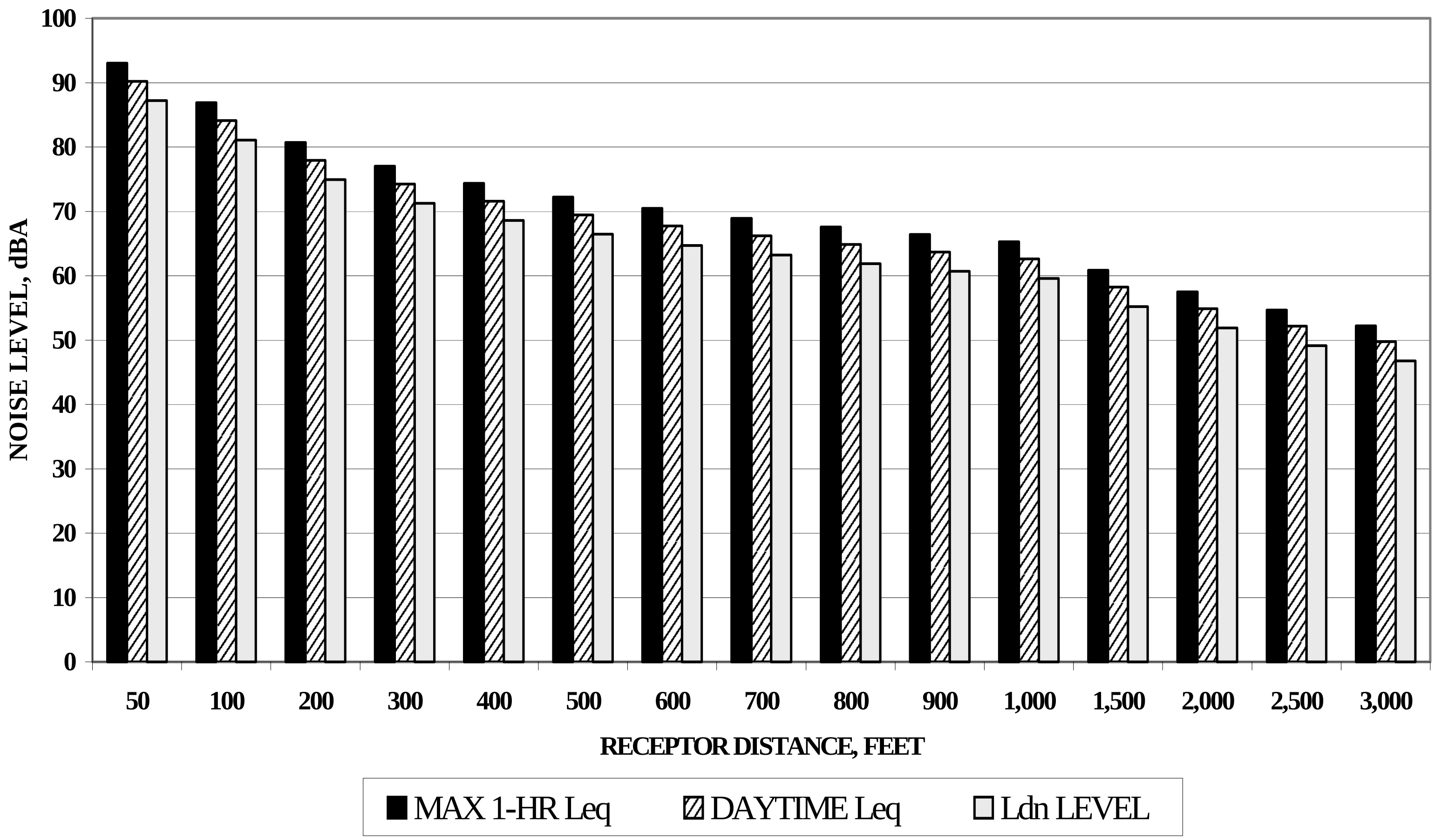



Figure 5-19 Construction Noise Impacts for Schofield Range Control Building: Building Shell

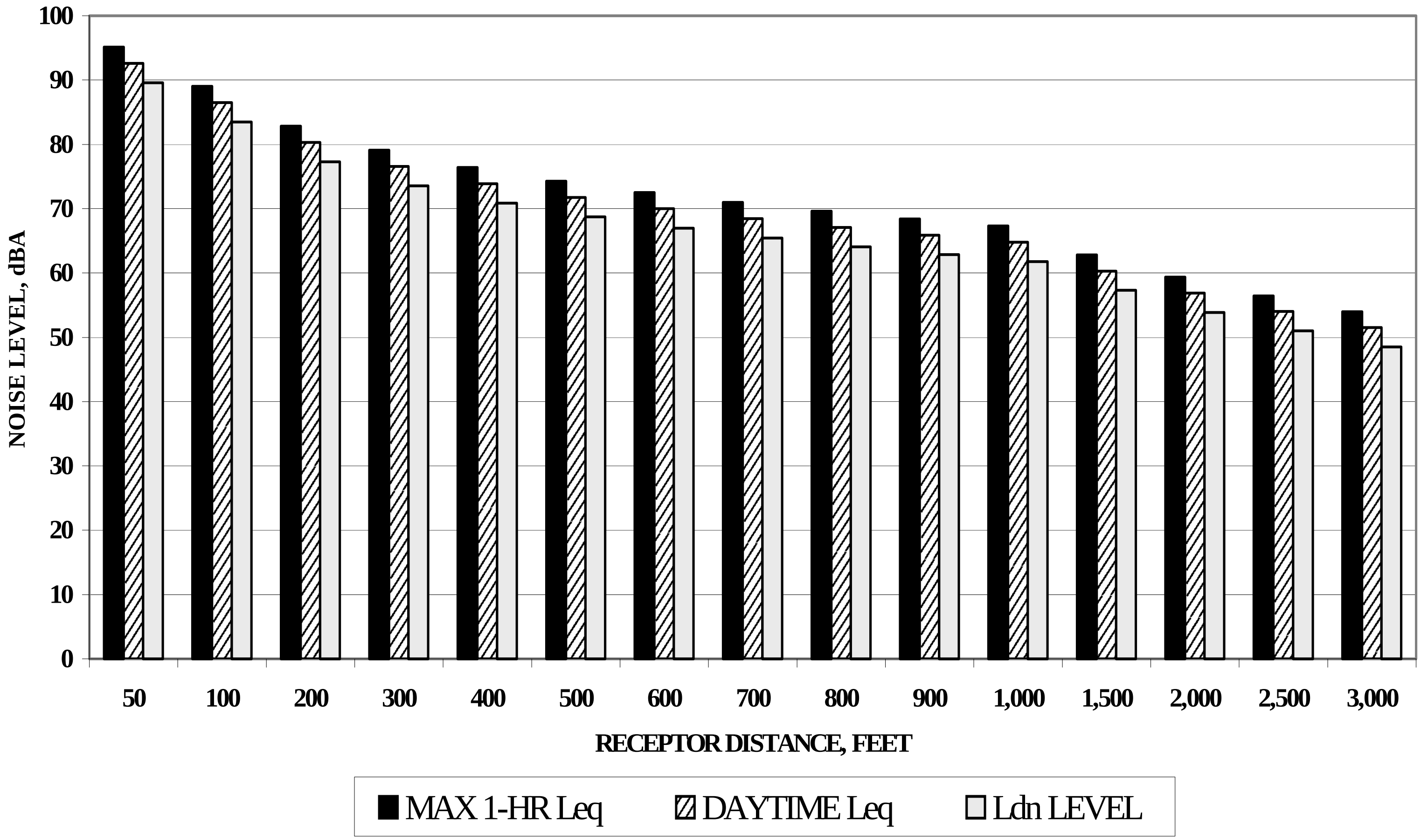



Figure 5-20 Construction Noise Impacts for Schofield Motor Pool Facility: Paving

would be about 72 dBA. The Ldn increment attributable to construction activities would be about 70 dBA. Maximum noise impacts at Solomon Elementary School would be a daytime average noise level of about 65 dBA and a maximum one-hour noise level of about 67 dBA. The noise estimates do not account for partial noise shielding that would be provided by buildings between the school site and the motor pool facility construction site. While construction activities would temporarily contribute Ldn increments of up to 70 dBA at the closest housing area, all of the noise would occur during daytime periods. No nighttime construction activity is expected. Consequently, this impact is considered less than significant.

Figure 5-21 illustrates noise levels expected from the noisiest stage of construction (excavation of lagoons and paving activities) for the Tactical Vehicle Wash Facility. Construction activities would generate average daytime noise levels of about 64 dBA at the closest noise-sensitive area, the south boundary of the Wahiawā Elementary School site (900 feet distant). Because average daytime noise contributions from construction activities would be less than 65 dBA at the nearest noise-sensitive area, construction noise would be a less than significant impact.

Figure 5-22 illustrates noise levels expected from the noisiest stage of construction (pavement removal) for the WAAF apron upgrade project. Construction activities would generate average daytime noise levels of about 60 dBA at the closest noise-sensitive area a family housing area 1,500 feet (460 meters) away. Average daytime noise levels would be about 51 dBA at the more distant Wheeler Elementary and Intermediate School (3,000 feet [900 meters] distant). Because incremental Ldn contributions from construction activities would be less than 65 dBA at the nearest noise-sensitive areas, construction noise would be a less than significant impact.

Most other construction projects would be further removed from noise-sensitive locations than the projects discussed above. Consequently, noise impacts from these projects would be less than the noise impacts discussed above. The noise levels presented in Figures 5-18 through 5-22 are typical and could be expected during construction of those other projects.

While construction schedules partially or fully overlap in various combinations, only two pairs of construction projects would occur concurrently in proximity to each other. The BAX and QTR1 would both be constructed in a similar time frame. These facilities would be 1,500 feet (457 meters) from the nearest noise sensitive area, a distance sufficient to offset the combined effect of construction activity at the two sites. The WAAF apron upgrade would occur concurrently with construction of the MDF. The MDF would be more than 750 feet (229 meters) further from the nearest noise sensitive area than the WAAF apron upgrade project site. Distances to the nearest noise-sensitive area are sufficient to avoid significant noise impacts from the concurrent construction activities.

Based on the analysis summarized above, construction activities associated with the Proposed Action would have a less than significant noise impact.

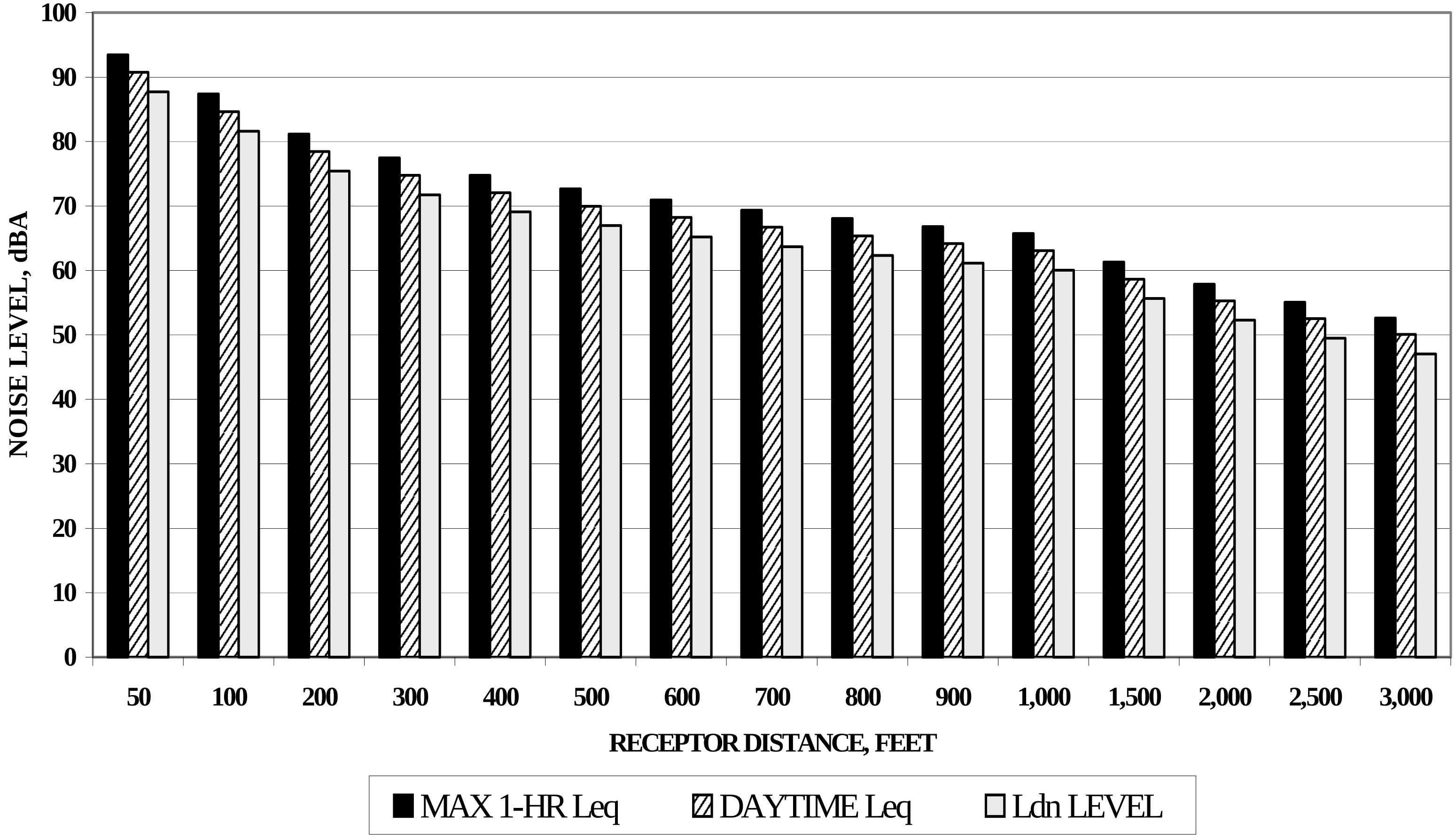



Figure 5-21 Construction Noise Impacts for Schofield Vehicle Wash Facility: Lagoons and Paving

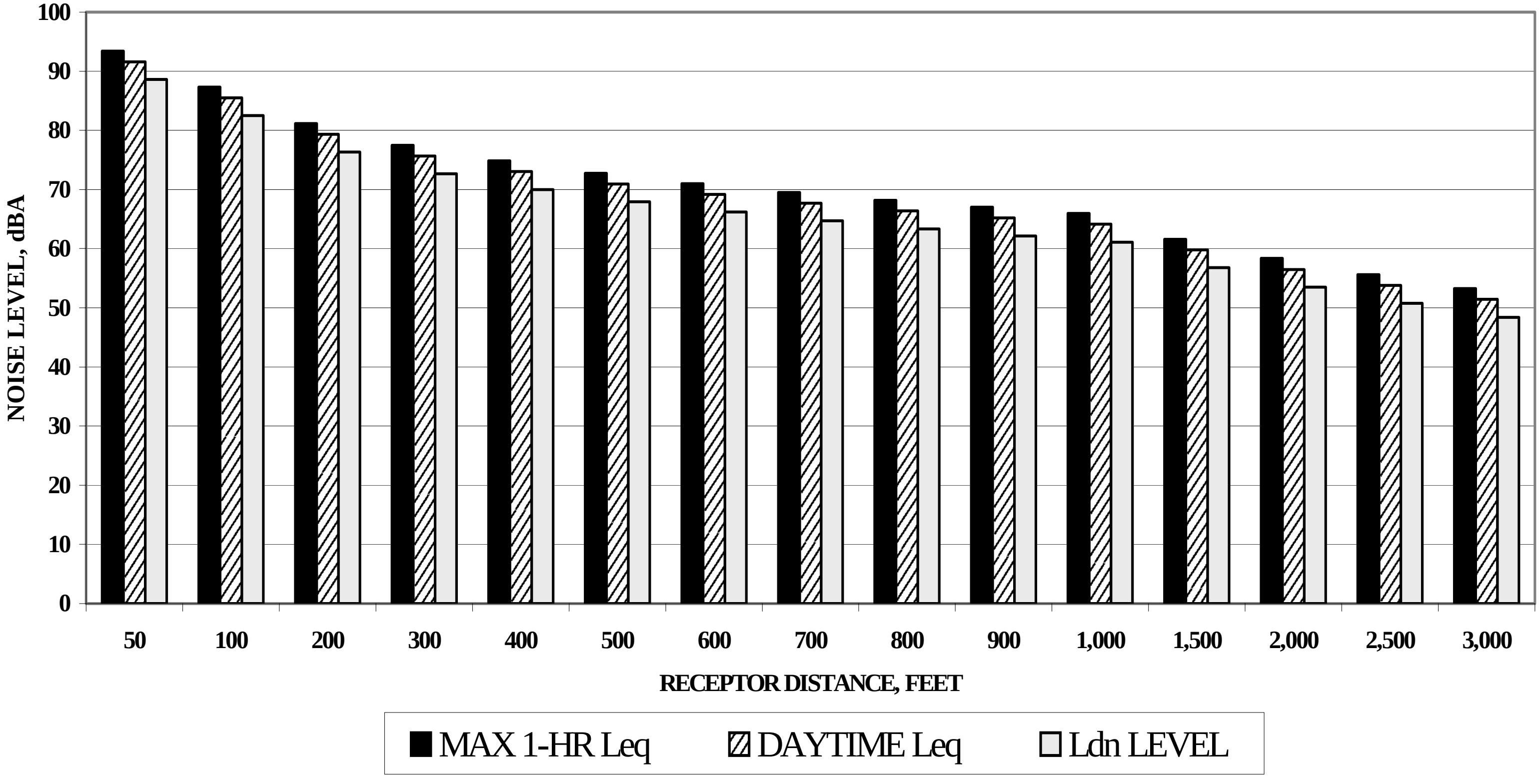



Figure 5-22 Construction Noise Impacts for Wheeler Airfield Apron Upgrade: Pavement Removal

*Noise from military vehicle use.* Tactical and support vehicles would travel within SBMR during military training exercises. Vehicles also would travel from SBMR to other installations in support of training exercises at those installations. Vehicle convoys using public roads on O'ahu are limited to no more than 24 vehicles in a group. Vehicles within a convoy group (also called convoy serials) typically are spaced about 165 to 330 feet (50 to 101 meters) apart. Convoy serials generally are spaced at least 15 to 30 minutes apart. These convoy procedures prevent situations where convoy vehicles dominate local traffic flow for substantial periods of time. Instead of creating conditions where military vehicle traffic dominates traffic noise conditions for a noticeable amount of time, convoy procedures result in noise from convoy traffic occurring as a sequence of multiple individual vehicle pass-by events within a background of normal traffic noise conditions.

Noise data are not readily available for most military vehicles, and noise data specific to the Stryker vehicle are not yet available. Noise data for heavy construction equipment provide some general guidance regarding expected noise levels from military vehicles. Vehicle noise generation equations used in highway traffic noise models provide additional useful noise estimates for various types of trucks and passenger vehicles. Limited vehicle drive-by noise data are available for the Bradley Fighting Vehicle (US Army Construction Engineering Research Laboratory 1985). The Bradley Fighting Vehicle is a tracked vehicle that has a larger engine (500 horsepower) and is heavier (25 to 33 tons) than the Stryker (which has a 350 horsepower engine and weighs 19 to 20 tons). Consequently, drive-by noise data for the Bradley Fighting Vehicle can be used as an upper limit for the expected noise levels from wheeled military vehicles.

Figure 5-23 summarizes maximum drive-by noise levels as a function of speed for various categories of vehicles. Noise levels for the three categories of multi-axle heavy trucks are quite similar at most vehicle speeds. Noise levels generated by the Stryker are expected to fall between those of multi-axle heavy trucks and those of the Bradley Fighting Vehicle.

Under the Proposed Action, the number of military vehicles assigned to the 2nd Brigade at SBMR would increase by slightly more than 52 percent. Most of the added vehicles would be Strykers, but 50 military vehicles of other types also would be added. Each of the 12 subordinate commands based at SBMR has its own vehicle fleet. The total government-owned vehicle fleet based at SBMR has not been inventoried for this EIS, but it exceeds 2,000 vehicles. Under the Proposed Action, Stryker vehicles would account for no more than 12 to 15 percent of the total military vehicle fleet based at SBMR. Military vehicle traffic, dominated by HMMWVs, light trucks, and medium trucks, would be expected to produce noise levels comparable to normal highway traffic that has a high fraction of medium and heavy trucks. Noise levels from individual vehicle pass-bys would be comparable to noise levels generated by typical highway truck traffic. The Stryker vehicle is expected to generate peak drive-by noise levels a few decibels higher than levels produced by typical multi-axle heavy trucks.

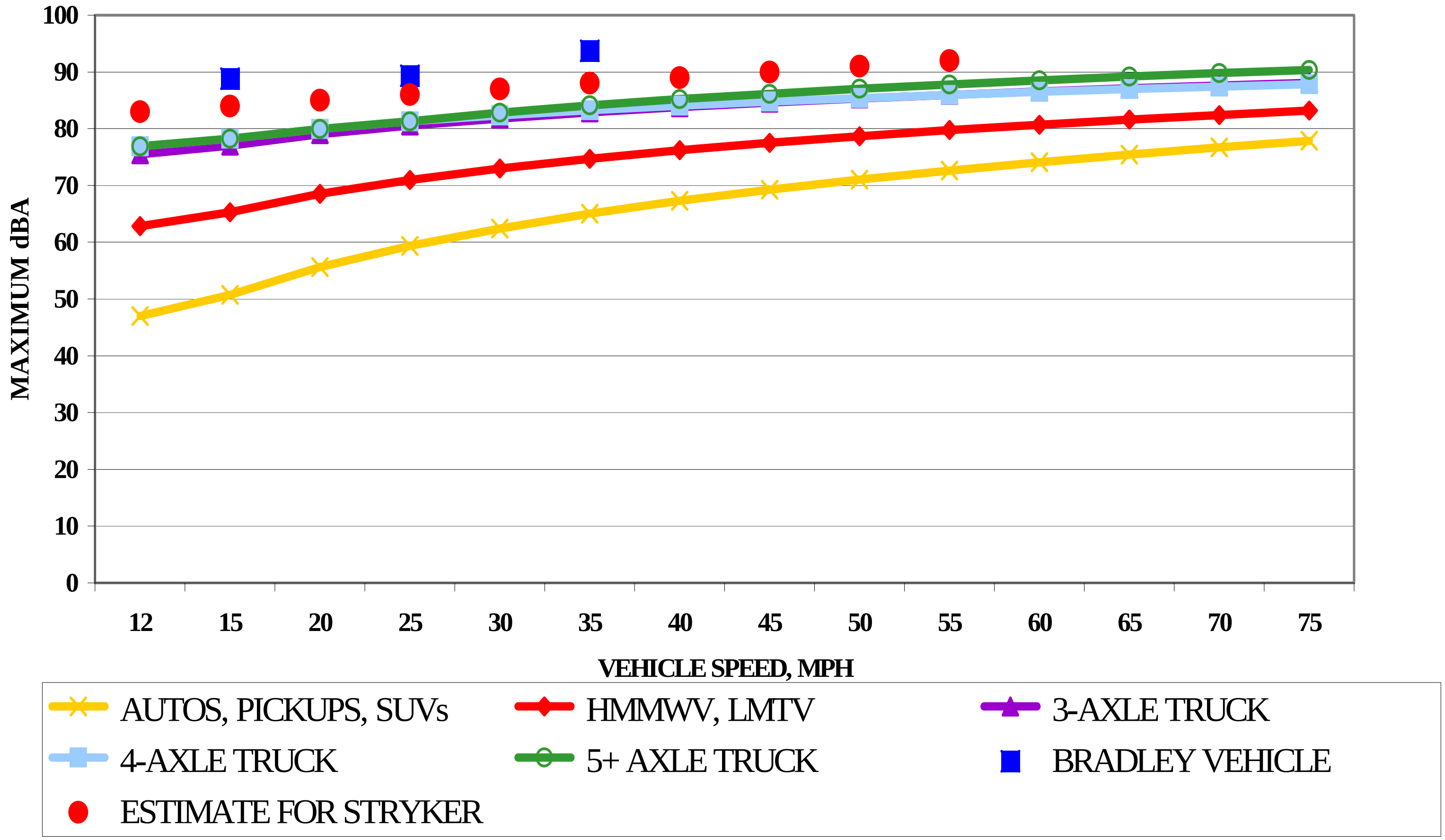



Figure 5-23 Peak Pass-by Noise Levels at 50 Feet (15 meters) for Different Vehicle Types

In general, it takes a doubling of noise source activity to create a 3 dBA increase in noise levels. This means that it takes a doubling of traffic volume to produce a 3 dBA change in resulting traffic noise levels. A 3 dBA noise level increase represents a 23 percent increase in perceived loudness. A 10 dBA noise level increase represents a doubling of perceived loudness. The procedures used for military convoy travel would prevent convoy traffic from substantially increasing traffic volumes on public roadways. Consequently, the Proposed Action would not produce any substantial change in traffic noise levels along public roads.

Noise levels along on-post roadways and along military vehicle trails would increase under the Proposed Action. However, overall traffic volumes and vehicle speeds generally are low for these types of roadways. As a result, noise increments attributable to vehicle traffic would remain within the Army's land use compatibility guidelines.

Traffic on military vehicle trails between SBMR and other installations would increase noise levels along the trail corridors during the periods of vehicle travel. Up to 56 vehicles might travel at one time between SBMR and DMR, and up to 173 vehicles might travel at one time between SBMR and KTA. Figure 5-24 illustrates average hourly noise levels for different volumes of vehicle traffic along a one-lane military vehicle trail such as Helemanō Trail. If the maximum number of vehicles departed within a single hour, the resulting hourly average noise level would be about 72 dBA at a distance of 50 feet (15 meters) from the trail, and less than 60 dBA at a distance of 400 feet (122 meters). Because there are no noise-sensitive land uses immediately adjacent to Helemanō Trail, these noise levels would be a less than significant impact. The smaller size of vehicle convoys to DMR would result in lower noise levels along the Dillingham Trail than along the Helemanō Trail.

Military vehicle maneuvers would occur along unpaved roads and in various off-road areas at SBMR and SBER. Vehicle noise during these activities would include peak pass-by noise levels as illustrated in Figure 5-23 and average hourly noise levels as illustrated in Figure 5-24. The peak pass-by noise levels illustrated in Figure 5-23 are representative of close distances (50 feet (15 meters) from the vehicle travel path). Peak pass-by noise levels would drop by 15 dBA at a distance of 500 feet (152 meters) from the travel path. Vehicle maneuvers would occur during both daytime and nighttime hours, making vehicle maneuver activity noise an issue of concern where residential land uses and school sites are close to SBER boundaries. Because vehicle speeds are low during most maneuver activities and because vehicles tend to be relatively dispersed during off-road maneuvers, maneuver activities would be expected to produce hourly average noise levels of less than 55 dBA at a distance of about 500 feet (152 meters), with brief peaks of 65 to 70 dBA. Such noise levels would not cause significant noise impacts at off-post noise-sensitive land uses during daytime hours. These noise levels would be more disturbing during nighttime hours. As noted in Chapter 2, the Army has established a 1,000-foot (305-meter) noise buffer along those portions of SBER that border residential areas of Wahiawā. As long as nighttime vehicle maneuver activity is minimized in this buffer area, vehicle noise from training and maneuver activities would be a less than significant impact under the Proposed Action.

*Noise from aircraft operations.* The Proposed Action would not result in any meaningful changes in flight operations at WAAF. Improvements to WAAF under the Proposed Action would improve facilities for C-130 aircraft operations. Increased use of WAAF by C-130 aircraft would increase airfield vicinity noise levels somewhat. However, noise conditions in the vicinity of WAAF would continue to be

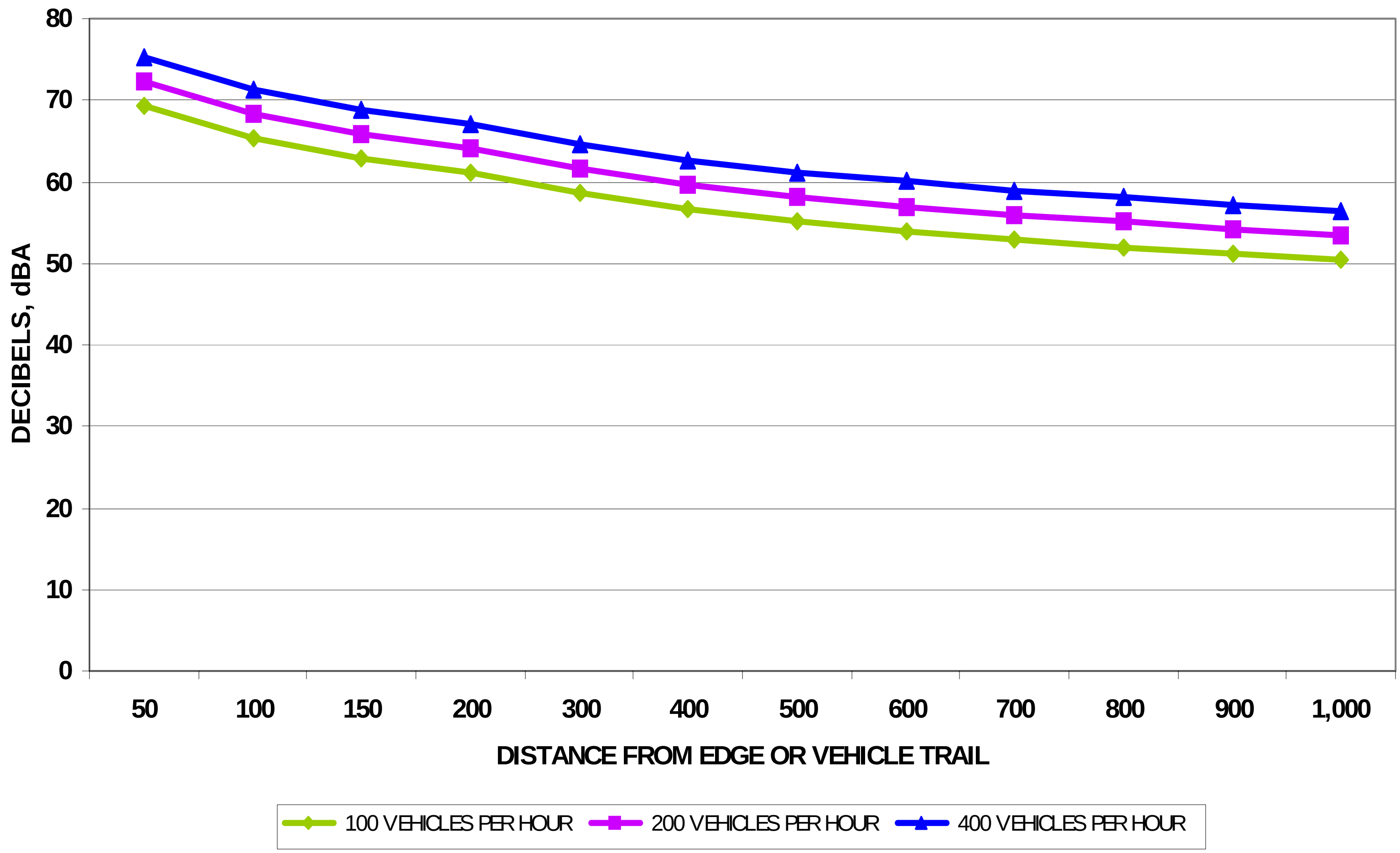



Figure 5-24 Hourly Average Traffic Noise Levels Along the Helemanō Military Vehicle Trail

dominated by helicopter flight operations. The 65 dBA Ldn contour around WAAF extends into Leilehua Golf Course but not into any residential area (USAEHA 1993b; US Army CHPPM 1999). Overall changes in airfield vicinity noise levels would be less than significant under the Proposed Action.

Current levels of helicopter and fixed wing aircraft flight operations would continue over SBMR and SBER under the Proposed Action, and UAV flight operations also would be conducted. Figure 5-25 illustrates peak flyover event noise levels for various helicopters, fixed wing aircraft, and the UAV. Noise level data for the Shadow 200 UAV are limited to ground test measurements with the engine at either an idle setting or at a high power setting. The Shadow 200 UAV produces a noise level of 85 dBA at a distance of about 70 feet (21 meters) when the engine is at an idle power setting, and a noise level of 85 dBA at a distance of about 342 feet (10 meters) when the engine is at a high power setting (US Army 2001a). The UAV noise levels shown in Figure 5-25 represent a high power setting. It is likely that typical flight operations would involve an engine power setting of less than 100 percent. Thus, the UAV noise levels presented in Figure 5-25 are probably a slight overestimate for typical flight conditions.

Helicopters normally operate at low flight altitudes. C-130 aircraft also may operate at low flight altitudes when conducting cargo drop training. In most cases, the UAV would be expected to operate at relatively high altitudes to avoid conflict with other helicopter and aircraft flight activity. As a result, the addition of UAV flight activity to current patterns of aircraft and helicopter flight operations would not result in any noticeable change in noise levels from aircraft flight operations. About half of the complaints received by SBMR are concerned with helicopter and fixed-wing aircraft operations over SBER or between WAAF and other installations. Although residents of areas surrounding SBMR are likely to file occasional complaints about low flying aircraft and helicopters, historically the complaints have been about discrete flyover events rather than overall average noise levels. As indicated by past estimates of noise contours around WAAF and by the noise contours for large caliber weapons firing, presented in Figure 5-17, noise levels associated with SBMR and SBER do not cause noise levels in off-post residential areas to exceed generally accepted land use compatibility criteria. Consequently, noise from aircraft operations at SBMR would be a less than significant impact under the Proposed Action.

*Noise from added personal vehicle traffic.* The Proposed Action would result in a 5.5 percent increase in combined military and civilian personnel based at SBMR. This would produce a change in traffic noise levels of only 0.23 dBA. Most people cannot detect a noise level change of less than 1.5 dBA. Consequently, noise from added personal vehicle traffic would be a less than significant impact under the Proposed Action.

### No Impacts

*Noise from construction activities.* There would be no construction noise impacts from the construction of QTR2 at the SRAA because of its distance from any potential sensitive receptors.

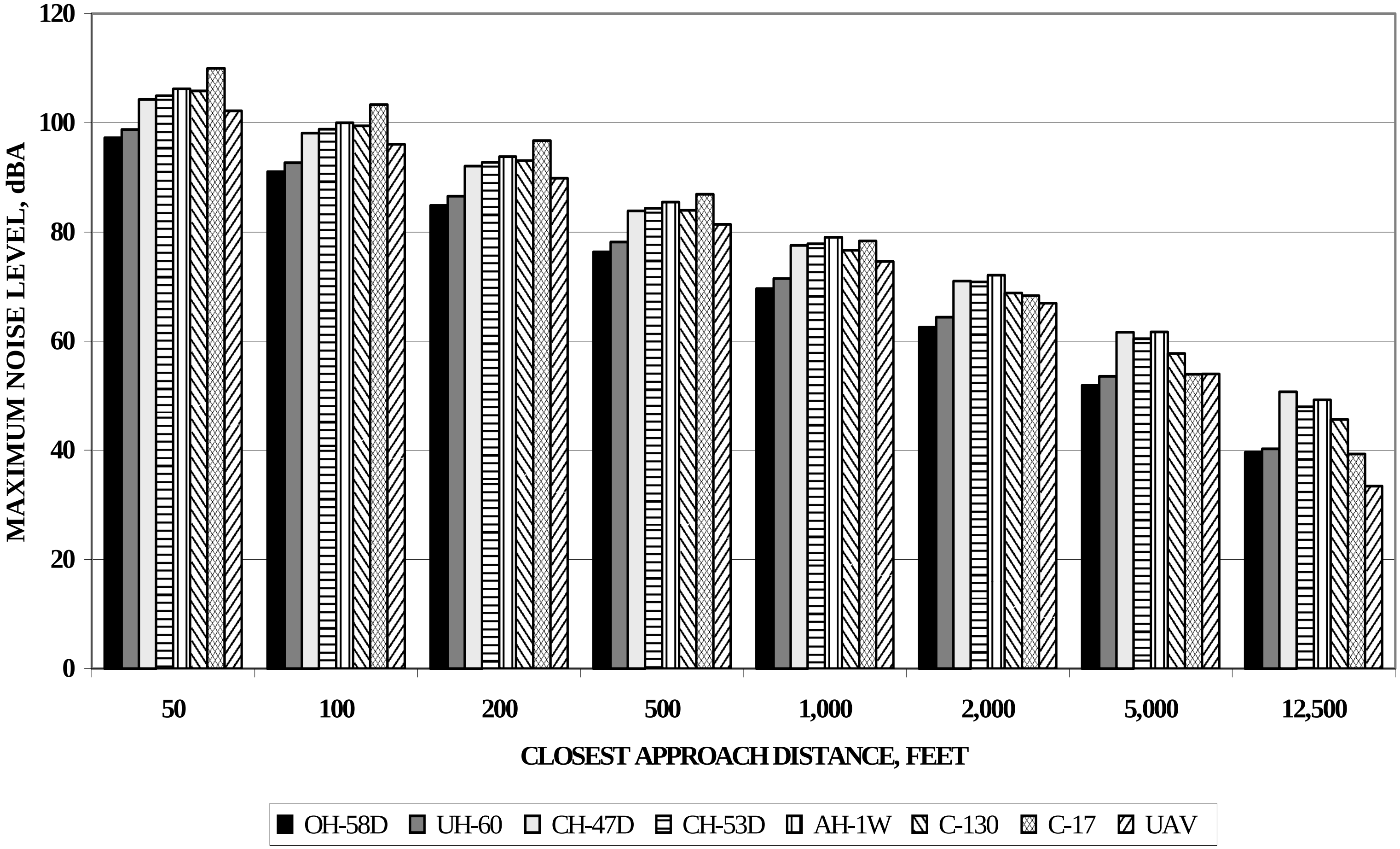



Figure 5-25 Maximum 1-Second Average Noise Levels from Aircraft and Helicopter Flyover Events

### Reduced Land Acquisition

The RLA Alternative noise impacts would be the same as under the Proposed Action, with minor differences as discussed below.

#### Significant Impacts

Impact 1: Noise from ordnance use. The RLA Alternative would result in the proposed QTR2 range being located at PTA instead of in the SRAA. Except for the resulting reduction in small arms firing at SBMR, types and quantities of ordnance use would be the same as for the Proposed Action. Because noise from ordnance use is dominated by artillery and other high explosives use, noise conditions associated with ordnance use would be the same as previously discussed for the Proposed Action. Zone III conditions would expand slightly in the southern part of the Main Post to encompass some additional family housing areas. Zone II conditions would expand somewhat to encompass additional troop housing and family housing areas on the eastern side of the Main Post. Solomon Elementary School would continue to be exposed to Zone II noise conditions during its hours of operation. The increase in nighttime training may increase the frequency of complaints about noise and vehicle traffic. Because noise conditions would exceed Army standards for compatibility with family housing, troop housing, medical facilities, and schools, the RLA Alternative would continue to have a significant noise impact from ordnance use on persons residing on or working at SBMR.

Additional Mitigation 1. Potential mitigation measures being considered by the Army are:

- An evaluation of training techniques, scheduling and location to reduce overall noise impacts. In this evaluation, the Army would consider, as feasible, the benefit of timing restrictions on training and moving certain training activities to PTA.
- Providing noise insulation measures whenever new buildings are constructed or existing buildings are renovated, such as modifications to window materials and cooling systems to noise sensitive land uses that are or that may become exposed to Zone II and Zone III noise conditions.

#### Less than Significant Impacts

Noise from construction activities. The RLA Alternative would require the same new facilities as the Proposed Action, but the QTR2 range facility would be built at PTA rather than in the SRAA. Moving construction of QTR2 to PTA would not result in a decrease in construction noise impacts as compared to the Proposed Action, because, as noted above, there are no construction noise impacts associated with QTR2.

Noise from military vehicle use. Military vehicle use at SBMR would be nearly the same under the RLA Alternative as previously discussed under the Proposed Action. The major difference would be that there would be no on-post transport of troops to the QTR2 range. Other aspects of on-post and off-post military vehicle use would be the same. Consequently, similar vehicle activity under the RLA Alternative would have less than significant noise impacts.

### ***No Action***

#### Significant Impacts

*Impact 1: Noise from ordnance use.* Existing live-fire training would continue under No Action. As discussed in Section 5.6.1, much of the cantonment area is affected by Zone II and Zone III noise conditions. Solomon Elementary School would continue to be exposed to Zone II noise conditions during its hours of operation. Continued exposure of troop housing, family housing, and schools to Zone II and Zone III noise conditions would be a significant impact under No Action.

*Additional Mitigation 1.* Potential mitigation measures being considered by the Army are:

- An evaluation of training techniques, scheduling and location to reduce overall noise impacts. In this evaluation, the Army would consider, as feasible, the benefit of timing restrictions on training and moving certain training activities to PTA.
- Providing noise insulation measures whenever new buildings are constructed or existing buildings are renovated, such as modifications to window materials and cooling systems to noise sensitive land uses that are or that may become exposed to Zone II and Zone III noise conditions, with a priority given to school and family housing areas affected by Zone III conditions.

#### Less than Significant Impacts

*Noise from military vehicle use.* The fleet of military vehicles based at SBMR would remain unchanged (659 vehicles) under No Action. As noted in the discussion of the Proposed Action, military vehicle convoys, on-post vehicle traffic, vehicle traffic on military vehicle trails, and vehicle maneuver training activities would not generate significant noise levels. Consequently, noise from military vehicle traffic would be a less than significant impact under No Action.

*Noise from aircraft operations.* Flight operations from WAAF would remain the same as current conditions under No Action. Similarly, flight activity in the airspace over SBMR would be the same. Although residents of areas surrounding SBMR would continue to file occasional complaints about low flying aircraft and helicopters, the complaints generally would be about discrete flyover events rather than overall average noise levels. Consequently, noise from aircraft and helicopter flight operations is considered a less than significant impact under No Action.

#### No Impacts

*Construction Noise.* No SBCT construction projects are associated with No Action, so there would be no noise impacts from construction under No Action, although there might be minor impacts from current construction projects.

*Noise from Added Personal Vehicle Traffic.* There would be no additional personnel based at SBMR under No Action, so there would be no noise impacts from added personal vehicle traffic.

## 5.7 TRAFFIC

### 5.7.1 Affected Environment

#### *Regional Transportation System*

The main vehicular traffic access routes into SBMR are via H-2 from the Ewa/Honolulu area, Kamehameha Highway and Kunia Road from the Ewa District, and Kamananui Road and Wilikina Drive from the North Shore District. H-1 provides a connection between H-2 and Hickam Air Force Base. These sections of H-1 and H-2 were designed to carry heavy vehicle traffic from SBMR to HAFB for deployment and can handle large heavy vehicles.

Trimble Road, Kolekole Avenue, and Lyman Road are the primary circulation routes through SBMR. These roadways traverse SBMR in an east-west orientation.

#### *Local Transportation System*

East of Beaver Road, Trimble Road is a four-lane divided roadway. The westbound approach to Beaver Road has a separate right turn only lane and a shared left and through lane. West of Beaver Road, Trimble Road is two-lane and two-way. The eastbound approach of Trimble Road to Beaver Road is a single lane for left turns, through traffic, and right turns.

Beaver Road is two-lane and two-way and runs north-south along the east boundary of the project; it terminates at Trimble Road. Hendrich Street is the extension of Beaver Road south of Trimble Road; it provides access to the residential area south on Trimble Road and is also a two-lane two-way street.

*Schofield Barracks – Main Post*

Two main roadways serve Schofield Barracks. These roadways are Foote Avenue/Trimble Road and Kolekole Avenue. Both roadways traverse the main compound and are oriented in an east-west direction.

Foote Avenue connects the main gate with the central area, which contains the commercial area and barracks. West of the commercial area, Foote Avenue turns into Trimble Road, which continues west to the training areas. Generally, Foote Avenue/Trimble Road is a four-lane roadway between the main gate and Beaver Road, which is approximately 1.2 miles west of the commercial area.

Generally, traffic levels of service are good. There are two areas that are periodically congested. The first is the commercial area. There are numerous commercial activities in this area that attract both vehicular and pedestrian traffic. The commercial area is being redeveloped and many of these circulation issues are being addressed. Specific issues are capacity, traffic calming, and parking.

The second area of congestion is at the gates along Kunia Road, especially during periods of heightened security, when traffic will back up onto Kunia Road. Redesigning the gate areas to increase their capacity is the only way to contend with this.

### *Schofield Barracks East Range*

There are few roadways in the East Range, but traffic circulation appears to be good because no traffic issues have been reported.

### *Wheeler Army Airfield*

There are two entrances to WAAF from Kunia Road. The main roadway serving the airfield is Wright Avenue, which traverses it in a southwest-northeast orientation. A traffic study for new housing completed a few years ago did not identify any traffic-related problems that required mitigation.

### *South Range Acquisition Area*

The SRAA is bounded by Kunia Road on the east and by the southern boundary of SBMR on the north; the remaining area is bounded by undeveloped land. Two roadways lie within and adjacent to the SRAA.

### *Kunia Road*

Kunia Road is a state highway along the east boundary of the proposed training area. It connects SBMR to the north and Waipahu to the south. Kunia Road is two-lane and two-way, and the posted speed limit is 35 miles per hour (56 kilometers per hour) north of the SRAA.

Safety along Kunia Road may be an issue. Long sections have been striped and signed to prohibit passing because of limited sight distances. During field reconnaissance, many drivers were observed ignoring these restrictions. Honolulu Police Department vehicles operate speed patrols in the area. At times there may be hazards due to smoke from agricultural burns adjacent to the road. Pineapple and other agricultural burns are permitted in the fields adjacent to the roadway, but signs are required to alert drivers to the possibility of reduced visibility during the burn. These are usually orange construction area signs, advising drivers to use caution due to smoke and dust.

As a policy, neither HPD nor HDOT will provide accident statistics or data citing liability concerns, so there is no available historical data on the number of accidents related to speed along this roadway. However, there are frequent speed traps set up along the roadway, so it appears that HPD is enforcing the posted speed limit. The Proposed Action would have no impact on the average vehicular speed along this roadway. The Hawai'i Department of Transportation has a 24-hour traffic count station along Kunia Road, south of Foote Gate, that provides traffic data. The latest counts were performed during April 2001. Data from this count station indicate that the average traffic along Kunia Road is approximately 16,300 vehicles per day. The morning peak hour is between 8:00 AM and 9:00 AM, when volume is approximately 1,120 vehicles per hour. The afternoon peak hour is between 3:30 PM and 4:30 PM, when volume is approximately 1,320 vehicles per hour.

The traffic data also indicated that the peak hour k-factors (the percentage of daily traffic during the peak hour) are 7.5 percent in the morning and 8.0 percent in the afternoon. These are lower than usual, indicating that hourly traffic volumes are relatively consistent during the day, with no dominant peak periods.

*Road to Kunia*

This roadway is unpaved and unmarked and connects the proposed training area on the SRAA to Kunia Road approximately 1.2 miles (2 kilometers) south of Foote Gate. The roadway is used as a plantation road and provides access to a small military-related facility approximately 200 feet (61 meters) west of Kunia Road.

### 5.7.2 Environmental Consequences

***Summary of Impacts***

A summary of traffic impacts at SBMR and WAAF is shown in Table 5-20. Impacts from intersection operations, roadway segment operations, construction traffic, and parking would be less than significant under the Proposed Action and under the Reduced Land Acquisition Alternative. These impacts would result from building and operating the VFTF, the Motor Pool, the Tactical Vehicle Wash, the Multiple Deployment Facility, and QTR2 and from acquiring and using the SRAA, which would increase local traffic volumes during peak periods and affect intersection operations and roadway segment operations. There would be no traffic impacts under No Action.

**Table 5-20**
**Summary of Potential Traffic Impacts at SBMR/WAAF**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Intersection operations | ⨀ | ⨀ | ○ |
| Roadway segment operations | ⨀ | ⨀ | ○ |
| Construction traffic | ⨀ | ⨀ | ○ |
| Parking | ⨀ | ⨀ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⃠ = Significant but mitigable to less than significant
⨀ = Less than significant
○ = No impact
+ = Beneficial impact
N/A = Not applicable

***Proposed Action (Preferred Alternative)***

Under the Proposed Action, 1,005 vehicles would be used, an increase of 346 vehicles. Strykers would be used at the BAX and urban assault course for off-road training. Troops would continue to be transported in trucks to the ranges. Strykers would train on the BAX at up to a company level, which would include up to 10 trucks and 21 Strykers. New parking lots are proposed. During emergencies, the public would have access to military vehicle trails.

*Less than Significant Impacts*

*Intersection operations*. There are numerous projects proposed within SBMR and WAAF, and one land acquisition project. Those with traffic impacts expected to be less than significant are summarized below. Helemanō Trail is discussed in Section 7.7.

While no mitigation is required for project impacts on traffic congestion, the Army will operate a public Internet Web site that lists a schedule of upcoming USARHAW activities, including training and public involvement projects. Subject to force protection measures and other security measures, the site would contain USARHAW training and convoy schedules, community projects the USARHAW is involved in, any USARHAW activity or function that the public could attend, any general USARHAW news that might be of interest to the public, and USARHAW services available to the public.

### *Virtual Fighting Training Facility*

The VFTF would have the capacity to accommodate 50 trainees plus administrative staff. The increase in traffic would be below the recommended threshold of 100 vehicles per hour in the peak direction for a traffic impact analysis (ITE 1991, 5). Thus, impacts on intersection operations would be less than significant.

### *Motor Pool Maintenance Shops*

Traffic into and out of the motor pool would consist of two components. The first is vehicles entering and leaving the facility for maintenance and storage. All vehicles assigned to SBCT would be parked in the motor pool. These vehicles would typically arrive and depart during off-peak hours and therefore would not affect peak hour levels of service. Additionally, the facility would be located in the SRAA and would be immediately adjacent to the training area; therefore, vehicles would not use major roadways in the area.

The second component is personnel assigned to the motor pool. Traffic associated with employees would typically occur during peak traffic periods. The exact number of personnel that would be assigned to this facility has not been determined. The traffic impacts would be less than significant if the maximum number of personnel assigned to this facility (per shift if applicable) is 100 or fewer. Because the facility is relatively isolated, there are no unique factors that would result in a significant traffic impact.

### *Tactical Vehicle Wash Facility*

This facility is relatively isolated and located in SBER. The capacity of the facility would be 10 vehicles per hour. The impact of 10 vehicles per hour is well below the threshold for a significant impact; therefore, this impact would be less than significant.

### *South Range Acquisition Area*

The SRAA involves the use of a large tract of land south of and adjacent to SBMR. Because the land tract abuts SBMR, traffic between SBMR and the SRAA would not be on public roadways but on connecting roadways within the boundary of SBMR and the SRAA. Use of the SRAA for military training would require closing an unpaved road to Kunia that few people, if any, use. The road may be used for training. Therefore, traffic impacts would be less than significant.

### *Qualification Training Range 1*

This project is the consolidation of five ranges into one modernized facility, which would be in a relatively isolated area north of the Trimble Road/Beaver Road intersection. Troops would be transported to and from the complex via truck convoy, which would be scheduled for non-peak traffic periods. Traffic into and out of the complex would be rerouted from the ranges. No net increase in hourly traffic volumes is anticipated; therefore, traffic impacts would be less than significant.

### *Qualification Training Range 2*

QTR2 would be located in the SRAA. As with QTR1, troops would be transported to and from the range via truck convoy, which would be scheduled for non-peak traffic periods. Traffic into and out of the complex would be rerouted from the ranges. No net increase in hourly traffic volumes is anticipated; therefore, traffic impacts would be less than significant.

### *Multiple Deployment Facility*

Except for a major exercise, traffic into and out of this facility would be for training exercises. The maximum number of hourly vehicles would be limited by the number of vehicles in the convoy. Traffic between SBMR and the Multiple Deployment Facility would cross Kunia Road. The Lyman Gate of SBMR and the Kunia Gate of WAAF would be used; there are no signals at either of these intersections. Under the current configuration, traffic across Kunia Road must be restricted to non-peak periods, or else the activity would adversely affect peak-hour traffic flows along Kunia Road. However, the SBMR DPW will implement a project during the summer of 2003 to reroute the road to WAAF Kunia Gate so it is directly across from Lyman Gate. A traffic light will be added on Kunia Road between the two gates. This traffic signal will make it possible to travel during peak hours without affecting traffic. Therefore, traffic impacts would be less than significant.

*Roadway segment operations.* The maximum number of vehicles per convoy would be 24. Convoys would be sequenced at 15- to 30-minute intervals, so the maximum hourly volume would be 96 vehicles per hour. Convoys would be scheduled during non-peak traffic hours, thus reducing potential impacts on peak-hour traffic conditions. The identified impact would be less than significant, and no mitigation would be necessary.

Before the Helemanō Trail is constructed, all SBCT military vehicles would use public roadways to access DMR and KTA. The discussion of Helemanō Trail is included in Section 7.7.

*Construction traffic.* The construction associated with the Proposed Action would generate additional traffic from worker vehicles and trucks, but construction traffic would be temporary and less than significant.

To minimize traffic impacts on the surrounding community during construction, a construction traffic management program would be implemented. The program would stagger work hours to reduce impacts from construction workers during peak hours, would identify truck routes to limit truck traffic to major streets, and would designate parking for construction workers. Because project traffic would not significantly affect operations at the intersections and street segments in the project vicinity and traffic is generally free flowing, the interim construction worker traffic impacts would not be significant. No mitigation would be required.

*Parking*. The Proposed Action would result in increased parking demand associated with proposed facilities and additional personnel assigned to SBMR. The number of parking spaces would be determined by the proposed uses of the buildings. Therefore, as individual buildings are designed, the number of parking spaces required to accommodate the anticipated number of employees and visitors would be determined. The parking demand is usually based on the square footage of the building or the estimated number of employees and visitors that would use the building.

Because the number of parking spaces required would be determined by the buildings that they provide parking for, additional parking would be required only for new facilities. For example, if new personnel are assigned to existing housing, the existing parking facilities would accommodate them. If new housing were constructed, parking would be designed and constructed according to standards. (The number of parking spaces per housing unit is typically determined by the number of bedrooms.)

All on-street construction should be performed during off-peak hours. Traffic control plans should be designed and coordinated with Military Police responsible for traffic management. Traffic control officers, or other uniformed personnel, should be assigned to assist with traffic control during on-street construction activities.

### No Impacts

*Intersection operations*. Projects with no expected impacts on traffic are summarized below.

#### Urban Assault Course Training Facility

Troops would be transported to this facility in truck convoys, which would follow standard procedures that limit the number of vehicles per hour. Parking facilities for the transport trucks would be provided. Traffic would be within SBMR and therefore would have no impact on public roadways.

#### Range Control Facility

This new facility would accommodate staff currently working in separate buildings. Because there is no proposed increase in staff size, peak hour traffic volumes would not change, and no impacts would result.

#### Battle Area Complex

As with the urban assault course, the BAX supports off-road vehicle training. Troops would be transported by truck convoy within SBMR. The maximum number of vehicles per convoy would be limited by standard convoy procedures. There would be no traffic on public roadways; therefore, no impacts would result.

#### Fixed Tactical Internet

This project consists of communication devices. There would be no traffic impact because there is no traffic associated with the project.

*Upgrade Wheeler Army Airfield for C-130 Aircraft*
This project would upgrade an aircraft facility. No additional peak-hour traffic would result from this action.

*Roadway segment operations*. Roadway segment operations at SBMR would continue to be at acceptable levels under the Proposed Action including convoy activity between SBMR and HAFB. The Stryker vehicle is well within the design standards for these highways. Therefore there would be no impacts of the Proposed Action on roadway segment operations, and no mitigation would be required.

### *Reduced Land Acquisition Alternative*

*Less than Significant Impacts*
The impacts from Reduced Land Acquisition would be the same as for the larger expansion described under the Proposed Action. The one difference would be a lessened impact on intersection operations because the road to Kunia connecting the SRAA to Kunia Road would not be closed to public access.

### *No Action Alternative*

*No Impacts*
Under No Action, impacts related to traffic at SBMR would continue at their current levels.

# 5.8 WATER RESOURCES

## 5.8.1 Affected Environment

### *Precipitation and Surface Water Drainage*

Main Post

Precipitation at SBMR varies seasonally and with elevation. The average annual precipitation is 43.75 inches (111 centimeters). Monthly averages range from 1.63 to 3.78 inches (41 to 10 centimeters) during the dry season (April through October) and from 4.14 to 6.21 inches (11 to 16 centimeters) during the wet season. Average annual rainfall at the highest elevations exceeds 50 inches (127 centimeters) (Wu 1967; USARHAW and 25th ID[L] 2001a).

Precipitation varies from year to year and from storm to storm. SBMR lies within an area in which the 100-year 24-hour rainfall is estimated to be about 16 inches (41 centimeters). The 100-year 24-hour rainfall is the maximum amount of rainfall over a 24-hour period that is expected to occur, on average, in any 100-year timeframe. Such estimates are made based on historical rainfall records. Estimates for rainfall durations and return periods other than 24 hours or 100 years also can be made. Thus, for example, the maximum one-hour rainfall with a 100-year return period in the SBMR area is about four inches (10 centimeters) (Wu 1967). The maximum precipitation likely to ever occur over a 24-hour period at SBMR (probable maximum precipitation) ranges from about 42 inches (107 meters) in the lower part of the watershed to about 50 inches (127 centimeters) on the ridges. Thus, the probable maximum 24-hour rainfall is approximately equal to the average annual rainfall. Figure 5-26 shows the watersheds and principal drainage features and water bodies within the SBMR Main Post. SBMR lies near the drainage divide between the Kaukonahua watershed and the Waikele watershed. These watersheds stretch across the Schofield plateau, from the ridgeline of the Koʻolau Range to the ridgeline of the Waiʻanae Range. The Kaukonahua watershed is bordered on the north by the Poamoho watershed.

The principal surface water feature of the Kaukonahua watershed is the Wahiawā Reservoir (Lake Wilson), which lies just outside the eastern boundary of the reservation, east of Highway 99. The reservoir stores drainage from tributaries of the Kaukonahua Stream that originate in the Koʻolau Range. The reservoir is owned by the Dole Foods Corporation, which operates it for agricultural irrigation. The reservoir receives small amounts of surface drainage from the eastern side of SBMR.

Part of the summit of Mount Kaʻala lies within the extreme northwest corner of SBMR. The summit is a wide nearly level plateau with poor drainage and contains a wetland area.

The main drainages at SBMR are the Waikōloa Gulch and the Waikele Stream. The Waikōloa Gulch drains the area just north of the cantonment and joins the Kaukonahua Stream below Wahiawā Reservoir. Two other streams that drain the north part of SBMR are tributaries to the Kaukonahua Stream—Mohiākea Gulch and Haleanau Gulch. Kaukonahua Stream drains northward, through the area underlain by the Waialua aquifer system, joining the Poamoho Stream to form the Kiʻikiʻi Stream, which discharges to Kaiaka Bay, just east of Waialua.

**Figure 5-26**
Watershed Boundaries and Drainage Features at Schofield Barracks Main Post

Waikele Stream, which originates in the Honouliuli Forest Preserve along the east slope of the Wai‘anae Range south of SBMR, drains the south boundary of SBMR. It flows south along the west side of WAAF, across land overlying the Waipahu-Waiawa aquifer system, and eventually discharges to the West Loch of Pearl Harbor.

Streams in lower reaches of SBMR tend to be intermittent because runoff from small storms is absorbed in bedrock fractures and never reaches the plateau. Runoff from larger or more intense storms overwhelms the capacity of these fracture systems and continues to flow onto the plateau.

*Wheeler Army Airfield*

WAAF is a 2,085-acre (844 hectare) installation bounded by Schofield Barracks, Wahiawa Reservoir, the Kamehameha Highway, and Waikele Stream. The mean annual precipitation measured at WAAF is 38 inches, most of falls from November through April. Surface drainage from WAAF drains to Waikele Gulch. Runoff from the runway area reportedly is collected in a network of grated drains that drain to a 15-inch-diameter storm drain believed to discharge to Waikele Gulch (US Geological Survey 1996).

*South Range Acquisition Area*

The SRAA is a 1,402-acre (567-hectare) area that borders the southern boundary of the Main Post west of WAAF, as shown in Figure D-8. It is drained by Waikele Stream and its tributaries and lies entirely within the portion of the watershed of Waikele Stream that is upstream of WAAF. As described above, the Waikele Stream ultimately discharges to the West Loch of Pearl Harbor. The tributaries to Waikele Stream are ephemeral and generally dry except for during short periods following heavy rainfall. Perched groundwater occurs below the elevation of the stream channels, and therefore does not contribute to local streamflow (Golder Associates 1998).

*Schofield Barracks East Range*

The mean annual rainfall within SBER varies from about 200 inches (508 centimeters) on the crest of the Ko‘olau Range to about 40 inches (102 centimeters) near Wahiawā and WAAF (Oki 1998). The mean annual evaporation rate increases from east to west, ranging from about 20 inches (51 centimeters) on the crest of the Ko‘olau Range to over 60 inches (152 centimeters) in the vicinity of Wahiawā. In general, both evaporation and rainfall are correlated with elevation. Rainfall and evaporation maps provided by Oki (1998) indicate that the mean annual rainfall and evaporation are about equal in the region of the Kū Tree and Ko‘olau Reservoirs, while evaporation exceeds rainfall to the west and rainfall exceeds evaporation to the east of this region.

SBER occupies a portion of the Waipahu/Waiawa watershed in the Pearl Harbor hydrologic sector, just south of the hydrologic divide that separates it from the Central hydrologic sector. Figure 5-27 shows the principal drainage and surface water features in SBER. Most of SBER is drained by the South Fork of Kaukonahua Stream, which discharges to the Wahiawā Reservoir. The Kaukonahua Stream, downstream of Wahiawā Reservoir, ultimately discharges to Kaiaka Bay at Hale‘iwa. Kaukonahua Stream, at 33 miles (53 kilometers), is the

**Figure 5-27**
Watershed Boundaries and Drainage Features at Schofield Barracks East Range

longest stream on O'ahu and also the longest perennial stream (30 miles [48 kilometers]). The southern boundary of SBER lies on or near the topographic divide separating the watershed of the South Fork Kaukonahua Stream from the Waikakalaua Stream. Some surface water from SBER may drain to the Waikakalaua Stream, which ultimately drains south to the West Loch of Pearl Harbor.

SBER extends to the crest of the Ko'olau Range, which has the highest rainfall on O'ahu. Thus, the east side of SBER is an important source region for surface water supplies. A number of reservoirs and surface water conveyances (ditches and tunnels) have been constructed along the Kaukonahua Stream drainage and its tributaries. The farthest upstream of these is Canon Dam, a small interception facility that enables water to be diverted in the Ko'olau Ditch to other storage reservoirs off stream of the Kaukonahua Stream, including the Ko'olau Reservoir and the Kū Tree Reservoir. The Kū Tree Reservoir is the largest of these water storage facilities. Currently, the Kū Tree Reservoir is not in use and the lakebed is dry. However, when in use, water released from the Kū Tree Reservoir discharges to a tributary of the Kaukonahua Stream and joins the Kaukonahua Stream below the East Pump Reservoir.

A little farther downstream the Kaukonahua Stream becomes an arm of the Wahiawā Reservoir. Most of the 302-acre (122 hectare) reservoir is west of Highway 80 and the boundary of SBER, but stream channels in the western end of SBER are inundated by the reservoir, to an elevation of about 842 feet (257 meters) msl.

#### *Helemano Trail*

Helemanō Trail begins a short distance to the east of the point where the Drum Road joins the Twin Bridges Road. Helemanō Trail turns south from Twin Bridges Road and crosses the Helemanō watershed, which is drained by Helemanō Stream; on the coastal plain Helemanō Stream joins Paukauila Stream, which discharges to Kaiaka Bay, south of Hale'iwa. Helemanō Stream is a perennial Class 1 stream in its upper reaches. The trail crosses four branches or tributaries of the Helemanō Stream before crossing into the adjoining Poamoho watershed at a point west of the HMR.

The Poamoho watershed is drained by the Poamoho Stream and several smaller streams. The Upper Helemanō Reservoir is east of the Helemanō Trail and stores water for irrigation. The water is conveyed to farmland in the Poamoho watershed through a network of canals and ditches, some of which follow existing drainages. Helemanō Trail crosses the main stem of Poamoho Stream near Poamoho Camp. At Kaukonahua Road (Route 80), the trail crosses into the Kaukonahua watershed downstream of Wahiawā Reservoir. The trail then crosses Kaukonahua Stream, which marks the boundary of SBMR.

### *Flooding*

Federal Emergency Management Agency Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies are available for parts of the County of Honolulu (e.g., FEMA 2000). SBMR is in Zone D, which refers to areas that have not been mapped. The area containing the reach of Waikele Stream adjacent to WAAF has not been mapped.

### *Surface Water Quality*

#### Main Post and Wheeler Army Airfield

The State of Hawai'i classifies the Kaukokonahua and Waikele watersheds as second tier Category I under the Hawai'i Unified Watershed Assessment (HDOH 1998b). Category I watersheds do not meet, or face imminent threat of not meeting, clean water and other natural resource goals. The classification of the Kaukokonahua watershed was based largely on the fact that the coastal receiving water, Kaiaka Bay, is an impaired water body. Kaukokonahua Stream is not identified as an impaired water body. Waikele Stream is listed as an impaired water body, based on nutrients and turbidity (Henderson and Harrigan 2002). The Waikele watershed drains to Pearl Harbor, which is also an impaired waterbody.

#### South Range Acquisition Area

No surface water quality data are available for the Waikele Stream where it flows through the SRAA. However, as described above, Waikele Stream is listed as an impaired water body. The US Geological Survey (2001a) monitored water quality at a station south of Wheeler Army Air Field, near Waipahu from 1999 to 2001. Concentrations of trace metals, semivolatile and volatile organic compounds, physical parameters, major ions, organochlorine pesticides, but not explosives, were determined monthly as part of the National Water Quality Assessment Program. Additional samples of streambed sediment, and fish tissue from selected stations along the stream were also analyzed.

#### East Range

Water quality in Kū Tree Reservoir, when full, is reportedly good, but water quality in the Wahiawā Reservoir has been affected by nutrients, such as phosphates and nitrates, which resulted largely from discharged treated municipal wastewater and possibly from urban nonpoint sources. These pollutants caused algal blooms and eutrophic conditions in the reservoir (Young et al. 1975). In response, the city of Wahiawā studied plans to upgrade its wastewater treatment plant and discharge the effluent through an outfall deep in the Wahiawā Reservoir (Sprague 1998).

As mentioned above for the SBMR, the State of Hawai'i classifies the Kaukokonahua and Waikele watersheds as second tier Category I, under the Hawai'i Unified Watershed Assessment (HDOH 1998b).

### *Groundwater Flow*

#### Main Post

SBMR is in the Schofield groundwater area of the central O'ahu groundwater flow system, the largest and most productive flow system on O'ahu (Oki 1998; refer to Figure 3-7). The central flow system is bounded on the east by the crest of the Ko'olau Range and on the west by the crest of the Wai'anae Range. On the southeast it is bounded by the Ka'au rift zone, which transects Diamond Head. On the north and south it is bounded by coastal sedimentary deposits, known as caprock because they overlie more permeable rocks and can confine the groundwater contained in those rocks within the coastal zone.

The Schofield subarea lies on the divide between the northern and southern parts of the Central O‘ahu flow system. The northern part includes the Mokulē‘ia, Waialua, and Kawailoa hydrologic units, while the southern part includes the Ewa, Pearl Harbor, Moanalua, Kalihi, Beretania, and Kaimukī hydrologic units (Figure 3-7).

The Schofield subarea is bounded on the north and south by vertical low permeability features that reduce or prevent groundwater flow and act like groundwater dams. These features might be dike intrusions or possibly depositional features (Oki 1998). Because the groundwater elevation inside the "dams" is higher than outside, the groundwater in the Schofield Plateau is called high-level groundwater.

As of the mid-1980s, about 72 percent of the groundwater recharge on O‘ahu was estimated to occur in the central flow system. Annual pumpage from the central flow system was estimated to be nearly 200 million gallons (757 million liters) per day (MGD) in 1995 and ranged from about 196 MGD to about 367 MGD between 1927 and 1977 (Oki 1998).

The Ko‘olau Basalt formation consists of nearly horizontal basalt flows interbedded on the western margin with alluvial deposits resulting from erosion of the Wai‘anae Range.

Runoff that reaches the plateau tends to percolate slowly and contributes little to groundwater recharge (HLA 1992).

In the SBMR area, the USGS reports that the hydraulic conductivity of the aquifers tapped by wells in the volcanic rocks range from about 655 to 2,317 feet (200 to 706 meters) per day (Oki 1998). (Hydraulic conductivity is a property of a formation that describes the rate of groundwater flow through a given area perpendicular to the line of flow under a hydraulic gradient. A hydraulic conductivity of 655 feet (200 meters) per day means that 655 cubic feet (19 cubic meters) of water can flow across a vertical cross section one square foot in area under a hydraulic gradient of one foot per foot).

Rift zones associated with the Wai‘anae and Ko‘olau volcanoes contain swarms of vertical or nearly vertical dikes that bar groundwater flow. The eastern and western sides of the Schofield subarea are bounded by dike zones of the Ko‘olau and Wai‘anae volcanoes, respectively.

Recharge over most of the SBMR ranges between about 10 and 25 inches (25 to 64 centimeters) per year. Recharge is higher along the eastern slope of the Wai‘anae Range and in the southeast margin of the reservation (Shade and Nichols 1996). Recharge near the southeast margin of the range is greater because of contributions from irrigation.

Most of the recharge to the central sector (Wahiawā aquifer system) is from the Ko‘olau Range. The US Geological Survey (USGS) estimates that about 31 MGD enters the southern half of the sector, and about 64 MGD enters the northern half of the sector as underflow from the Ko‘olau Range. In contrast, only about 12 MGD enters the sector from the west (Shade and Nichols 1996).

Annual groundwater pumpage in the Schofield groundwater area (Wahiawā aquifer system) is estimated to be less than 10 MGD and has decreased since 1979, when total pumping was about 20.6 MGD (Oki 1998). While this is less than half the estimated sustainable yield of the aquifer, any consumptive use of groundwater in the Central Sector decreases the underflow to the adjacent Pearl Harbor Sector and/or North Sector.

Groundwater occurs in three types of groundwater aquifer systems, illustrated on Figure 5-28. Beneath the Schofield Plateau, groundwater occurs in the Schofield High-Level Groundwater Body, where groundwater elevations are in the range of 275 feet (84 meters) above msl. Depth to groundwater is approximately 600 feet (183 meters) or more, depending on the ground surface elevation.

Across these groundwater dams is the basal aquifer. Here, groundwater elevations are in the range of only 10 to 30 feet (3 to 9 meters) msl (Oki 1998). The basal aquifer is a freshwater lens occupying porous and permeable volcanic rocks beneath the island. The freshwater lens is thickest near the center of the island and tapers off toward the edges of the island.

The third groundwater system is the dike-impounded groundwater system associated with the dike intrusions within the Wai'anae Volcanics underlying the Wai'anae Range. The dike-impounded groundwater system is recharged by runoff in the mountains, but lateral flow of this groundwater is blocked by vertical dike intrusions.

In addition to the three main groundwater systems, groundwater also occurs locally in perched aquifers above the High-Level Groundwater Body or the basal aquifer. Perched aquifers are permeable groundwater-bearing strata that are underlain by strata with much lower permeability that restrict downward groundwater flow.

*Wheeler Army Airfield*

As described above, WAAF lies over the southern boundary of the Schofield high-level water body. The water table declines from about 275 feet above sea level on the north side of WAAF (high level groundwater, or transitional) to about 30 feet above sea level on the south side (basal aquifer) (US Geological Survey 1996). Groundwater flows south, toward the Pearl Harbor aquifer.

*South Range Acquisition Area*

The SRAA, as described above, is in the upper portion of the Ewa-Kunia subunit of the Peal Harbor hydrologic unit (see Figure 3-7). The Ewa-Kunia subunit lies along the southern edge of the subsurface basalt groundwater dam that underlies the Schofield Plateau (see Figure 3-8) and is recharged in part by groundwater that overflows this dam and flows southward from the Central or Wahiawā hydrologic unit. It is unlikely that groundwater contributes significantly to flows in Waikele Stream because perched groundwater is at greater depth than the stream channel (Golder Associates 1998). Perched groundwater has been encountered at a depth of about 80 to 100 feet (24 to 31 meters) below the ground surface in the Kunia Village area. The ground surface elevation in this area is about 850 feet (259 meters) msl, but the extent of this perched groundwater is not known. Several wells have

**Figure 5-28**
Generalized Regional Cross-Section Schofield Plateau

been drilled south of SBMR in the vicinity of Kunia Village. One, called the Navy Well, is about one mile (2 kilometers) north of Kunia Village and provides most of the drinking water for Kunia Village (Golder Associates 1998). The well is believed to be completed in the high level aquifer rather than in the basal aquifer at this location (Golder Associates 1998). The direction of groundwater flow beneath the South Range Acquisition Area is thought to follow the regional trend, as indicated in Figure 3-8, and likely flows south.

#### *East Range*

Groundwater in the eastern part of SBER includes high-level volcanic dike-impounded groundwater that overlies and is probably hydraulically connected to the basal aquifer that underlies the island. This area is part of a 135-square-mile (350-square-kilometer) area in the Northwest Rift Zone of the Koʻolau Range that is the most important and productive of the dike-impounded groundwater reservoirs on the island. The USGS has estimated that approximately 560 billion gallons (2,120 billion liters) of water are stored above sea level in this natural groundwater reservoir (Takasaki and Mink 1985). The elevation of the dike-impounded water is 1,000 feet (305 meters) or more. Additional groundwater is believed to be present below sea level but has not been estimated.

Although the dikes impede the flow of groundwater, they do not prevent it, and groundwater leaks from the dike complex at an estimated rate of 280 MGD. This is over half of the total estimated yield of water from all sources from the Koʻolau Range of 450 to 580 MGD (Takasaki and Mink 1985).

### *Groundwater Quality*

#### *Main Post and Wheeler Army Airfield*

The Southern Oahu Basal Aquifer, which underlies SBMR and part of the East Range was designated by the US EPA as a Sole Source Aquifer in 1987 under Section 1424(e) of the Safe Drinking Water Act (USEPA 2003). A sole source aquifer supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer, and represents a water supply source for which there is no alternative that could "physically, legally, and economically supply all those who depend on it for drinking water." Under the program, all federally funded projects in the area overlying a sole source aquifer are subject to review by EPA to ensure that they do not endanger the water source.

The quality of groundwater in the Schofield groundwater area is generally high. Agricultural contaminants (pesticides and fertilizers) have affected the regional groundwater system somewhat. Groundwater quality in the SBMR has been affected by contaminants from industrial activities at the reservation.

Groundwater beneath SBMR has been affected by TCE and carbon tetrachloride. Both are chlorinated chemical solvents. For cleaning up the contaminated groundwater, the groundwater beneath SBMR has been identified as an "operable unit," requiring remediation under CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA). The groundwater is identified as Operable Unit 2 (OU2). The source of the carbon tetrachloride contamination was identified as a former landfill located on SBMR. The source of the TCE contamination was never found. The distribution and extent of groundwater contamination is discussed briefly here and in more detail in the hazardous materials chapter.

TCE concentrations above five ppm have been found in two areas. One area, the smallest, is in the vicinity of a former landfill that was located near the northeast boundary of the Main Post, between Mohiākea Gulch and Waikōloa Gulch. The second area is much larger and underlies the northern half of WAAF and extends northeastward into SBER. In the first area, TCE concentrations are relatively uniform from the depth of the aquifer at 275 feet (84 meters) msl to about 0 feet (0 meters) msl, the greatest depth to which groundwater was investigated (HLA 1996). In the WAAF/SBER plume, the highest TCE concentrations were found in the aquifer at an elevation of about 195 feet (59 meters) msl and decreases to below the drinking water standard at a depth of about 5 feet (2 meters) msl.

The ROD for OU2 identified the groundwater remedy as continued pumping of contaminated groundwater by SBMR supply wells and treatment of the extracted water at the wellhead by air-stripping (HLA 1996). This remedial action was first implemented in 1986 and will continue to be operated indefinitely. Recent data indicate that SBMR drinking water wells contain about 18.5 micrograms per liter of TCE and less than 0.5 micrograms per liter of tetrachloroethene (PCE) before treatment (State of Hawai‘i 1998).

In August 2000, the USEPA delisted SBMR from the NPL because it determined that the site remediation, including continued wellhead treatment of groundwater and long-term monitoring, was adequate to protect human health and the environment.

#### *South Range Acquisition Area*

No groundwater quality data are available for the SRAA. Several wells have been installed and are being monitored in the Kunia area, south of the SRAA, as part of a remedial investigation of the Del Monte Corporation Superfund Site. The primary contaminants of concern at this site are pesticides resulting from accidental spills.

Also, monitoring wells 3-2803-05 and & 3-2803-07 in this area are periodically sampled as part of the SBMR groundwater monitoring program. Carbon tetrachloride, as a know groundwater contaminant from OU2, has not been detected in these wells. TCE, as another known groundwater contaminant from OU2, has been detected in this wells, but at low concentration levels just below the USEPA Region IX maximum contaminant level (MVCL).

#### *East Range*

Groundwater quality in the dike-impounded groundwater system is generally excellent, with chloride concentrations less than 20 mg/L. Dike-impounded groundwater is not known to be contaminated with organic chemicals within the central O‘ahu flow system (Oki 1998).

As described above, high level groundwater in portions of SBER is contaminated by TCE. The contamination is being addressed by treating the water pumped by domestic water supply wells at the wellhead.

### 5.8.2 Environmental Consequences

#### *Summary of Impacts*

Project activities under the Proposed Action at SBMR would include both construction and training activities, each of which could have both short-term and long-term impacts. Table 5-21 summarizes impacts on water resources. Short-term impacts are those that occur during the construction, or ramp up, phase until the project is built out or fully implemented. Long-term impacts are those from operating and maintaining the project after buildout or full-scale implementation. Table 2-5 in Chapter 2.0 of this EIS summarizes the construction and training activities that would occur as a result of the project. Significant but mitigable impacts would result from an increase in nonpoint source pollutants from training activities and an increase in explosives residue, both of which would adversely affect surface water quality. Less than significant impacts on surface water quality would result from construction and operation of SBCT facilities and wildland fires and on groundwater quality from facility operation. Other less than significant impacts would involve stream crossings from construction of Helemanō Trail, possible flooding impacts from increases in impermeable surfaces, and depletion of groundwater resources from staffing increases.

**Table 5-21**
**Summary of Potential Water Resources Impacts at SBMR/WAAF**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Impacts on surface water quality | ⦸ | ⦸ | ⊙ |
| Impacts on groundwater quality | ⊙ | ⊙ | ⊙ |
| Increased flood potential | ⊙ | ⊙ | ⊙ |
| Groundwater supply | ⊙ | ⊙ | ⊙ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | | | |
|---|---|---|---|---|---|
| ⊗ | = | Significant | + | = | Beneficial impact |
| ⦸ | = | Significant but mitigable to less than significant | N/A | = | Not applicable |
| ⊙ | = | Less than significant | | | |
| ○ | = | No impact | | | |

#### *Proposed Action (Preferred Alternative)*

In the following discussion of the potential impacts of the project, the impacts are identified by type of impact and then by source or cause.

*Significant Impacts Mitigable to Less than Significant*

*Impact 1: Impacts on surface water quality.* The Proposed Action could affect surface water quality through an increase in nonpoint source pollutants delivered to streams. Nonpoint source pollutants are those that tend to originate from, or to be distributed over, a wide area, as opposed to being discharged from a single point, such as an outfall. Nonpoint source pollutants may include sediments resulting from increased soil erosion associated with construction or training activities, or they may include chemical substances, such as metals, explosives, nutrients, or pathogens.

*Impact 1a: Impacts on surface water quality from nonpoint source sediment loading from mounted maneuver training.* Training activities under the Proposed Action are expected to result in an increase in mounted maneuver training compared to existing conditions. The increase would occur in the SRAA and in SBER. A significant increase in soil erosion is likely to result in a significant increase in suspended sediment in adjacent streams. Soil erosion is discussed further in Section 5.9. Of most concern are the major perennial streams that receive runoff from SBMR, including Kaukonahua Stream to the north and Waikele Stream to the south.

*Impact 1b: Impacts on surface water quality from nonpoint source contamination of surface water during construction.* During construction, surface water quality may be affected by stormwater runoff coming into contact with disturbed soil or with contaminants from accidental spills. The resulting stormwater runoff could carry sediments or contaminants to adjacent waterways. Within the urban cantonment area, storm drainage is collected in the storm sewer system and would be discharged through storm outfalls to stream channels. Outside urban areas, drainage would be controlled by topography. Figure 2-8 shows the locations of construction projects at SBMR. Drainage from proposed construction sites could affect water quality in either the Kaukonahua Stream, north of the SBMR boundary, or the Waikele Stream, south of the installation boundary. The proposed QTR1 range footprint extends slightly into the Hale'au'au Gulch drainage, but most of the QTR1 range, as well as the tentative site of the Tactical Vehicle Wash and the BAX, is within the Mohiākea Gulch drainage. The Range Control Facility is in the drainage of Waikōloa Gulch. Each of these drainages is a tributary of Kaukonahua Stream. The South Range Acquisition Area, the Motor Pool Maintenance Shops, the Multiple Deployment Facility, and the Upgrade to the WAAF for C-130 Aircraft project are within the watershed of Waikele Stream.

*Impact 1c: Impacts on surface water quality from nonpoint source contamination of surface water during operation of proposed facilities.* Each of the proposed construction projects includes engineering components to control site drainage and to minimize erosion. For example, the proposed motor pool maintenance shops would be provided with a storm drainage system incorporating modern oil-water separators; repair activities would be performed indoors to avoid stormwater exposure, and petroleum, oil, and lubricants and hazardous waste storage facilities would be designed according to modern standards. The proposed motor pool would primarily address the increased maintenance requirements of the Proposed Action, which involves approximately an additional 400 wheeled vehicles. The Proposed Action would involve retaining the existing motor pool, so this alternative would not reduce surface water impacts from this motor pool. Accidental spills are not entirely unavoidable, and increased industrial activity under the Proposed Action could result in a greater probability for accidental spills to occur. The impact on water quality from these combined nonpoint sources is considered potentially significant.

*Impact 1d: Impacts on surface water quality from sediment and chemical impacts on water quality from wildland fires.* The risk of wildland fires is expected to remain at about the same level as under existing conditions, or slightly higher due to the increase in munitions use. The potential for wildland fires on the SRAA is expected to be low but could increase when the land is fallowed, due to growth of grasses and other vegetation. Wildland fires can generate chemical contaminants and loss of vegetation can increase the potential for soil erosion and sediment loading to streams. Either of these effects could result in significant impacts on surface water quality.

*Impact 1e: Impacts on surface water quality from migration to surface water of nonpoint source chemical residues in soils on training ranges.* Drainage and runoff from training ranges could transport contaminants to streams, reducing water quality in the stream and ultimately discharging contaminants in the ocean. Contaminants associated with military activities include residues of explosives or other constituents of munitions, such as metals, constituents of plastics, or combustion products. Other chemical pollutants, such as petroleum hydrocarbon fuels or lubricants, may be inadvertently spilled or released as an indirect result of military activities. The Proposed Action may result in a significant increase in sediment transported to streams draining the ranges, and ultimately to surface waters beyond the installation boundary. Based on the logic described below, it is possible that surface water could be impacted by current levels of contaminants. In the absence of mitigation an increase in sediment erosion could result in greater impacts, possibly in exceedance of health-based standards, or antidegradation policy goals.

No systematic sampling investigations of the major streams or tributaries that drain the watersheds of SBMR have been performed to determine whether or not explosives residues or other chemical pollutants from military training have affected surface water quality. Samples of surface soils from selected areas on the training ranges were collected and analyzed, and these data provide an indication of the concentrations of metals, semivolatile organic compounds, and explosives in surface soils that could be transported to surface water (USACE 2002a).

The principal explosives chemicals of concern identified in soil samples, listed in order of their water solubilities, were nitroglycerin, 2,4,6-TNT, RDX, and HMX. These are also the most prevalent organic constituents of the explosives used in the munitions used on the ranges.

Solubility is an indicator of the affinity of a chemical for water. Low solubility chemicals tend to have a greater affinity for binding to soil. Other factors influence the partitioning of a chemical between water and soil as well, including the size of the molecule (larger molecules tend to have greater affinity for binding to soils and are also less volatile), the amount of natural organic material in the soil, and the size of the soil particles (fine particles, such as clays, have a large surface area compared to larger particles, and some chemicals tend to bind to them more strongly). While each of these factors may influence the rate of migration of a chemical through soil, other factors contribute to the fate and transport of chemicals. The chemicals may degrade when exposed to air, moisture, sunlight, heat, or microbes (for example, 2,4,6-TNT breaks down into 2,4-DNT). The rates of degradation of the four explosives identified above tend to be in order of their solubilities, with HMX being the least reactive. The ultimate degradation products of these compounds are inorganic nitrogen compounds, carbon dioxide, and water.

Chemicals that bind to soil particles could be transported with soils particles, by storm runoff, into streams. These chemicals tend to bind more strongly to fine particles, so they would likely be more prevalent in the fraction of sediment that remains suspended in the stream flow. Streams continually move their sediment loads downstream, depositing sediments when flows are slow and remobilizing them when flows are high. Since stream flows can vary over a wide range in Hawaiian streams and runoff tends to be routed very quickly through Hawaiian stream systems, most sediment transport may occur during a relatively few high flow, short duration events. Such events would tend to drive contaminants that might enter the stream downstream in a rapid pulse.

It is possible, though unlikely, that the contaminant concentrations observed in soils from ranges at SBMR could significantly affect stream water quality. The chemicals of concern are likely to bind to soil particles and to migrate in this bound state. The amount of water needed to mobilize the contaminated sediments would likely result in very low concentrations in water. Without direct surface water sample data, it is necessary to make some assumptions in order to estimate the concentration of contaminants that might enter stream waters beyond the boundary of SBMR.

Assuming a suspended sediment concentration of 1 g/L in water, which is typical for turbid runoff water, and assuming that the sediment carried by the streams that drain SBMR contain the average RDX concentration (estimated at 5.9 mg/kg, or 5.9 micrograms per gram [USACE 2002a]), the resulting concentration of RDX in the water containing the sediment would be 5.9 micrograms per liter (5.9 μg/L). Using the same logic, the average concentrations of TNT, HMX, and nitroglycerin in the surface water would be 0.21, 0.72, and 16.6 μg/L, respectively, based on their average concentrations in the surface soils (USACE 2002a; see Table M1-1 in Appendix M-1).

Given these assumptions, the projected concentration of RDX in the stream water discharged at the installation boundary would be just slightly above the USEPA lifetime health advisory level (3.7 μg/L versus 2 μg/L), the concentration of nitroglycerin would be about three times the lifetime health advisory level (15.5 μg/L versus 5 μg/L), and the concentrations of the TNT and HMX would be much lower than the lifetime health advisory levels. Lifetime Health Advisory Levels are concentrations of contaminants that apply to drinking water or groundwater. These levels are similar to Maximum Contaminant Levels, which are enforceable standards established to protect public health by limiting the levels of contaminants in drinking water and groundwater; however, Lifetime Health Advisory Levels are not legally enforceable standards, but serve as technical guidance to assist regulators with water consumption advisories and groundwater remedy decisions. The concentration of contaminants that would actually be transported by runoff to the installation boundary is very difficult to predict, and the predicted concentration is highly dependent on the assumptions on which the prediction is based. Therefore, the estimate described above is intended only to illustrate a simple approach to the problem and to provide an idea of the approximate order of magnitude of the concentrations under these assumptions. Note that the average concentration used in this estimate likely greatly overestimates the average concentration in soils over the larger area of the ranges because it is based on sampling that was purposely selected for areas expected to contain higher than average concentrations of contaminants. Also, the sample results indicate that the contaminants occur in some areas but not others, so the distribution is not even. Many contaminants are not highly mobile in water, and sediments may require many months or years to migrate downslope to streams. Meanwhile, some contaminants, such as explosives, would be undergoing chemical degradation.

The assumption of the lifetime health advisories is that the water is consumed at a rate of 2 liters per day for a year. The stream water would not be consumed without filtration, and filtration would remove the contaminants because they are bound to the suspended sediment. After dilution in the main stems of Kaukonahua or Waikele Streams, the concentrations of contaminants would be below detection levels. These low concentrations would not reduce the beneficial uses of the streams, so the impacts on water quality would not be significant under existing conditions, where soil erosion rates are generally low. However, the significance would depend on the loading rate, which is determined by the rate of soil erosion.

A similar analysis can be done for metals, using the concentrations observed in the soil samples on the ranges. The results would show that metals could be transported to streams at concentrations that might exceed drinking water standards. The loading rates would increase with increased soil erosion.

Implementing the following mitigation measures would reduce the impacts on surface water quality to less than significant levels.

*Regulatory and Administrative Mitigation 1.* The Army will implement design measures in accordance with new Phase II Stormwater Management Regulations of the Clean Water Act. The Army will choose the most practicable solution for the specific project or project area during design. As directed via NPDES permit approval, the contractor will be required to implement a stormwater pollution prevention program during construction.

The Army will continue to implement land restoration measures identified in the INRMP. Mitigation measures include, but are not limited to, implementing the ITAM program to identify and inventory land condition using a GIS database; coordinating between training planners and natural resource managers; implementing land rehabilitation measures identified in the INRMP; monitoring the effectiveness of the land rehabilitation measures; evaluating erosion modeling data to identify areas in need of improved management; and implementing education and outreach programs to increase user awareness of the value of good land stewardship.

The Army will develop and implement a DuSMMoP for the training area. The plan will address measures such as, but not limited to, restrictions on the timing or type of training during high risk conditions, vegetation monitoring, soil monitoring, and buffer zones to minimize dust emissions in populated areas. The plan will determine how training will occur in order to keep fugitive dust emissions below CAA standards for $PM_{10}$ and soil erosion and compaction to a minimum. The Army will monitor the impacts of training activities to ensure that emissions stay within the acceptable ranges as predicted and environmental problems do not result from excessive soil erosion or compaction. The plan will also define contingency measures to mitigate the impacts of training activities that exceed the acceptable ranges for dust emissions or soil compaction.

The Army will implement the existing spill prevention and response plan to all new lands and activities under the Proposed Action. The IWFMP for Pōhakuloa and O'ahu Training Areas was updated in October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts associated with wildland fires. The plan is available upon request. The Army will incorporate BMPs that will reduce runoff and sedimentation to aquatic environments in accordance with CWA regulations for stormwater runoff at construction sites

*Additional Mitigation 1.* The Army proposes to implement design measures in accordance with Army design standards to reduce soil erosion and sediment loading impacts to Waikele Stream, Konokanahua Stream or tributaries from road construction. Mitigation design measures include, but are not limited to, hardening the roads, raising the elevation of the roadway to improve drainage, installing drainage ditches adjacent to roads to control water running on or off the road, and planting grasses to slow overland flow. The Army would choose the most practicable solution for the specific project or project area during design.

### *Less than Significant Impacts*

*Impacts on surface water quality from the use of dust control palliatives.* Applying calcium or magnesium chloride or calcium lignosulfonates could affect surface water quality, either by increasing the biological oxygen demand or by increasing total dissolved solids concentrations. These impacts are expected to be less than significant because the chemicals will be applied according to industry standards (Parametrix, undated).

*Impacts on groundwater quality during construction of proposed facilities.* As described for surface water, chemical or fuel spills might occur during construction activities, resulting in chemicals seeping into the subsurface and eventually to groundwater. However, any spills that occur would be immediately cleaned up, and the depth to groundwater is great enough in the SBMR area that contaminants would not reach groundwater rapidly, increasing the likelihood that surface spills would be addressed before they become a groundwater problem. Standard construction practices and materials would be used, resulting in no greater than usual potential for spills compared to other construction projects.

*Impacts on groundwater quality from operation of proposed facilities.* Operating several proposed facilities, particularly the motor pool maintenance shops, the tactical vehicle wash, and the Multiple Deployment Facility (MDF) (a current force project that would still be constructed and operated), would involve handling hazardous liquids or other chemicals or processing wastewater or other waste liquids. The MDF is in the Wheeler Gulch area, which reportedly has shallow groundwater conditions. All facilities that generate hazardous wastes or that store hazardous materials would provide appropriately trained personnel to manage these materials. Hazardous materials are managed according to the Army's standard operating procedures and in compliance with state and federal requirements. Facilities would be designed with engineering controls, such as secondary containment, waste treatment facilities, automatic shutoff controls, and other systems, to reduce the potential for releases. If releases were to occur, they would be cleaned up. Implementing these procedures is expected to reduce the potential for impacts on groundwater to less than significant levels.

*Impacts on surface water quality from stream crossings.* The proposed action could affect waters of the US via stream crossings along the Helemanō Trail at Poamaho Stream. All stream crossings would be reviewed by the Corps of Engineers prior to construction to determine if the activity is regulated under Section 404 of the Clean Water Act. In accordance with Section 404 of the Clean Water Act, any dredge or fill activities in these streams associated with the crossings may require a Department of the Army permit. If a Department of the Army permit is required, then a Clean Water Act Section 401 Water Quality Certification issued by the State of Hawai'i may also be required. The Army would design the stream crossing to minimize any dredge or fill impacts on the stream to the fullest extent practicable in compliance with Section 404 of the Clean Water Act. If the Corps determines that a Department of the Army permit is required, the Army would abide by all appropriate Clean Water Act regulations and permit processes administered by the Corps and the State of Hawai'i.

*Increased flood potential.* None of the construction projects proposed under the Proposed Action are in a 100-year flood zone. Although minor flooding reportedly occurs in some parts of the cantonment area, no additional housing or support facilities are proposed that would be affected by flooding or that would significantly expose personnel to flood hazards greater than under No Action.

Construction of parking lots and structures can increase the impermeable ground surface area at the expense of permeable surface area, resulting in larger volumes of runoff for a given area over a given period of time during a storm. This can increase the amount of water that arrives at a drain or that is discharged to a stream. The designers of new construction projects would take these effects into consideration when designing the drainage system and would size the drainage system appropriately, or they would divert runoff to channels with adequate capacity to prevent flooding.

*Ground water supply.* The Proposed Action would result in an increase of 810 Soldiers, accompanied by about 920 family members, for a population increase of about 1,730 individuals. Per capita domestic water use is likely to be on the order of 100 gallons (379 liters) per person per day, which means that the daily water use could increase by about 173,000 gallons, and the annual increase in water use attributable to the Proposed Action would be about 160 acre-feet. Current potable water pumping ranges between 4.0 and 9.0 MGD (see Section 5.14). The projected increase in water use would be about one to three percent, well within the current variation in the amount of groundwater pumping. Compared to the overall sustainable yield of the aquifer, this is a relatively small change, and it would be unlikely to stress existing water supplies or to significantly lower groundwater levels.

The water supply at SBMR comes from several large groundwater wells that were affected by TCE contamination from past practices at the installation. The contaminated groundwater, referred to as Operable Unit 2 was delisted in August 2000 from the Superfund NPL because the remedy for the operable unit successfully addressed the hazards. The solution is treatment of the groundwater at the wellhead to remove the TCE prior to use, a long-term remedy that has been approved by state and federal regulators after public review and comment. The USEPA has recently reduced the PRG for TCE in drinking water, based on a more conservative estimate of the cancer risk. This has not resulted in a change in the primary drinking water standard, but if the standard is lowered, this could affect the compliance status of the groundwater treatment system. The treatment system meets the new PRG, and the lower PRG is not expected to result in any change in the remedy or in the water supply assumptions for SBMR under the Proposed Action.

### *Reduced Land Acquisition Alternative*

Each of the impacts identified under the Proposed Action would also occur under RLA, except that the SRAA would be limited to 100 acres (40.7 hectares) instead of 1,402 acres (567 hectares) and would not include the QTR2 range. The South Range is within the watershed of Waikele Stream, which flows south into the Pearl Harbor watershed. The reduced training area available under this alternative could increase the intensity of soil impacts in the available land area relative to the Proposed Action. However, these impacts would occur in areas that are already affected by training activities, rather than expanding the region of impacts on land that has been previously managed for agriculture. Since there would be fewer modifications to existing land use than under the Proposed Action, including fewer new roads and less ground disturbance in new areas, the potential for soil erosion would be contained mainly within areas that are currently affected. The potential for chemical constituents of munitions associated with the QTR2 to be released to the land surface that exists under the Proposed Action would not occur under RLA. This would result in reduced potential for impacts on surface water quality in the Waikele Stream drainage area relative to the Proposed Action.

### *No Action Alternative*

#### Less than Significant Impacts

*Impacts on surface water quality.* The ATTACC modeling results suggest that under current conditions, the erosion impacts from training activities are less than significant. With improved monitoring and implementation of appropriate land rehabilitation measures, moderate impacts may be largely mitigated. The current moderate impacts are considered less than significant.

Some construction activity would occur, resulting in a minor increase in impermeable surface area, which in turn could slightly increase the potential for flooding in flood-prone areas. The amount of increase is expected to be negligible, compared to the overall capacity of the drainage system, and drainage systems at new facilities would be designed to prevent flooding, so this impact is not expected to be significant.

Impacts on surface water quality from chemical residues in training range soils have not been characterized, although, based on data from initial soil sampling on the ranges, it appears that less than significant impacts could occur.

# 5.9 GEOLOGY, SOILS, AND SEISMICITY

## 5.9.1 Affected Environment

The discussion of SBMR is divided between the Main Post, which is west of the town of Wahiawā and WAAF, and SBER, which is east of Highway 99.

### *Physiography*

*Main Post*

Most of the Main Post of SBMR is in the Schofield Plateau geomorphic province, which is a broad interior highland that lies between the Wai'anae Range and the Ko'olau Range. The western side of the Main Post lies within the Wai'anae Range geomorphic province. Figure 5-29 shows the location of SBMR and some of the other major features discussed in this section.

The Main Post is bounded on the east by Kaukonahua Stream, Wahiawā Reservoir, the town of Wahiawā, and Route 750, and it extends westward to the ridgeline of the Wai'anae Range. Elevations in the Main Post of SBMR range from about 660 feet (less than 201 meters) along the eastern boundary to about 3,000 feet (greater than 915 meters) on the ridgeline of the Wai'anae Range.

*Wheeler Army Airfield*

WAAF is near the southern edge of the Schofield Plateau, between Schofield Barracks Main Post and the East Range. It is bounded by Waikele Stream on the south and by Wahiawa Reservoir on the north. The land is relatively flat, with a gentle southward slope over most of the installation, from an elevation of about 860 feet near Wahiawa Reservoir, to about 790 feet on the south edge of the plateau. Along the southern boundary of the installation the slope breaks sharply in steep gullies that drain to the channel of Waikele Stream, about 80 to 100 feet below the level of the runways.

*South Range Acquisition Area*

Most of the SRAA is south of Waikele Stream, and consists of a generally east-sloping upland that slopes from an elevation of about 1,200 feet msl in the southwest to about 850 feet msl near Wheeler Army Airfield on the east. The upland surface is deeply dissected by Waikele Gulch and gulches of several north-draining tributaries to Waikele Stream. The channel of Waikele Stream is more than 100 feet below the rim in some areas. The upper surface of the SRAA is planted with non-irrigated pineapples, in long rows that run generally along the contour of the land.

*Schofield Barracks East Range*

SBER is on the east side of the Schofield Plateau geomorphic province, an area created by the lapping of basalt flows from the Ko'olau Volcano against the remnants of the older Wai'anae Volcano to the west. The eastern side of SBER lies within the Ko'olau Range geomorphic province.

**Figure 5-29**
Geologic Map of Schofield Barracks Main Post

The southern boundary of SBER is the boundary between the Kaukonahua watershed and the Waikele watershed. The northern boundary of SBER, east of Wahiawā, corresponds to the boundary between the Kaukonahua watershed and the Poamoho watershed.

SBER is on the leeward slope of the Koʻolau Range. The landscape is geologically young and undergoing rapid erosion. Streams cut deep V-shaped valleys in volcanic flow deposits that have deeply weathered in place, leaving the remnant structure of the volcanic flows but reducing their original permeability.

The upper surface of SBER slopes at an average rate of about 10 percent, dropping from an elevation of about 2,681 feet (817 meters) msl on the Koʻolau Ridge at Puʻu Kaʻaumakua to about 850 feet (259 meters) msl at Highway 99. The slope increases to the east. The western third of the range slopes at about half that rate, while the eastern third slopes at nearly twice that rate. The terrain is very rugged; the walls of the stream valleys in the eastern two-thirds of the range typically have slopes of 30 to over 100 percent.

### *Geology*

#### Main Post

SBMR is underlain by the Koʻolau Basalt member of the Koʻolau Volcanics series, which butts up against the older eroded surface of the Kamaileʻunu and Lualualei (lower and middle) members of the Waiʻanae Volcanics series (Figure 5-29). The Koʻolau Basalt flowed in thin nearly horizontal layers, on which soils developed and alluvial sediments were deposited between flows during the eruptive history of the Koʻolau Volcano. The Koʻolau volcanics are overlain by recent alluvial sediments eroded from the Waiʻanae Range, which accounts for the surficial deposits that cover most of the Main Post (Oki 1998).

The thickness of the alluvial sediments generally increases toward the center of the Schofield Plateau. Beneath that is soil that developed in place on the surface of the Koʻolau volcanics. This soil surface is underlain by saprolite (basalt that has been intensely weathered in place but retains many of the features of the original rock). Saprolite is exposed in some stream channels at SBMR (HLA 1992). The saprolite grades with depth into less weathered basalt. Thus, relatively soft materials are found to depths of 100 to 200 feet (30.5 to 61 meters) below the ground surface (HLA 1992).

#### *Wheeler Army Airfield*

WAAF is adjacent to the east side of the Main Post and is underlain by a thick 100-foot or greater sequence of saprolite, as described above, over which has developed an approximately 10-foot (3-meter) thick layer of clay-rich soil.

#### South Range Acquisition Area

As illustrated in Figure 5-29, the geology underlying the SRAA is dominated by lava flows of the lower and middle members of the Waiʻanae Volcanic Series, which crops out along the uplands on the east side of the Main Post, and underlies WAAF. The channel of Waikele Stream is incised 80 to 120 feet (24 to 37 meters) below the surface of the plateau, meaning that the stream channel has eroded through softer alluvium, soil, and saprolite deposits and rests near the depth of the underlying weathered basalt. The stream channels are covered by sediments eroded from the uplands and from the side slopes of the channels.

*Schofield Barracks East Range*

The geology of SBER is similar to that described above for the Main Post. Stearns and Vaksvik estimated the thickness of the Koʻolau deposits (depth to the underlying Waiʻanae volcanic deposits) to be about 1,500 feet (457 meters) under the east side of SBMR. The thickness increases to the east.

The eastern side of SBER is part of the Northwest Rift Zone of the Koʻolau Volcano. This is an area of greater dike intensity. The eruptive center of the Koʻolau Volcano was probably to the east of the ridge of the Koʻolau Range, near Kāneʻohe Bay.

### Soils

*Main Post*

Figure 5-30 is a map of the soil series found within the Main Post. Four of the seven soil associations found on Oʻahu occur within SBMR. Each of these is derived from volcanic parent material. Soils on the steep east-facing slopes above an elevation of about 1,500 feet (457 meters) belong to the Tropohumults-Dystrandepts association (Foote et. al 1972). These are thin light soils derived from volcanic ash; they are high in organic matter and when saturated can contain more water than soil. Deep V-shaped drainages and narrow ridges dominate the areas in which these soils occur. The soils are strongly to extremely acid. Tropohumults have a surface layer of reddish-brown silty clay. The subsoil has a strong blocky structure and is underlain by saprolite. Dystrandepts are dark-colored friable soils with a silty clay surface layer. The subsoil is generally massive. These soils may contain thick accumulations of organic material.

Lower on the flanks of the range, the two major soil groups are Kolekole silty clay loam and Manana silty clay loam. Kolekole soils are developed in gravelly alluvium mixed with volcanic ash. They are found on gently to moderately steep slopes at elevations ranging from 500 to 1,200 feet (152 to 366 meters). These soils are used for sugarcane, pineapple, and pasture. Permeability is moderately rapid to the depth of a hardpan layer at about 2 to 3 feet (0.6 to 0.9 meters). Runoff is slow, and erosion hazard is slight.

The principal soil type on the flatter lands at lower elevations is Kunia silty clay. Kunia soils are well-drained soils found on nearly level ground in upland terraces and fans at elevations of 700 to 1,000 feet (213 to 305 meters). Permeability is moderate, runoff is slow, and erosion hazard is slight. The surface layer is a dark reddish-brown silty clay about 2 feet (0.61 meters) thick, grading to a blocky silty clay loam to a depth of about 6 feet (1.83 meters), and underlain by gravelly silty clay (Foote et al. 1972).

In gulches, the principal soils are Helemano and Kawaihapai series. Helemano soils are well-drained silty clays that occur in V-shaped gulches. Erosion hazard is severe to very severe. Kawaihapai soils occur in drainageways on alluvial fans. These soils are well drained, and the erosion hazard is slight.

**Figure 5-30**
Soils Map Schofield Barracks Main Post

A study conducted for the Army in 1979 (WLA 1979) identified soil erosion problems in the Central and South Ranges of SBMR. The study concluded that erosion of the walls of gulches in heavy rainfall/runoff was primarily a natural phenomenon, mainly affecting Helemano soils. The study also identified soil erosion problems associated with unstable or poorly drained road cuts, mainly at gulch crossings and in areas with steep slopes, and associated with bare ground surfaces where vegetation loss was caused by vehicle traffic and other military activities. The study found that in the 3,600-acre (1,457 hectare) study area, about 48 acres (19.4 hectares) (1.3 percent of the total study area) were undergoing high rates of erosion due to natural conditions, while about 126 acres (51 hectares) (3.5 percent) were undergoing a high rate of erosion due to military activities. Erosion rates in denuded upland soil areas were estimated at between 28 and 80 tons per acre per year, compared to erosion on vegetated surfaces of 1.7 tons per acre per year. The erosion rate from soils at the tops of gulches in denuded areas was estimated at over 400 tons per acre per year, versus a rate of 8.1 tons per acre per year in areas where the tops of gulches were vegetated. Most of the erosion was caused by precipitation and runoff, but wind erosion was also a factor in bare soil areas. Revegetation, along with improving drainage at road cuts, was the principal management measure identified to address the erosion problems.

#### *Wheeler Army Airfield*

Most of the flat lands on WAAF are underlain by Waihiawa silty clay soils, as described above. The gully slopes adjacent to Waikele Stream are underlain by Helemanō soils. As described above, Helemanō soils have a high erosion hazard.

#### *South Range Acquisition Area*

Most of the SRAA is underlain by Kunia Silty Clay. Uplands on the east side of the South Range are underlain by soils similar to those at the same elevations on the Main Post, including Kolekole Silty Clay Loam and Mahana Silty Clay Loam. Soils in the SRAA are classified by the State of Hawai'i as "important farmland" because they support unirrigated pineapple culture.

#### *Schofield Barracks East Range*

Figure 5-31 shows the soils within SBER. The eastern half of SBER, above about 1,200 feet (366 meters) msl, contains thin soils classified as "rough mountainous land." The soils range from one to ten inches (2.54 to 25.4 centimeters) thick over saprolite. The saprolite is typically soft enough for roots to penetrate. Annual rainfall ranges from 70 to more than 400 inches (178 to more than 1,016 centimeters). On the narrow ridge tops, the soils are similar to Olokui and Amalu soils of Maui and Moloka'i. Amalu soils are poorly drained, peaty silty clays on slopes up to 20 percent. Olokui soils are shallow poorly drained soils that are high in organic matter content and found on slopes of up to 30 percent. A thin impermeable iron-cemented layer (ironstone) is found just above weathered rock at depths of 6 to 20 inches (15 to 51 centimeters). Roots and infiltration of rainwater are limited by the ironstone, so vegetation must have a flat shallow rooting system. These soils are always wet.

**Figure 5-31**
Soils Map Schofield Barracks East Range

Farther downslope, at elevations below about 1,200 feet (366 meters) msl, the predominant soil is Helemano silty clay on 30 to 90 percent slopes. These are well-drained soils formed on alluvial fans or on the colluvium deposited along the walls of gulches. Colluvium is a loose deposit of rock debris accumulated through the action of gravity at the base of a cliff or slope. The surface soil is dark reddish-brown silty clay, about 10 inches (25.4 centimeters) thick, which is underlain by about 50 inches (127 centimeters) of similar soil with a blocky structure. The soil is developed on soft highly weathered basalt. Runoff is medium to very rapid, and the erosion hazard is severe to very severe. On the gentler slopes of ridge tops below an elevation of about 1,200 feet (366 meters) msl are silty clay soils of the Leilehua and Paaloa series. Leilehua soils are about 48 inches (122 centimeters) thick over gravelly parent material weathered from basalt. Permeability is moderately rapid, runoff is slow to moderate, and the erosion hazard is slight to moderate, depending on slope. Paaloa soils are silty clays or clays. Permeability is moderately rapid, runoff is slow to medium, and the erosion hazard is slight to moderate.

At the lowest elevations of SBER, near Wahiawā, the predominant soil is Wahiawa silty clay. Slopes range from 0 to 8 percent. These soils are well drained, about four feet (1.2 meters) thick, and developed on alluvium underlain by weathered basalt. Runoff is slow, and the erosion hazard is slight.

#### *Helemanō Trail*

Helemanō Trail extends from HMR to SBMR and is the southern segment of the route connecting SBMR and KTA. The northern segment of that route is Drum Road, and soils along that segment are discussed in Section 7.9. Dillingham Trail, which connects DMR and SBMR, uses the portion of Helemanō Trail south of the Poamoho Stream crossing, near Poamoho Camp. Soils along Dillingham Trail are discussed in Section 6.9.

The soils along Helemanō Trail are shown in Figure 7-15 (provided in Chapter 7, Section 7.9 with the soils map for Drum Road). Beginning at HMR, the trail follows the Paʻalaʻa Uka Pūpūkea Road, which is a paved road. The trail continues south from the junction of Paʻalaʻa Uka Pūpūkea Road and the Kamehameha Highway, about one mile to near the head of small gulch tributary to Poamoho Stream, and continues south for less than a mile along the west rim of the gulch, to the crossing point on the main stem of Poamoho Stream. At this point, the route to SBMR is the same as for Dillingham Trail. (For a description of the soils along the trail alignment south of the Poamoho Stream, please refer to Section 6.9.)

The only portion of Helemanō Trail north of the Poamoho Stream crossing that would be over unpaved road is along the rim of the short tributary gulch. The trail skirts the margin of cultivated farmlands underlain by Wahiawa silty clay soils (WaA and WaC). Wahiawa soils are described as having good suitability for road fill. The banks of the gulch are composed of Helemano silty clay soil on 30 to 60 percent slopes.

### *Chemical Constituents in Soils*

Main Post

USACE conducted a surface soil investigation at SMBR from November 8 to November 10, 2002. The objective of the investigation was to get a snapshot of the current condition of soils on the active training ranges. Comparison tables of detected compounds are included in Appendix M.

The results of the investigation as they relate to concentrations of natural and introduced substances in soils are summarized and briefly discussed in this section. The data from the investigation are intended to support the description of current conditions based on past use of the ranges and naturally occurring factors. The investigation was not intended to be a comprehensive study of the distribution of contaminants on the ranges.

Appendix M contains the complete list of detected constituents. The concentrations are compared to the USEPA's preliminary remediation guidelines (PRGs) for industrial soils. Information about the use of PRGs is provided by the USEPA at: http://www.epa.gov/region09/waste/sfund/prg/files/02userguide.pdf.

PRGs are not regulatory standards. Since risk assessment methods are fairly well standardized, the USEPA has developed PRGs for certain common scenarios that provide a rapid means of screening the results of site investigations to identify areas of potential concern. PRGs have been developed for many chemicals, for residential and industrial soil exposure scenarios, based on conservative assumptions about exposure. The PRGs are goals and are designed to be protective of health under a wide range of conditions.

The guidelines for the use of PRGs allow users to adjust the exposure assumptions to better reflect site-specific conditions. This has not been done for the analysis presented in this report. The Army used the industrial soil PRGs in order to establish a basis of comparison for the concentrations of contaminants observed on the training ranges. However, these PRGs are based on exposure assumptions that are substantially higher than could be expected for military personnel using the proposed range areas. Industrial soil PRGs assume adult outdoor worker exposures for a period of 25 years. In fact, most military personnel use the training ranges only for brief periods, totaling days or weeks, so that actual exposures are far lower than assumed in the industrial soil PRGs. No public exposure can be expected at the proposed range areas.

Three general classes of compounds were detected: metals, explosives, and semivolatile organic compounds. Metals occur naturally in Hawaiian soils, as a result of the weathering of minerals contained in the volcanic rock from which the soils were derived. Training activities may contribute additional metals concentrations to the natural background concentrations present in soils. For example, bullets are composed of an alloy of lead and antimony, which hardens the lead, and lead is present in some explosives.

*Explosives*. The sampling detected four explosives: TNT (2,4,6-TNT), HMX (Octahydro-1357-tetranitro-1357-tetrazocine), RDX (Hexahydro-1,3,5-trinitro-1,3,5-triazine), and nitroglycerin. The reporting limit for TNT, HMX, and RDX was 0.4 mg/kg and for nitroglycerin was 2.2 mg/kg. It is one of these four explosives; two samples of RDX and one sample of nitroglycerin exceeded their respective industrial PRGs. Whether the levels of arsenic detected occur naturally or because of human activity is unclear.

Based on these results, it appears that traces of explosives compounds are present in areas where high explosives have been used or where munitions demolition occurred: the Engineering Demolition Range, the MAC, and the KR8 Anti-Armor Range. Explosives were not detected in samples collected from the North Firebreak Road Impact Area or from the firing point area for 105mm and 155mm mortars in the South Range.

*Metals.* High concentrations of a number of metals, including aluminum, manganese, iron, chromium, and others, occur naturally in Hawaiian soils. These concentrations are not related to human activities. Activities on the ranges have nothing to do with these concentrations, even though the concentrations exceed industrial soil PRGs. These metals are major constituents of the minerals in the basalt lavas found in Hawai'i. As can be seen in the frequency distribution diagrams, the concentrations of most of the metals, including these, show a normal distribution. In other words, most of the concentrations are near the average, with a decreasing number of samples containing concentrations much higher or lower than the average.

The concentrations of some metals exceeded the average in some samples. Where this occurs, it may indicate a contribution from human-made sources. For example, one sample, MAC-04, from the MOUT Assault Course in the South Range, contained an arsenic concentration of 45 milligrams per kilogram (mg/kg). Arsenic is one of several metals that occurs naturally in Hawaiian soils, at ranges from 1 to 5 mg/kg. Arsenic is one of several metals that occur naturally in Hawaiian soils, at ranges from 1 to 5 mg/kg. Arsenic is one of several metals that is known or suspected to cause cancer in humans, and both the cancer and the noncancer risk must be taken into account. Arsenic was detected in 36 of the 44 samples analyzed, and the average arsenic concentration was 3.9 mg/kg, well below the noncancer industrial soil PRG for arsenic of 260 mg/kg but above the cancer industrial soil PRG of 1.59 mg/kg, The carcinogenic risk from arsenic is about $4 \times 10^{-5}$ and is the largest contributor to the total carcinogenic risk among the metals and explosives detected. Arsenic was detected in all four samples from the MAC, at concentrations representative of the full range of concentrations observed at SBMR.

Only a few metals seem to be present sporadically at concentrations attributable to human activities. These may include arsenic, lead, cadmium, and vanadium. With the exception of the discussion of arsenic above, all of the concentrations of these metals detected in samples from the ranges were below industrial soil PRGs. Whether the levels of arsenic detected occur naturally or because of human activity is unclear.

*Semi-volatile Organic Compounds.* No semivolatile organic compounds were detected above industrial soil PRGs. Most of the semivolatile organics that were detected (22 of 27 detections in a total of nine separate samples) were found in the five samples from the Infantry Demolition Area.

### *Geologic Hazards and Seismicity*

*Main Post*

Steep slopes, slopes weakened by road cuts, and slopes supported by poorly consolidated materials are subject to failure. Slope failure may be initiated by a number of factors, including seismic shaking, high water content, and excessive loading relative to soil strength. Failure also can occur on gentle slopes for similar reasons. Figure 5-32 shows areas of steep slopes that may be particularly vulnerable to landslides or slope failure.

The risk of strong ground shaking at SBMR is relatively low due to its distance from the south coast of the island of Hawai'i, where most earthquakes are centered. The US Geological Survey's National Seismic Hazard Mapping Project estimates that there is about a 10 percent chance that ground accelerations of more than 12 percent of gravity would occur in firm rock areas within the southeastern three quarters of O'ahu over the next 50 years.

*Wheeler Army Airfield*

Geologic hazards at WAAF are similar to those described above for the Main Post, and the potential for earthquakes and ground motion is the same. The steep slopes of Waikele Gulch are underlain by erodible soils and soft saprolite deposits, which are vulnerable to slope failure.

*South Range Acquisition Area*

The SRAA is dissected by the channels of Waikele Stream and its tributaries. The streams have incised steep-sided gullies, 80 to 120 feet (24 to 37 meters) deep, into the relatively gently northeast-sloping surface of the plateau. The floors of the gullies are relatively wide and flat, and the Waikele Stream meanders within this incised channel. The slopes of the plateau surface are stable, while the walls of the gullies are subject to collapse due to erosion at the base of the slopes from migration of the streams within their channels. This situation is similar to what occurs in stream channels on the Main Post. Seismic hazards are the same as those described above for the Main Post.

*Schofield Barracks East Range*

SBER contains many areas of steep slopes and deeply weathered rock (Figure 5-33). Erosion tends to prevent the accumulation of alluvium and colluvium, but slope failure remains a potential hazard in many areas.

Similar to the Main Post, there is little risk of strong ground shaking in areas underlain by firm rock in SBER. However, site-specific conditions, such as the thickness of loose geologic deposits and the depth of the water table, may increase ground shaking. Earthquakes also may trigger landslides in areas of unstable slopes.

**Figure 5-32**
Steep Slopes at Schofield Barracks Main Post

**Figure 5-33**
Steep Slopes at Schofield Barracks East Range

### 5.9.2 Environmental Consequences

***Summary of Impacts***

Table 5-22 summarizes the levels of significance of the various categories of impacts expected for geology and soils resources. Enhanced soil erosion from maneuver training activities, which has already resulted in gullying and other damage in some areas of SBMR, is expected to continue under the Proposed Action, probably at significantly increased rates. This is considered a significant but not mitigable to less than significant impact.

Additional contributions to soil erosion and soil loss could occur because of wildland fires, and soil compaction, both of which would affect vegetation cover. Soil contamination is present on the live fire ranges at SBMR. Based on the results of the soil investigation of SBMR, there are indications that the cumulative health risks from exposure of military personnel to both natural metals concentrations and human-introduced metals and explosives concentrations are less than significant under current conditions. Note, however, that the investigation was designed to selectively sample areas in which higher than average contaminant concentrations would occur and that the PRGs to which these concentrations are compared are conservative values that may overestimate the risk to the exposed population at SBMR. Concentrations in soils on the ranges, and therefore the health risks associated with these concentrations are not expected to increase substantially under the Proposed Action.

**Table 5-22**
**Summary of Potential Geologic Resources Impacts at SBMR/WAAF**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Soil erosion and loss | ⊗ | ⊘ | ⊘ |
| Soil erosion and loss from wildland fires | ⊘ | ⊘ | ⊘ |
| Soil compaction | ⊘ | ⊙ | ⊙ |
| Exposure to Contaminated Soils | ⊙ | ⊙ | ⊙ |
| Slope failure | ⊘ | ⊘ | ○ |
| Volcanic and seismic hazards | ○ | ○ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table.
Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact
N/A = Not applicable

The potential for slope failure is considered significant in the SRAA, SBER, and along portions of Helemanō Trail. Mitigation would reduce most of these impacts to less than significant levels. Seismic hazards would remain less than significant under the Proposed Action.

### *Proposed Action (Preferred Alternative)*

Significant Impacts

*Impact 1: Soil erosion in training ranges.* Training activities under the Proposed Action are expected to result in a significant increase in soil erosion and soils loss compared to existing conditions in the SRAA and in SBER. The soil loss may be partially but not fully mitigated. Therefore, this is considered to be a significant but not mitigable to less than significant impact.

The Army developed the ATTACC model, which is described in more detail in Appendix M-2, to assess the impacts of mounted maneuver training on land. The first step in using the model is to estimate the training load placed on the land by the vehicles that would be used to transport and accompany troops on maneuvers on the ranges. This training load is measured in terms of a standard based on the impact of an Abrams tank per mile of travel during maneuver training. The standard unit is called a maneuver impact mile (MIM). Other vehicles have different impacts on land condition due to their weight, wheel or track configuration, and how they are operated. The effect of mounted maneuver training on a particular plot of land can be generally described by a curve that relates the land condition to the training load. As the training load increases, the condition of the land would generally decrease because the training load damages vegetation cover and disturbs soils, and these effects can persist over time. Once initiated, damage to vegetation cover and soils can accelerate, as eroded areas widen, for example, and soil loss prevents vegetation from becoming reestablished. Mounted maneuver training is generally not restricted to roads but is restricted by terrain factors (slope and vegetation) and can be further restricted by the need to avoid sensitive habitat or cultural sites. Curves that relate land condition to training load can be developed for small areas based on detailed information about the susceptibility of the land to the effects of maneuver training, or they can be developed for larger areas, where the effects are not known in as much detail, but are averaged. ATTACC modeling was performed at this broader level of analysis for this EIS to estimate the overall effects of the Proposed Action relative to existing conditions for entire ranges.

In modeling the effects on the Schofield ranges, the existing annual training load at SBMR was estimated at 16,740 MIMs, and the existing training load in SBER was estimated at 11,680 MIMs. The training load at SBMR is confined to a small portion of the South Range that is accessible to vehicles. This includes unpaved roads and off-road areas. For the Proposed Action, the annual training load at SBMR would increase to 25,855 MIMs and the load at SBER would increase to 19,145 MIMs per year. The increase results from a combination of increased training intensity and the increased effects on land condition per mile of training with the Stryker vehicle. Land condition curves were developed for both SBER and SBMR. For SBMR, future training was assumed to be on the SRAA.

In both the SRAA and SBER, the ATTACC model results indicate that land condition would decline. In the SRAA, the land is currently used for pineapple cultivation. The pineapple fields would be left in place, and the Stryker vehicle would be restricted to existing farm roads. These roads are oriented in a grid pattern that allows access to the pineapple rows. In modeling the effects on the SRAA, the pineapple crop was assumed to be removed, so that maneuver training would be unrestricted over the entire accessible area where slopes are less than 30 percent. Under this assumption, the land condition was determined to decline to a severely degraded condition. However, the modeling conflicted with the Proposed Action, which restricts Strykers to existing farm roads. This would have two opposing effects relative to the assumption used in the modeling: the land damage would be limited to the existing roads instead of distributed over the entire SRAA, but the restriction to the roads would mean that damage to the road areas would be increased because the vehicle use would be focused onto a smaller area. The existing roads do not contain vegetation, but intense vehicle use could disturb the soils underlying the roads and cause ruts and gullies to form, which in turn could lead to enhanced soil erosion. These opposing effects do not necessarily cancel each other out, but it is difficult to know what the differences would be. Within the uncertainties of the model, it is expected that, without mitigation, the effects of soil loss from soil erosion caused by the mounted maneuver training would be significant over time.

Similarly, for SBER, land condition is projected by the ATTACC model to decline from "moderate" under existing conditions to "severe" under the Proposed Action because mounted maneuver training with the Stryker vehicle would be focused in the relatively small portion of the range having less than 30 percent slopes and because the effect of the Stryker vehicle on vegetation and soils is relatively greater than from existing vehicles. Therefore, without mitigation, the effects on soil loss in SBER are considered to be significant over time. The mitigation measures detailed below could be implemented. Their success cannot be adequately assessed, and because of the expected severity of the effects, the effects likely would not be fully successful in preventing the eventual loss of fertility and sustainability of the soils on the SRAA.

*Regulatory and Administrative Mitigation 1.* The Army will develop and implement a DuSMMoP for the training area. In the plan the Army will address measures such as, but not limited to, restrictions on the timing or type of training during high risk conditions, vegetation monitoring, soil monitoring, and buffer zones to minimize dust emissions in populated areas. The Army will use the plan to determine how training will occur in order to keep fugitive dust emissions below CAA standards for $PM_{10}$ and soil erosion and compaction to a minimum. The Army will monitor the impacts of training activities to ensure that emissions stay within the acceptable ranges as predicted and environmental problems do not result from excessive soil erosion or compaction. The plan will also define contingency measures to mitigate the impacts of training activities that exceed the acceptable ranges for dust emissions or soil compaction.

The Army will implement land management practices and procedures described in the ITAM annual work plan to reduce erosion impacts (US Army Hawai'i 2001a). Currently these measures include implementing a TRI program; implementing an ITAM program and an SRA program; developing and enforcing range regulations; implementing an Erosion and Sediment Control Management Plan; coordinating with other participants in the Ko'olau Mountains Watershed Partnership (KMWP); and continuing to implement land rehabilitation projects, as needed, within the LRAM program. Examples of current LRAM activities at KTA include revegetation projects involving site preparation, liming, fertilization, seeding or hydroseeding, tree planting, irrigation, and mulching; a combat trail maintenance program (CTP); coordination through the Troop Construction Coordination Committee (TCCC) on road maintenance projects; and developing mapping and GIS tools for identifying and tracking the progress of mitigation measures.

### *Significant but Mitigable to Less Than Significant*

*Impact 2: Soil erosion from wildland fires.* At each of the installations, wildland fires have the potential for removing vegetation that protects soil from erosion. Wildland fires can affect large areas of land, removing grasses and larger trees and shrubs that hold the soil. The magnitude of this impact is directly related to the size of the fire. Fires may be initiated by detonation of munitions, or potentially even by vehicle engines, smoking, use of welding torches, by downed power lines, and many other causes. Land management practices can increase or reduce the potential damage caused by fires, through management of the fuel supply (wood, brush, grasses). Although naturally-caused fires are not common in Hawai'i, fires may also be started naturally, by electrical storms. Wildland fires are considered to be a potentially significant impact of all alternatives because of the potential for increased soil erosion.

*Regulatory and Administrative Mitigation 2.* The IWFMP for Pōhakuloa and O'ahu Training Areas was updated in October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts associated with wildland fires. The plan is available upon request.

*Impact 3: Soil compaction.* Soils may be compacted by tracked or wheeled off-road vehicles during maneuver training. Soils on the SRAA may be susceptible to compaction. Compaction can reduce soil moisture holding capacity, and harden silty-clay soils, making it harder to restore damaged vegetation. Since vegetation cover is one of the primary means of preventing soil erosion, widespread compaction could indirectly increase soil loss. Compacted wheel tracks may create surface drainage conduits, resulting in faster runoff, formation of ruts, and enhanced erosion.

*Regulatory and Administrative Mitigation 3.* Mitigation for compaction is the same as described for mitigation of soil erosion above.

*Impact 4: Slope failure.* Slope failure involves the collapse of soils on a steep slope when the internal friction of the materials supporting the slope is exceeded by the weight of the materials. Slope failure can be initiated by the presence of water in the pore spaces of the materials which reduces the internal frictional forces, by a change in the angle of repose of the materials through undercutting the slope, by increasing the loading at the top of the slope, by deeper weathering of the materials in the slope, and by vibration, among other causes. The combination of steep slopes, easily erodible soils, and the damage or modification to land cover or surface drainage that would occur in construction of the road or use of the ranges for maneuver training, has the potential to increase rates of slope failure. Although many slopes are prone to localized failure, the principal effect would be to increase rates of erosion, and to move sediment into stream channels. These processes are continuous and naturally occurring, but the potential for substantially enhanced rates of failure is considered a potentially significant impact of construction and use of Helemanō Road, and of maneuver training on the SRAA and at SBER.

*Regulatory and Administrative Mitigation 4.* Enhanced slope failure rates would be observed through monitoring land condition under the ITAM Program. Many slope failures would be small, and might not be noticed. But if slope failures occur in areas associated with training activities or roads, they would be more likely to be noticed and may require response. The Army proposes to minimize and avoid cut slopes, where practicable. Cut slopes would be blended into the landscape by rounding the edges of the slope, differentially orienting the slope and the roadbed alignments where practicable. Use of these techniques would be varied based on the specific conditions, including depth of the cut, orientation of the slope, and type of material (e.g., dirt slope and rock slope). In accordance with Army design standards, potential mitigation measures for this impact also include, where practicable, selecting the least failure-prone route, testing soils where necessary along the route to identify problems, designing the roadbed, slope, and surface to avoid slope failure, properly sizing drainage systems, designing storm drainage outfalls for efficient performance, and properly monitoring and maintaining the road.

### *Less than Significant Impacts*

*Exposure to contaminated soils.* An important factor in evaluating risk due to exposure to contaminated is soils is the fact that munitions are fired from firing points down range and into the range impact areas. These areas are not accessible to or entered by Soldiers or members of the public because of the safety explosive risk they represent. Therefore, it is unlikely that human beings, either military personnel or off-post residents, would come into contact with the constituents of these munitions in the downrange or impact area soils. Taken together, the chemical concentrations on the training ranges represent a low risk to personnel who use the ranges. There is no threat to the general public from munitions constituents related to range use because there would be no public access to these areas.

Based on the analysis described above, this represents a less than significant impact.

Although a relatively small number of samples were collected to represent the ranges, the samples were specifically collected from locations that were considered to have a high probability of representing the most contaminated sites. Therefore, the sample results represent above average concentrations on the ranges overall. RDX was found in the highest relative levels among the chemicals detected on the ranges, exceeding the PRG for RDX in two composite samples of 39 composite samples taken. The soil concentrations used for comparison to the PRGs in this report are not randomly distributed, but represent the highest concentrations on the ranges (USACE 2002a). The actual exposures would be lower than has been assumed in this analysis. Arsenic was detected in levels far below its non-cancer industrial PRG, but slightly above its cancer industrial PRG.

The Proposed Action is not expected to cause increased exposures to these chemicals because it would not place personnel in additional contact with contaminated soils. Instead, by moving mounted maneuver training to the SRAA, it would reduce some of the opportunities for exposure. In addition, it is unlikely that troops would be exposed to these compounds while training, since Soldiers are not exposed to conditions on a training range for the long periods of time (25 years) assumed in the industrial soil PRGs. For the reasons described above, the actual risk to human receptors from the low level compounds in the range soils is not significant.

With regard to the presence of pesticides in land within the SRAA, the USEPA has investigated pesticide use in the Del Monte plantation lands surrounding Kunia, and did not find unusual concentrations of farm chemicals in the SRAA (the Kunia Plantation Superfund Site investigations are discussed further in Section 5.11).

*Impacts on soil loss from training activities - construction sites.* Excavation, grading, trenching, and other earth-disturbing activities can expose soils to runoff and erosion. The impacts of localized soil loss related to development of construction sites are not expected to be geologically significant. Also, implementing standard construction BMPs to control stormwater runoff would reduce the potential for soil loss at construction sites to less than significant levels.

*No Impacts*

*Volcanic and seismic hazards.* At SBMR, as with all of the island of O'ahu, the expected intensity of a reasonably probable earthquake would be moderate to low because of its distance from the center of most seismic activity on the island of Hawai'i. There is little risk of renewed volcanic activity on O'ahu, so the impacts from this issue at SBMR are considered less than significant.

### Reduced Land Acquisition Alternative

*Significant Impacts Mitigable to Less than Significant*

*Impact 1: Impacts on Soil loss from training activities.* The impact of soil erosion on SBER would be similar to that described under the Proposed Action, and the mitigation measures described above would also apply. The impact in the SRAA would not occur; instead, maneuver training would be moved to PTA under this alternative, and the training load there would be increased. This impact is discussed in Section 8.9.

*Regulatory and Administrative Mitigation 1.* Because training intensity would be at levels similar to existing conditions, the impacts are expected to be mitigable to less than significant levels with implementation of the ITAM program.

*Additional Mitigation 1.* The same mitigations would be implemented under the RLA as under the Proposed Action, including implementing a DuSMMoP.

*Less than Significant Impacts*

*Exposure to contaminated soils.* The impacts under this alternative would be the same as or similar to those described under the Proposed Action alternative, and would less than significant for the same reasons.

Soil compaction from loss of important farmland. Under RLA, only about 100 acres (40.5 hectares) of land in the SRAA would be transferred. This land is on the north side of Waikele Stream and is not currently in cultivation, although the soils are of the type that can be considered important farmland. Therefore, there would be no conversion of important farmland under this alternative, and no impact would occur.

With regard to the presence of pesticides in land within the SRAA, the USEPA has investigated pesticide use in the Del Monte plantation lands surrounding Kunia, and did not find unusual concentrations of farm chemicals in the SRAA (the Kunia Plantation Superfund Site investigations are discussed further in Section 5.11).

Impacts on soil loss from training activities - construction sites. The impacts of construction on soil erosion would be the same as those described for the Proposed Action and would be less than significant for the same reason described above.

### No Action Alternative

The current baseline of existing conditions would continue under No Action. Under the status quo of No Action, impacts on geology resources would continue at their current levels; they are summarized below.

#### Significant but Mitigable to Less than Significant Impacts

Impact 1: Impacts on soil loss from training activities. Current training activities, including use of vehicles on unimproved roads and off roads, have resulted in localized severe soil erosion, particularly in areas underlain by Helemanō soils on steep slopes adjacent to streams or gulches. The training activities impair vegetation growth, resulting in gully erosion, which increases in severity as the gullies broaden. This erosion can remove large volumes of soil, which are ultimately redeposited downslope or downstream. Although ATTACC modeling identifies the current effects of maneuver training overall on SBMR ranges as moderate, current conditions are not sustainable and land condition has continued to decline. Under the No Action Alternative, no additional lands would be available to enable training to be rotated to other areas while the damaged land recovers. Therefore, continued damage to the land is considered a significant impact under No Action.

Regulatory and Administrative Mitigation 1. As described above for the Proposed Action, the ITAM program and DuSMMoP would be implemented to evaluate land condition, to identify mitigation measures for land restoration appropriate to specific local problems and conditions, and to monitor the success of the restoration measures.

Impact 2: Soil erosion and loss from wildland fires. The impact from soil erosion and loss from wildland fires would be the same as for the Proposed Action, and the mitigation measures described above would also apply.

#### Less than Significant Impacts

Exposure to Contaminated Soils. The impact from exposure to contaminated soils would be the same as for the Proposed Action, and would be less than significant for the same reasons described above.

*Soil compaction.* The impact from soil compaction would be the same as for the Reduced Land Acquisition alternative described above.

*No Impacts*

*Slope failure*. Because Helemanō Trail would not be constructed, no off-road maneuvers would take place at SBER. There would be no impacts under the No Action Alternative.

# 5.10 BIOLOGICAL RESOURCES

## 5.10.1 Affected Environment

This section is divided into discussions of general vegetation, wildlife, and habitat types common to SBMR, SRAA, and WAAF, including sensitive species and habitats known to occur or with the potential to occur in this area. Also included are federal, state, and locally regulated species, such as threatened and endangered species or species of concern.

Included in this ROI is SBMR, SRAA, and WAAF and the proposed Helemanō Trail, with a 164-foot (50-meter) buffer on either side of the trail. The ROI was determined by analyzing the extent of potential impacts of routine military training activities and foot maneuvers. Since the potential effects of fire covered the largest area and included the areas affected by the introduction of weeds, noise, trampling, soil erosion, and all other impacts, the ROI was delineated using the fuel types, human-made barriers, and topographic barriers to fire. The ROI is depicted in Figure 5-34.

### *Recovery Plan*

There are recovery plans for 34 plant and 1 animal species that are known to or have the potential to occur within the SBMR ROI. These species are listed in Appendix I-1a.

### *Installation Overview*

The ROI contains areas of dry cliff, montane wet, lowland wet, and lowland moist communities (R. M. Towill Corp. 1997b; USARHAW and 25th ID[L] 2001a). The three types of montane wet communities in these training areas are mixed fern/shrub, ʻōhiʻa forest, and ʻōhiʻa shrubland. There is also a small lowland dry shrubland area.

#### *Main Post*

The Main Post is in central Oʻahu and covers over 8,860 acres of land. It shares boundaries with the Kamehameha Highway to the east, private land and Mount Kaʻala Natural Area Reserve to the north, Waiʻanae Kai Forest Reserve to the west, and Lualualei Naval Reservation and private and state-owned land to the south. Botanical surveys to identify rare plants, communities, and potential threats to these resources have been conducted intermittently since 1977. HINHP conducted a comprehensive biological survey from 1992 to 1993. The Center for Environmental Management of Military Lands (CEMML) conducted an additional comprehensive botanical survey in 1997. In addition, the Army's environmental division routinely monitors and surveys for rare and listed plant species. These reports provided the foundation for much of the botanical information currently in use to describe this area. South and east of the Main Post is the SRAA.

The vegetation on the Main Post includes residential and business and range areas that consist of highly managed nonnative vegetation like grasses, shrubs, and trees. The vegetation communities in the undeveloped border areas are mainly nonnative. Species include koa haole *(Leucaena leucocephala),* an invasive species of tree that regenerates rapidly after fire and is prone to forming dense thickets that exclude all other plants. Molasses grass *(Melinus multiflora)* also regenerates quickly after fire and can inhibit the growth of other

**Figure 5-34**

Schofield Barracks Military Reservation Biological Region of Influence plants by its dense matting and by producing chemicals that discourage other plants from taking root. Christmas berry *(Schinus terebenthifolius)* is an aggressive rapidly spreading tree whose dense canopy shades out understory plants and creates single species stands. This tree is most common in the mesic (moderately moist) forests and is not thought to be a threat to the wetter native communities.

### South Range Acquisition Area

The SRAA is adjacent to Del Monte agricultural land and the Honouliuli Preserve, a 3,962-acre forest area managed by The Nature Conservancy since 1990. The preserve is habitat for over 70 rare species and contains five vegetation community types that are native to Hawai'i (HINHP 1994). The proposed acquisition land consists mainly of lowland dry shrubland and grassland and agricultural fields. The native natural communities and sensitive species are mostly restricted to the upper elevations of the Wai'anae Mountain range included in or adjacent to this proposed acquisition area.

A 0.3-acre dry cliff area is in the southwest portion of the SRAA, near the border of Honouliuli Preserve. The dominant vegetation in these communities is often 'ōhi'a *(Metrosideros polymorpha)* or lama, with understory shrubs like 'a'ali'i and 'akoko. Grasses can be native or introduced.

### East Range

SBER is in central O'ahu, and shares boundaries with the town of Wahiawā to the northwest, Kamehameha Highway to the west, Kahana Valley to the east, KLOA to the north, the USFWS James Campbell National Wildlife Refuge and private agricultural and forestland to the south. SBER contains native moist and wet forest types toward the Ko'olau Summit. These communities change to predominantly nonnative vegetation in the lower elevations. SBER covers 5,145 acres.

### Wheeler Army Airfield

WAAF, an airfield with runways and ancillary facilities, is between the Main Post and SBER. It is a developed area that contains mainly nonnative urban vegetation.

### ***Vegetation***

The following vegetation communities described below occur in multiple places of the SBMR, WAAF, and SRAA ROI, as shown in Figure 5-35.

The mixed fern/shrub community is a fairly restricted community in the topmost reaches of the Ko'olau Mountains, and rainfall generally exceeds 150 inches (381 centimeters) (USARHAW and 25th ID[L] 2001a). Common fern species in the area include *Sadleria* spp., *Cibotium* spp., pala'ā *(Odontosoria chinensis),* and *Diplazium* spp. Common shrub species include manono *(Hedyotis* spp.*),* 'ōhi'a, 'ōhelo *(Vaccinium* spp.*),* and pū'ahanui *(Broussaisia arguta)*. The only rare plant listed within this community at SBMR is O'ahu violet *(Viola oahuensis)*.

**Figure 5-35**
Vegetation Communities in the Schofield Barracks Military Reservation Region of Influence

Montane wet ʻōhiʻa forest is generally restricted to gulches and ridge tops between 3,200 and 4,000 feet (1,219 meters). The dominant tree is ʻōhiʻa. Additional native species include manono *(Hedyotis terminalis),* mehame *(Antidesma platyphyllum),* ʻōhiʻa hā *(Syzygium sandwicensis)* and kāwaʻu *(Llex anomala). Cibotium* species are the dominant ferns. Herbaceous plants are māmaki *(Pipturus albidius),* naupaka kuahiwi *(Scaevola* spp.*),* and naʻenaʻe *(Dubautia* spp.*).* Rare plants *Alsinidendron trinerve* and *Melicope christophersonii* complete the community.

ʻŌhiʻa shrubland falls between 2,500 and 3,000 feet (762 to 914 meters) in SBMR. The steep windswept ridges have shallow soil, and rainfall is generally between 100 and 200 inches (254 and 508 centimeters) per year. Dwarfed native tree and shrub species thrive here. In addition to ʻōhiʻa, this community frequently consists of manono, ʻalani *(Melicope* spp.*),* and kōlea *(Myrsine* spp.*).* Common herbaceous species in this community include *Trematolobelia* spp. and *Clermontia* spp., and ferns are represented by *Cibotium* spp. and ʻamaʻu *(Sadleria* spp.*).* The documented rare plant of this vegetation community on the SBMR is Oʻahu violet (USARHAW and 25th ID[L] 2001a).

Within the lowland wet communities there are three community types, where conditions are generally warm and sheltered from wind, with annual rainfall exceeding 100 inches (254 centimeters). ʻŌhiʻa forest is below the Koʻolau summit between 1,900 and 2,700 feet (823 meters) and below 5,000 feet (1,524 meters) in the Waiʻanae Mountains (USARHAW and 25th ID[L] 2001a). In addition to the dominant tree ʻōhiʻa, other common tree species include manono, mehame, and kōlea. *Cibotium* species are the dominant ferns. Herbaceous plants are māmaki, naupaka kuahiwi, and naʻenaʻe. Rare plants *Hesperomannia arborescens, Doodia lyonii, Pteris lidgatei, Tetraplasandra gymnocarpa, Cyrtandra subumbellata,* and *Isodendrion laurifolium* complete the community in SBMR.

Uluhe shrubland is widespread on many of the Hawaiian Islands, usually in wet lowland areas below 2,200 feet (671 meters). The dominant plants in this community include two ferns, *Dicranopteris linearis* and *Diplopterygium pinnatum*. No rare plants were observed in this community.

Loulu hiwa forest gets between 75 and 150 inches (191 and 381 centimeters) of rainfall annually. It occurs exclusively in the Koʻolau Mountains on steep, rocky windward slopes. The groves of loulu hiwa *(Pritchardia martii)* are generally homogenous, with little or no understory vegetation. This is considered a globally imperiled vegetation community (USARHAW and 25th ID[L] 2001a).

There are four types of lowland moist communities on the training areas:

- Kāwelu grassland has shallow soils and gets around 30 to 40 inches (76 to 102 centimeters) of rainfall annually. The kāwelu grasses *Eragrostis grandis* and *E. variabilis,* sedges *(Carex wahuensis* and *C. meyenii),* and dwarfed shrubs *(Bidens* spp., *Metrosideros polymorpha)* make up the simple communities, along with rare plants nehe *(Lipochaeta tenuis)* and ʻānaunau *(Lepidium arbuscula)*;

- ʻŌhiʻa lowland moist shrubland is found on windy slopes commonly adjacent to the Kāwelu grassland, with similar plant species represented. The rare plants in this community are nehe, pāmakani *(Viola chamissoniana),* and pānaunau *(Lobelia yuccoides);*
- Oʻahu diverse forest occupies only about an acre on SBMR. The soil is usually rocky and thin. Common natives are kōpiko *(Psychotria* spp.*),* mehame, ʻālaʻa *(Pouteria sandwicensis),* and pāpala *(Charpenteria* spp.*).* The only rare plant documented is *Pteralyxia macrocarpa*. This community is considered critically imperiled; and
- Koa/ʻŌhiʻa forest is below 2,100 feet (640 meters) and in leeward areas of good drainage, where the annual rainfall is between 35 and 75 inches (89 and 191 centimeters). In addition to the dominant trees ʻōhiʻa and koa *(Acacia koa),* native trees in this community include kōpiko, mehame, ʻōhiʻa hā, and ʻahakea *(Bobea* spp.*).* Uluhe (*Dicranopteris linearis*) is the dominant understory species, and rare plants in this community are nāʻū *(Gardenia mannii),* kāmakahala *(Labordia cyrtandrae), Schiedea pubescens* var. *purpurascens*, and pilo kea *(Platydesma cornuta* var. *decurrens).*

Lowland dry shrubland is generally dominated by ʻaʻaliʻi and is found on the main islands of Hawaiʻi. Adjacent communities are often dominated by <u>nonnative</u> grasses and shrublands in fire-disturbed areas like SBMR.

The aquatic natural communities on SBMR are limited to intermittent streams. Though some of these may actually flow all year, agricultural ditches or flumes interrupt them all. The primary drainages for the Main Post are Waikōloa Gulch and Waikele Stream. The north fork and two tributaries (Haleʻauʻau and Mohiākea gulches) of Kaukonahua Stream flow along the northeast boundary of SBMR. All streams on SBMR empty into the Pacific Ocean, except for Waikele Stream, which flows into Pearl Harbor. There are possible marshy, forested, and riparian wetlands on or adjacent to SBMR (USARHAW and 25th ID[L] 2001a). The south fork of Kaukonahua Stream is the only drainage in SBER. The USGS collects streamflow data, but no fish data are available. A stream assessment was conducted for the whole Kaukonahua Stream that documented the endemic species ʻoʻopu nākea *(Awaeous guamensis),* ʻoʻopu naniha *(Stenogobius hawaiiensis),* ʻoʻopu hiʻukole *(Lentipes concolor),* and ʻoʻopu ʻōkuhe *(Eleotris sandwicensis)* (USARHAW and 25th ID[L] 2001a), but natural resources staff have not confirmed these fish species on SBER.

### *Disturbed Habitat*

The Army seeks to preserve and expand the populations of federally listed plants on lands under its management. The pest management and endangered species management programs overlap and reduce the negative impacts of introduced species on the landscape (USARHAW and 25th ID[L] 2001a). Control of noxious weeds is required by the State of Hawaiʻi Noxious Weed Rules (USDA, no date) and is supported by AR 200-5, the Army's pest management regulations (HQDA 1999).

Noxious weeds and other highly invasive plants targeted for control or eradication around rare plants and communities on SBMR include oriental vessel fern *(Angiopteris evecta),* satinleaf *(Chrysophyllum oliviformes),* ginger *(Hedychium* spp.*),* and *Juniperus* spp. Current control efforts have focused on strawberry guava *(Psidium cattleianum),* ginger, and Koster's curse *(Clidemia* *hirta)* (USARHAW and 25th ID[L] 2001a). The nonnative plants that occur on SBER and that are targeted for control where they threaten rare or endangered species include moho *(Heliocarpus popayensis),* cat's claw *(Caesalpinia decapetala),* treedaisy *(Montana hibiscifolia),* false meadowbeauty (*Pterolepis glomerata),* Christmas berry, and Sacramento bur *(Triumfetta semitriloba)* (USARHAW and 25th ID[L] 2001a; PCSU 2001).

Populations of feral pigs *(Sus scrofa scrofa)* and goats *(Capra hircus hircus)* directly affect native plants and contribute to numerous ecological problems (Atlas 1998). The effects of these wild pigs and goats include trampled and grazed native plants, erosion, and landslides (USARHAW and 25th ID[L] 2001a; PCSU 1999, 2000, 2001). Water collects in the rutted ground, providing a perfect breeding place for mosquitoes, which can carry avian malaria (HINHP 1994). Browsing and otherwise destroying the native vegetation encourages nonnative plants to become established, which can severely affect the habitat.

The nonnative black twig borer *(Xylosandrus compactus)* is an additional threat to *Gardenia mannii, Alectryon macrococcus* var. *macrococcus, Flueggea neowawraea,* and possibly *Abutilon sandwicense, Melicope lidgatei,* and *Melicope st-johnii* (PCSU 1999). This pest burrows into branches and introduces a pathogenic fungus that often kills the host.

Introduced snails and slugs pose a threat to rare Hawaiian plants by preying on the seedlings' stems and fruit, which reduces regeneration of the host. Rats *(Rattus rattus* and *R. exulans hawaiiensis)* also are known to eat the fruit of native plants, seriously affecting the reproduction of *Pritchardia kaalae* and plants in the *Campanulaceae* and *Gesneriaceae* families (PCSU 2001).

Habitat disturbing activities by humans at SBMR include military training (R. M. Towill Corp. 1997b). Because most native and rare species grow on moderate to steep cliffs, ridges, and gulches, this disturbance is mostly limited to helicopter and foot traffic. Trampling associated with training activities (including construction and maintenance) could affect many of the rare plants (R. M. Towill Corp. 1997b). Pu'u Kalena and Pu'u Hāpapa hiking trails are within SBMR. Hiking activities are monitored to reduce potential human impacts. Littering, making campfires, committing arson, hunting, poaching, and using vehicles are nonmilitary activities that can affect the area (USARHAW and 25th ID[L] 2001a).

Fire occurs in SBMR and is a threat to native plants and ecological communities. Areas along the lower boundary of the native plant zones are mostly highly flammable introduced species. Additionally the rugged terrain of the training area limits access for fire suppression and control. As described in Section 2.1.5, the INRMP and ITAM LCTA programs at SBMR are used to minimize the impacts of training on vegetation through revegetation and fire suppression projects. A wildland fire management plan is being produced for SBMR and SBER and will focus on fire prevention and suppression; it will be finalized by August 2003.

### *Wildlife*

Regular zoological field surveys have covered much of the SBCT ROI. These surveys have focused on special status invertebrates, mammals, and birds. There have been no specific reptile or amphibian surveys at SBMR, due to the absence of native terrestrial reptiles and amphibians on the Hawaiian Islands. Wildlife surveys were conducted by Shallenberger at SBMR in 1976 and 1977 (USARHAW and 25th ID[L] 2001a; Shallenberger and Vaughn 1978), by the HINHP (1994), and by Pacific Cooperative Studies Unit (PCSU) natural resources staff in 2000 and 2001. These natural resource surveys were used for the resource assessments in the *Endangered Species Management Plan Report, O'ahu Training Areas* (R. M. Towill Corp. 1997b), as well as the more recent *O'ahu Training Areas Natural Resource Management Report* (PCSU 2001) and the *O'ahu Training Areas INRMP* (USARHAW and 25th ID[L] 2001a).

Wildlife information for the SRAA has been gathered from the HINHP database (HINHP 2002) and the Honouliuli Preserve Master Plan (TNC 2000). Less information is available regarding WAAF and the proposed Helemanō Trail. WAAF is an established air field, which offers little refuge to wildlife, particularly native wildlife adapted to Hawai'i s natural habitats. The area proposed for the Helemanō Trail is presently used as agricultural fields and dirt roads. Common O'ahu wildlife would be expected to inhabit these areas. Wildlife information for these two locations was based on the *Draft Environmental Assessment for Realignment of Kunia Gate, Wheeler Army Airfield with the Existing Lyman Gate, Schofield Barracks* (Edward K. Noda and Associates, Inc. 2001), *Preliminary Draft EA Aviation Complex 6A & 6B, FY01-03, Whole Barracks Renewal Wheeler Army Airfield, O'ahu, Hawai'i.* (USACE 2001b), and *Preliminary Draft Schofield Barracks to Helemanō Military Vehicle Trail Land Acquisition Environmental Baseline Study* (USACE 2002b).

The following sections describe the general presence of invertebrate, mammal, bird, and fish species.

*Invertebrates*

The native invertebrates at the Main Post include the O'ahu tree snail *(Achatinella mustelina),* six achatinellid land snail species *(Acuriculella ambusta, A.* spp. aff. *castanea, A.* spp. aff. *perpusilla, Elasmuius* spp.*, Partulina dubia, and Tornatellides* spp.*),* and two amastrid land snail species *(Amastra rubens* and *Letachatina* spp.*).* Three other native snail species, *Cookeconcha* spp.*, Philonesia* spp.*,* and *Succinea* spp.*,* were also observed at the Main Post (R. M. Towill Corp. 1997b; USARHAW and 25th ID[L] 2001a). Endemic invertebrates at SBER include O'ahu tree snails *(Achatinella apexfulva, A. byronii, A. decipiens, A. leucorraphe, A. sowerbyana,* and *A. swiftii).* Also found at SBER are achatinellid land snails *(A. perpusilla, A. pulchra,* and *A.* spp.*)*, the O'ahu megalagrion damselfly *(Megalagrion oahuensis),* the unique yellow-faced bee *(Hylaeus unica),* and 'ōpae 'oeha'a, the Hawaiian prawn *(Macrobrachium grandimanus)* (USARHAW and 25th ID[L] 2001a). Additional species currently proposed for federal listing as endangered are two picture-wing flies that occur on SBMR, *Drosophila aglaia* and *D. obatai.* Although the mountainous areas of the Honouliuli Preserve are valuable habitat to many O'ahu land snails, the portion proposed for the SRAA is highly disturbed agricultural area. These areas support mostly nonnative agricultural associated invertebrates (The Nature Conservancy 2000; HINHP 2002).

HHP surveys of SBMR in 1993 detected the following nonnative snails: giant African snail *(Achatina fulica),* bradybaenid land snail *(Bradybaena similaris),* cannibal snail *(Euglandina rosea),* and the zonitid land snail *(Hawaiia minuscula).* Humans have purposely or accidentally introduced these species to O'ahu, and they now threaten the native snail species through competition for resources, predation, and the spread of disease.

*Amphibians*

There are no native terrestrial amphibians on the Hawaiian Islands. Nonnative amphibians found on O'ahu include the green and black poison dart frog *(Dendrobates auratus),* the bullfrog *(Rana catesbeiana),* wrinkled frog *(R. rugosa),* giant toad *(Bufo marinus),* and Cuban tree frog *(Osteopilus septentrionalis)*. These species were introduced into O'ahu from other countries and have the potential to inhabit SBMR, WAAF, and the SRAA.

*Reptiles*

There are no native terrestrial reptiles on the Hawaiian Islands. Nonnative reptiles that have the potential to inhabit the SBMR, WAAF, and SRAA ROI include the green anole *(Anolis carolinenesis),* mourning gecko *(Lepidodactylus lugubris),* stump-toed gecko (*Gehyra mutilata),* tree gecko *(Hemiphyllodactylus typus),* Indo-Pacific gecko *(Hemidactylus garnotii),* house gecko *(H. frenatus),* metallic skink *(Lampropholis delicata),* and gold dust day gecko *(Phelsuma laticauda laticauda)*. The only known terrestrial snake occurring on the Hawaiian islands is the island blind snake *(Ramphotyphlops braminus),* although the brown tree snake *(Boiga irregularis)* has been found in Hawai'i at airports and other ports of entry; attempts are being made to prevent this species from establishing itself on the Hawaiian Islands. The red-eared turtle *(Trachemys scripta elegans)* was recorded at Waikele Stream and may be found at SBMR. This species was also identified in Kaukonahua Stream (Ki'iki'i Stream), the primary drainage of Poahmoho tributary on KTA and may be found at SBER (USARHAW and 25th ID[L] 2001a).

*Terrestrial Mammals*

The Hawaiian hoary bat *(Lasiurus cinereus semotus)* may occur at all areas of SBMR and SRAA. The last known observation of the hoary bat at SBMR was in 1976 over the Schofield-Waikane Trail (PCSU 2001). It is the only native terrestrial mammal on the Hawaiian Islands (USFWS 1998a).

The following nonnative species may occur at SBMR and SRAA: feral pigs, feral goats, feral cats *(Felis catus),* feral dogs *(Canis familiaris familiaris),* Norway rats *(Rattus norvegicus),* black rats *(R. rattus),* Polynesian rats *(R. exulans hawaiiensis),* and the house mouse *(Mus musculus).*

*Birds*

The following indigenous species have been recorded at the Main Post: O'ahu 'elepaio *(Chasiempis sandwichensis ibidis)*, O'ahu creeper *(Paroreomyza maculatus),* 'i'iwi (*Vestiaria coccinea),* 'apapane *(Hiatione sanguinea sanguinea),* O'ahu 'amakihi *(Hemignathus virens chloris),* white-tailed tropicbird *(Phaethon lepturus dorotheae),* black-crowned night heron *(Nycticorax nycticorax hoactli),* Pacific golden-plover *(Pluvialis fulva),* and the Hawaiian short-eared owl *(Asio flammeus sandwichensis)*, also known as pueo. The O'ahu 'elepaio, O'ahu creeper, 'i'iwi, O'ahu 'amakihi, and 'apapane are all species limited to the Hawaiian Islands. Native birds recorded at SBER include the O'ahu 'elepaio, O'ahu creeper, 'i'iwi, O'ahu 'amakihi, 'apapane, and O'ahu 'ākepa *(Loxops coccineus wolstenholmii),* the white-tailed tropic bird, black-crowned night heron, and the Pacific golden-plover. Hawaiian short-eared owls are known to inhabit areas adjacent to the

SRAA and may occur on the property (TNC 2000). Mostly nonnative and common birds such as the myna are expected to use the SRAA because of its highly disturbed nature and the agricultural habitat that it provides.

Nonnative bird species known to occur in SBMR include the red-billed leiothrix *(Leiothrix lutea),* white-rumped shama *(Copsychus malabaricus),* Japanese bush warbler *(Cettia diphone),* rock dove *(Columbia livia),* spotted dove *(Streptopelia chinensis),* zebra dove *(Geopelia striata),* common myna *(Acridotheres tristis),* red-vented bulbul *(Pycnonotus cafer),* and the Japanese white-eye *(Zosterops japonicus)*. The nutmeg manikin *(Lonchura punctulatua),* red-crested cardinal *(Paroaria coronata),* barn owl *(Tyto alba),* Erchel's francolin *(Francolinus erckelii),* ring-necked pheasant *(Phasianus colchicus),* house sparrow *(Passer domesticus),* chestnut manikin *(Lonchura malacca),* and northern cardinal *(Cardinalis cardinalis)* are also species that have been introduced by humans on O'ahu and are likely to occur on SBMR. Similar nonnative bird species are expected to occur in the SRAA.

*Fish*

The following endemic fish are known to inhabit the Waikele Stream, which runs through the Main Post: 'o'opu nākea *(Awaous guamensis),* 'o'opu naniha *(Stenogobius hawaiiensis),* 'o'opu hi'ukole, 'o'opu 'ōkuhe *(Eleotris sandwichensis),* āholehole *(Kuhlia sandvicensis),* and 'ama'ama *(Mugil cephalus)* (USARHAW and 25th ID[L] 2001a). Although these species have not been confirmed on the Main Post, they may occur within that portion of the waterway. No fish data are available specific to Kaukonahua South Fork Stream on SBER (USARHAW and 25th ID[L] 2001a), but information was gathered for Kaukonahua (Ki'iki'i) Stream, which includes the Poamoho tributary on KTA and may represent some species at SBER. Native fish identified from the Kaukonahua Stream assessment include 'o'opu nākea, 'o'opu naniha, 'o'opu 'ōkuhe, and 'o'opu hi'ukole (USARHAW and 25th ID[L] 2001a). Nonnative species known to Waikele Stream on SBMR include the mangrove goby *(Mugiligoius cavifrons),* liberty mollies *(Poecilia spehnops),* shortfin mollie *(P. mexicana),* bristle-nose *(Ancistrus* spp.*),* tilapias *(Tilapia melanotheron, Tilapia* spp.*)*, Chinese catfish *(Clarias fuscus),* guppies *(Poecilia* spp., *P. reticulatas),* loach *(Misgurnus anguillicaundatus),* mosquito fish *(Gambusia affinis), Thiaira tuberculata,* swordtail *(Xiphorus helleri), Lymnea reticulata,* and *Melanoides* spp. The following nonnative species may occur at SBER: swordtail, tilapia, snakehead *(Ophicephalus striatus),* stickfish *(Xenetodon cancila),* threadfin shad *(Dorosoma petenense),* midas cichlid *(Amphilophus citrinellum/Cichlasoma labiatum),* oscar, *(Astronotus ocellatus),* jewel cichlid *(Hemichromis elongatus),* bluegill *(Lepomis macrochirus), Carassius auratus, Ancistrus* spp., *Lophopodella carteri*, *Pterygoplichthys mlutiradiatus*, and bass *(Micropterus* spp.*)*. The Wilson Lake overflow channel, which Helemanō Trail would cross, is perennial but it is not known if fish inhabit this human-made stream. There is no documented aquatic species information available for the SRAA.

### Sensitive Species

Sensitive species include special status, or regulated, species such as federal or state listed endangered, threatened, candidate species, or proposed species, Marine Mammal Protection Act (MMPA) species, federal and state species of special concern, and locally regulated species. Rare species that have had rapid population decline or whose habitat has markedly decreased in recent years are also considered sensitive species. Potential sensitive species at SBMR were identified by HDLNR (2002a), USARHAW biologists, and the HINHP (1994).

A current list of all sensitive plant and wildlife species and any critical habitat found in the SBMR ROI is provided in tables 5-23 and 5-24. The likelihood of a species occurring at SBMR is based on the habitat requirements and geographic distribution of the species, existing on-site habitat quality, and the results of biological surveys. Natural history descriptions of sensitive species with the potential to occur in the ROI, and specific locations if known, can be found in Appendix I-1 (Recovery Plans I-1a; Plants I-1b; Wildlife I-1c; Critical Habitat I-1d).

#### *Sensitive Plant Species*

The training areas that make up SBMR are home to 57 rare plant species. The USFWS has also designated critical habitat for areas within the SBMR ROI but there is no designated critical habitat on the Army installations. Documented occurrences of sensitive plant species in the ROI are shown in Figure 5-36 and Table 5-23. Two species within the ROI were not included in the Section 7 consultation. The Army will need to determine the status and location of *Nototrichium humile* and *Lobelia niihauensis* before Section 7 consultation begins again.

#### *Sensitive Wildlife Species*

The following discussion includes only those special status wildlife species that are considered likely to be found in the project area. Twenty-eight special status wildlife species are known to occur or have the potential to occur at SBMR or its vicinity (R. M. Towill Corp. 1997b). These include twenty-two rare invertebrates (twenty of which are endangered mollusks), one damselfly and one wasp species, as well as five rare birds and an endangered bat (USARHAW and 25th ID[L] 2001a). Documented occurrences of sensitive wildlife species in the ROI are shown in Figure 5-37. Table 5-24 lists sensitive terrestrial wildlife species and their likelihood of occurrence in the SBMR ROI. Sensitive species occurring within the ROI are most likely to occur in the higher elevations of the Wai‘anae and Ko‘olau Mountains and are unlikely to occur in the disturbed lowland areas, which make up a large portion of the ROI. There is one wildlife species with a recovery plan in the ROI (Appendix I-1).

### **Sensitive Habitats**

#### *Critical Habitat*

Army lands were excluded from the 2003 plant critical habitat designations for O‘ahu based on the essential contribution that Army-led natural resource conservation actions play in the stabilization of threatened and endangered species. Small portions of critical habitat may occur within the ROI but outside of installation boundaries. The USFWS has designated critical habitat within the SBMR ROI: 180 acres for 12 plants and 4,620 acres for O‘ahu ‘elepaio. Plants with critical habitat within the ROI are listed in Appendix I-1d and are shown in Figure 5-34. Critical habitat for designated plants is shown in Figure 5-38 and critical habitat for O‘ahu ‘elepaio is shown in Figure 5-39.

**Table 5-23**
**Sensitive Plant Species Occurring or Potentially Occurring in the SBMR/WAAF ROI**

| Scientific Name | Hawaiian Name/ Common Name | Federal[1] Status | State[2]/Global[3] Status | Habitat | Date Last Observed | Likelihood of Occurrence |
|---|---|---|---|---|---|---|
| *Abutilon sandwicense* | NCN | E, CH | -/G1 | Dry to moist lowland forest | 2003 | C |
| *Alectryon macrococcus* var. *macrococcus* | ʻala ʻalahua, māhoe/- | E, CH | -/G2 | Moist forest and gulch slopes in native dominated forest | 2000 | C |
| *Alsinidendron trinerve* | NCN | E, CH | -/G1 | Wet forest slopes | 2003 | C |
| *Bobea sandwicwensis* | ʻahakea/- | SOC | -/G1 | Moist to wet forests | 2002 | C |
| *Chamaesyce rockii* | ʻakoko, koko, kōkōmālei/- | E, CH | -/G1 | Wet ʻōhiʻa-uluhe forests on upper ridges | 1993 | C |
| *Cyanea acuminata* | Hāhā/- | E, CH | -/G1 | Moist to wet forests | 2001 | C |
| *C. grimesiana* spp. *obate* | Hāhā/- | E, CH | -/G2 | Moist to wet forests | 1992 | C |
| *C. koolauensis* | Hāhā/- | E, CH | -/G1 | Moist to wet forest | 2000 | C |
| *C. lanceolata* ssp. *calcynia* | Hāhā/- | C | -/G1 | Moist to wet forest | 1999 | C |
| *C. membranacea* | Hāhā/- | SOC | -/G2 | Moist to wet forest | 1992 | C |
| *Cyrtandra subumbellata* | Haʻiwale/- | E, CH | -/- | Moist to wet forests | 2000 | C |
| *Delissea subcordata* | NCN | E, CH | -/G1 | Moist forest | 2000 | C |
| *Diellia falcata* | Palapalai lau liʻi/- | E, CH | -/G1 | Dry forests in deep shade or open understory | 2000 | C |
| *Dissochondrus biflorus* | -/NCN | SOC | -/G2 | Diverse moist forest slopes | 1994 | C |
| *Doodia lyonii* | -/NCN | SOC | -/G1 | Dark moist forests and near streambanks | 1993 | C |
| *Dubautia sherffiana* | Naʻenaʻe/- | SOC | -/G1 | Dry coastal and wetter inland ridge tops | 2000 | C |
| *Exocarpos gaudichaudii* | Heau/whisk broom sandalwood | SOC | -/G1 | Moist ridges and shrubland, often associated with ʻōhiʻa | 2000 | C |
| *Flueggea neowawraea* | Mehamehame/- | E, CH | -/- | Moist forests and gulch slopes | 2000 | C |
| *Gardenia mannii* | Nānū, nāʻū/- | E, CH | -/G1 | Moist to wet forests dominated by ʻōhiʻa | 1992 | C |
| *Hesperomannia arborescens* | NCN | E, CH | -/- | Slopes and ridges in wet forest | 2000 | C |
| *Isodendrion longifolium* | aupaka/- | T, CH | -/- | Diverse moist forest on rocky slopes | 2000 | C |
| *Joinvillea ascendens* ssp. *ascendens* | Ohe/- | C | -/G5 | Wet forests and along streams | 1999 | C |
| *Labordia cyrtandrae* | kāmakahala/- | E, CH | -/G1 | Moist valleys and forests | 2000 | C |
| *L. kaalae* | kāmakahala/- | SOC | -/G1 | On ridges in diverse moist forest | 2001 | C |
| *Lepidium arbuscula* | ʻānaunau, naunau, kūnānā/- | E, CH | -/G1 | Commonly found on exposed ridges and cliffs | 2000 | C |
| *L. tenuis* | nehe/- | SOC | -/G2 | Found only in the central Waiʻanae Mountains in diverse moist forest | 2001 | C |
| *Lobelia gaudichaudii* var. *koolauensis* | NCN | E | -/- | Wet cloud-swept slopes | 2000 | C |
| *L. niihauensis* | pānaunau/- | E, CH | -/G2 | Wet windswept summits | 2001 | P |
| *L. hypoleuca* | pānaunau/- | SOC | -/G3 | Dry ridges and canyons in diverse moist forest | 2001 | C |
| *L. yuccoides* | pānaunau/- | SOC | -/- | Dry ridges and canyons in diverse moist forest | 1995 | C |

**Table 5-23**
**Sensitive Plant Species Occurring or Potentially Occurring at SBMR/WAAF ROI** *(continued)*

| Scientific Name | Hawaiian Name/ Common Name | Federal[1] Status | State[2]/Global[3] Status | Habitat | Date last Observed | Likelihood of Occurrence |
|---|---|---|---|---|---|---|
| *Melicope christophersonii* | ʻalani/- | C | -/- | Wet forest | 1997 | C |
| *M. cinera* | ʻalani/- | SOC | -/G1 | Native dominated moist forests | 2000 | C |
| *M. sandwicensis* | ʻalani/- | SOC | -/- | Diverse moist forests | 1993 | C |
| *Neraudia melastomatifolia* | maʻaloa/- | SOC | -/ G2 | Diverse moist forests | 2000 | C |
| *Nototrichium humile* | Kului/ NCN | E, CH | -/G2 | Remnant dry forest and cliff faces | To Be Determined | P |
| *Panicum beechyi* | NCN | - | -/G2 | Mesic ridges and gulch bottoms | 2002 | C |
| *Phlegmariarus nutans (Lycopodium nutans)* | wāwaeʻiole/- | E, CH | -/- | Wet forest | 2000 | C |
| *Phyllostegia hirsuta* | ulihi/- | E, CH | -/G1 | Steep shaded slopes in wet to moist forests | 2001 | C |
| *P. kaalaensis* | ulihi/- | E, CH | -/G1 | Steep shaded slopes in wet to moist forests | 2001 | C |
| *P. mollis* | ulihi/- | E, CH | -/G1 | Steep shaded slopes in wet to moist forests | 2000 | C |
| *Plantago princeps* var. *princeps* | ʻale, laukahi kuahiwi/- | E, CH | -/- | Moist cliffs and rainforests | 2000 | C |
| *Platydesma cornuta* var. *cornuta* | pilo kea/- | C | -/G2 | Moist forest | 2000 | C |
| *Platydesma cornuta* var. *decurrens* | pilo kea/- | C | | Moist forest | 1999 | C |
| *Pleomele forbesii* | halapepe/- | C | -/G1 | Dry and moist forests | 2000 | C |
| *Pteralyxia macrocarpa* | kaulu/- | C | -/G2 | Valleys and slopes of diverse moist forest | 2000 | C |
| *Pteris lidgatei* | waikamanui/- | E, CH | -/G1 | Lowland wet forests | 2000 | C |
| *Sanicula purpurea* | NCN | E, CH | -/G1 | Moist forests in deep soil | 2001 | C |
| *Schiedea hookeri* | māʻoliʻoli/- | E, CH | -/G1 | Diverse moist forest | 2000 | C |
| *S. lunguistrina* | māʻoliʻoli/- | SOC | -/G2 | Diverse moist forest | 1992 | C |
| *S. pentandra* | māʻoliʻoli/- | SOC | -/G2 | Diverse moist forest | 1994 | C |
| *Sicyos lanceoloidea* | ʻanunu/- | SOC | -/G1 | On ridges or spurs in moist forest | 2000 | C |
| *Stronglylodon ruber* | NCN | SOC | -/G1 | Mid-elevation wet forest | 2001 | C |
| *Tetraplasandra gymnocarpa* | ʻoheʻohe/- | E, CH | -/G1 | Wet to moist summit forests | 2000 | C |
| *Viola chamissoniana* spp. *chamissoniana* | ʻolopū, Pāmakani/- | E, CH | -/G3 | Moist, somewhat exposed cliff habitat | 2000 | C |
| *V. oahuensis* | NCN | E, CH | -/- | Wet forests on cloud-swept summits | 2001 | C |

Sources: USFWS 2002a; USARHAW and 25th ID[L] 2001a; PCSU 2001

Notes:
NCN = No common name

Status:
[1]**Federal:**
E = Endangered
SOC = Species of concern
C = Candidate species for listing
CH = Critical habitat designated or proposed for designation
[2]**State**
/-/= No Status

[3]**Heritage Global Rank:**
G1 = Species critically imperiled globally (typically 1-5 current occurrences)
G2 = Species imperiled globally (typically 6-10 current occurrences)
G3 = Species very rare with restricted range

**Likelihood of occurrence on the project site**
C = Confirmed
P = Potentially may occur U = Unlikely to occur

**Figure 5-36**
Sensitive Plant Species in the Schofield Barracks Military Reservation Region of Influence

**Table 5-24**
**Sensitive Terrestrial Wildlife Species Occurring or Potentially Occurring in the SBMR/WAAF ROI**

| Scientific Name | Hawaiian Name/Common Name | Federal[1] Status | State[2]/Global[3] Status | Habitat | Date last Observed | Likelihood of Occurrence |
|---|---|---|---|---|---|---|
| **Invertebrates** | | | | | | |
| *Achatinella apexfulva* | pūpū kuahiwi, pūpū kani'oe, kāhuli/O'ahu tree snail | E | E/G1 | Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 m) | 1953 | P |
| *A. byronii/ decipiens* | pūpū kuahiwi, pūpū kani'oe, kāhuli/O'ahu tree snail | E | E/G1 | Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 m) | 2000 | C |
| *A. leucorraphe* | pūpū kuahiwi, pūpū kani'oe, kāhuli/O'ahu tree snail | E | E/G1 | Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 m) | 1989 | C |
| *A. lila* | pūpū kuahiwi, pūpū kani'oe, kāhuli/O'ahu tree snail | E | E/G1 | Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 m) | - | P |
| *A. mustelina* | pūpū kuahiwi, pūpū kani'oe, kāhuli/O'ahu tree snail | E | E/G1 | Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 m) | 2000 | C |
| *A. sowerbyana* | pūpū kuahiwi, pūpū kani'oe, kāhuli/O'ahu tree snail | E | E/G1 | Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 m) | 2000 | C |
| *A. swiftii* | pūpū kuahiwi, pūpū kani'oe, kāhuli/O'ahu tree snail | E | E/G1 | Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 m) | 1970's | P |
| *Amastra cylindrica* | -/Amastrid land snail | SOC | -/G1 | Areas with native vegetation, specific preferences not available | 1966 | P |
| *A. micans* | -/Amastrid land snai | SOC | -/G1 | Areas with native vegetation, specific preferences not available | 2001 | C |
| *A. spirizona* | -/Amastrid land snail | SOC | -/G1 | Areas with native vegetation, specific preferences not available | 1965 | P |
| *Auriculella ambusta* | -/Achatinellid land snail | - | -/G1 | Areas dominated with native vegetation | 1986 | C |
| *A.* sp. aff. *castanea* | -/Achatinellid land snail | - | -/G1 | Areas dominated with native vegetation | 1988 | C |
| *A.* sp. aff. *perpusilla* | -/Achatinellid land snail | - | -/G1 | Areas dominated with native vegetation | 1966 | P |
| *Cookeconcha* spp. | -/Endodontid land snail | SOC | -/G1 | Areas with native vegetation; specific preferences not available | - | P |
| *Drosophila aglaia* | -/ picture-wing fly | P | -/- | Scattered in moist and wet forests | 2003 | C |
| *D. obatai* | -/ picture-wing fly | P | -/- | Scattered in moist and wet forests | 2003 | C |
| *Hylaeus unica* | -/unique yellow-faced bee | SOC | -/- | Subalpine forest | - | P |
| *Laminella sanguinea* | -/Amastrid land snail | SOC | -/G1 | Areas with native vegetation, specific preferences not available | 2000 | C |
| *Leptachatina* sp. | -/Amastrid land snail | SOC | -/G1 | Areas with native vegetation; specific preferences not available | - | P |
| *Lepachatina* sp. (O'ahu) | -/Amastrid land snail | SOC | -/G1 | Areas with native vegetation, specific preferences not available | 1965 | P |

**Table 5-24**
**Sensitive Terrestrial Wildlife Species Occurring or Potentially Occurring in the SBMR/WAAF ROI** *(continued)*

| Scientific Name | Hawaiian Name/Common Name | Federal[1] Status | State[2]/Global[3] Status | Habitat | Date last Observed | Likelihood of Occurrence |
|---|---|---|---|---|---|---|
| *Megalagrion oahuensis* | -/Oʻahu megalagrion damselfly | SOC | -/G1 | Breed in damp leaf litter | 1958 | P |
| *Partulina dubia* | -/Achatinellid land snail | SOC | -/G1 | Areas dominated with native vegetation | 1948 | P |
| *Pleuropoma sandwichiensis* | -/Helicinid land snail | SOC | -/G1 | Areas with native vegetation; specific preferences not available) | 1966 | P |
| **Birds** | | | | | | |
| *Asio flammeus sandwichensis* | pueo/Hawaiian short-eared owl | SOC+ | E*/G5T3 | Pastures, grasslands, dry and wet forests that are dominated by either native or nonnative vegetation. Sea level to 7,900 feet (2,408 m). | 1986 | C |
| *Chasiempis sandwichensis ibidis* | Oʻahu ʻelepaio/- | E, CH | E/G4T1 | Native Hawaiian forest | 2000 | C |
| *Loxops coccineus wolstenholmii* | Oʻahu ʻākepa/- | - | -/G2 | Montane ʻōhiʻa-koa forest above the 3,000 foot (914.4 m) level | 1976 | P |
| *Paroreomyza maculata* | ʻalauahio/Oʻahu creeper | E | E /G1 | Native Hawaiian shrublands, forests, and bogs | 1976 | P |
| *Vestiaria coccinea* | ʻiʻiwi/Hawaiian honeycreeper | + | E*/G4 | Native forests, especially ʻōhiʻa *(Metrosideros)* forest | 1998 | C |
| **Mammals** | | | | | | |
| *Lasiurus cinereus semotus* | -/Hawaiian hoary bat | E | E /G5T2 | Bare rock, cliff, hardwood forest, grassland/herbaceous, hardwood woodland, and riparian habitats. | 1988 | C |

Sources: USARHAW and 25th ID[L] 2001a; HDLNR 2002a; HINHP 1994; R. M. Towill Corp. 1997b; PCSU 2001; NatureServe 2001; Virginia Tech 1998

Notes:
NCN = No common name
*The state endangered listing refers only to the populations on Oʻahu, Lanai, and Molokaʻi.

- Not yet recored within the SBMR/WAAF ROI

Status:

**[1]Federal:**
E = Endangered
SOC = Species of concern
C = Candidate species for listing
CH = Critical habitat designated or proposed for designation
+ = Birds of Conservation Concern

**[2]State**
E = Listed as endangered
/-/= No Status

**[3]Heritage Global Rank:**
G1 = Species critically imperiled globally (typically 1-5 current occurrences)
G2 = Species imperiled globally (typically 6-10 current occurrences)
G4 = Species apparently globally secure
G5 = Species demonstrably globally secure
T1 = Subspecies critically imperiled globally (typically 1-5 current occurrences)
T2 = Subspecies imperiled globally (typically 6-10 occurrences)
T3 = Subspecies either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range, or because of other factors making it vulnerable to extinction throughout its range (21-100 occurrences).
T4 = Subspecies apparently globally secure

**Likelihood of occurrence on the project site**
C = Confirmed
P = Potentially may occur
U = Unlikely to occur

**Figure 5-37**

Sensitive Wildlife Species Occurring in the Schofield Barracks Military Reservation Region of Influence

**Figure 5-38**
Designated Critical Plant Habitat in the Schofield Barracks Military Reservation Region of Influence

**Figure 5-39**
Federally Designated Critical Habitat for the O'ahu 'Elepaio at the Schofield Barracks Military Reservation Region of Influence

### *Ecologically Sensitive Areas*

Surveys done under the HINHP show eleven native natural vegetation communities on SBMR. These zones are determined by climate, topography, elevation and prevailing ecological conditions. The HINHP considers two of these vegetation communities to be rare with a HINHP rank of G1: the O'ahu diverse lowland moist forest and Loulu Hiwa lowland wet forest (HINHP 1994).

Three ecological zones have been identified in the SBMR survey area. The wet summit crest zone exists in areas above 3,000 feet (914 meters), along the tops of the Wai'anae and Ko'olau Mountains. This zone contains the globally imperiled Loulu Hiwa lowland wet forest. Cliffs and moderate slopes are the topographically dominant features in this cool, wet cloud-swept region.

Below this is the moist ridges and cliffs zone, which is warmer and drier than the wet summit zone, though it does not escape the winds. The vegetation community on this part of SBMR supports 'ōhi'a lowland moist shrubland and Kāwelu lowland moist grassland; these communities are not considered rare and have a Global Heritage Ranking of G3.

The third ecological zone exists below the steepest cliffs and slopes described above and along the ridge tops to the gulch bottoms; this is the lowland forest zone. Typically warm and moist to wet, there are three forest types in this zone. The koa/'ōhi'a lowland moist forest is predominant on ridge tops and in lower elevations; 'ōhi'a lowland wet forests and uluhe lowland wet shrubland are the dominant native natural communities. O'ahu diverse lowland moist forests occur on north-facing, moderately steep slopes, are considered rare, and have a Global Heritage ranking of G1.

### *Biologically Significant Areas (BSAs)*

SBMR contains large expanses of native-dominated plant communities. These areas are defined to prioritize areas for management based on their relative richness of rare natural resources. The Hawai'i Natural Heritage Program has defined three types of biologically significant areas for managing the important natural communities (Figure 5-40). They are described below.

BSA1 contains a high density of federally listed endangered, proposed endangered, or candidate species. There are three noncontiguous areas in the Wai'anae area of SBMR that have the BSA1 designation, and all three areas are habitat for the endangered land snail *Achatinella mustelina* and several endangered plants. The southernmost BSA1 is near Pu'u Hāpapa and the Honouliuli Preserve. It is the habitat for over 20 native and protected plant species, in addition to the endangered snail. This area is in the zone of proposed acquisition for the Army firing range (QTR2) at SBMR. The Ko'olau Mountain area of SBMR has two areas defined as BSA1. These areas are both in the eastern portion of the range, near the summit crest, and contain several species of endangered plants.

BSA2 contains all or some of the following: lower densities of federally listed endangered or proposed endangered species; candidate species or other species of concern that are expected to be upgraded to federal protected status within the next few years; and areas judged likely to contain high densities of federally listed species, based on habitat assessment, despite the lack of any record of such occurrence to date. SBMR has two noncontiguous areas and one somewhat isolated area of habitat classified as BSA2. These regions contain typical vegetation for natural communities of moist ridges and cliffs and lowland forest zones. There is one BSA2 in the Koʻolau region of SBMR at East Range. It covers most of the eastern end of the range and is primarily a lowland forest. Most of the rare plants found in the Koʻolau range survey are in this area.

BSA3 contains stands of intact native vegetation with few or no known occurrences of rare elements. There is one BSA3 in the Waiʻanae region of SBMR. There are no findings that support knowledge of natural communities in the area. Although there are no rare communities in the BSA3 area, the forest includes six native endangered plant species *(Cyanea grimseana, Gardenia mannii, Labordia cyrtandrae, Lycopodium nutans, Pteris lydgatei,* and *Tetraplasandra gymnocarpa).* The BSA3 designated range in the East Range/Koʻolau region contains *Gardenia mannii* and *Cyanea longiflora* but no rare natural communities. It is likely that with further surveys of the areas additional rare plant occurrences would be documented.

Also found within the ROI is sensitive snail habitat. Although this habitat has not been federally designated or proposed as critical habitat it has been identified as containing the habitat requirements necessary for supporting the federally listed and snail species of concern on Oʻahu. This area is shown in Figure 5-40.

### 5.10.2 Environmental Consequences

In response to the agency and public comments received during the Draft EIS comment period we reevaluated our analysis of the biological resources. As a result of considering these comments and of reanalyzing the available information, we recognize that the impact on biological resources from fire could not be mitigated to the less than significant level. However, these impacts will be substantially reduced as a result of mitigation.

#### *Summary of Impacts*

Biological resources that have been considered include vegetation communities, wildlife, sensitive species, and sensitive habitats. All biological resources have been assessed for potential impacts from project activities. (For a full description of the impact methodology used to determine impact on a resource, please refer to chapter 4.10. Only the resources potentially affected are included in this chapter; if a resource was determined not to be affected, it was not included for discussion.) A summary of impacts is provided in Table 5-25. Significant impacts would occur on sensitive plants and habitat from wildfires sparked by military training activities. Significant impacts mitigable to less than significant would occur from construction and training on sensitive species and sensitive habitat from training activities and from the spread of nonnative species introduced by construction and troop movements. Less than significant impacts would occur relating to general vegetation and habitat from training activities and construction, threats to migratory birds from the construction of FTI antennas, and noise and visual effects on wildlife from construction and training activities.

**Figure 5-40**

Biologically Sensitive Areas Found in the Schofield Barracks Military Reservation Region of Influence

### *Proposed Action*

#### Significant Impacts

Impact 1: Impacts from fire on sensitive species and sensitive habitat. Military training activities would increase the probability of wildfires and would increase the likely intensity of fires that occur. Wildfires that burn into native communities or sensitive habitats would destroy listed plant and animal species and sensitive habitats.

**Table 5-25**
**Summary of Potential Biological Impacts at SBMR/WAAF**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Impacts from fire on sensitive species and sensitive habitat. | ⊗ | ⊗ | ⊗ |
| Impacts from construction and training activities on sensitive species and sensitive habitat. | ⊘ | ⊘ | ⊘ |
| Impacts from the spread of nonnative species on sensitive species and sensitive habitat. | ⊘ | ⊘ | ⊘ |
| Impacts from construction and training activities on general habitat and wildlife. | ⊙ | ⊙ | ⊙ |
| Threat to migratory birds. | ⊙ | ⊙ | ⊙ |
| Noise and visual impacts. | ⊙ | ⊙ | ⊙ |
| Vessel impacts on marine wildlife and habitat. | N/A | N/A | N/A |
| Runoff impacts on marine wildlife and coral ecosystems. | N/A | N/A | N/A |

LEGEND:
⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact
N/A = Not applicable

The use of ammunition, weapon systems, and pyrotechnics during military training increases the risk of wildland fire ignition. Because natural sources of fire ignition are relatively rare in Hawai'i, many Native Hawaiian plants are not adapted to fire and are adversely affected by it. Nonnative species, particularly nonnative grasses and shrubs, typically invade areas after they have burned. This inhibits the regeneration of native plants. The removal of native species and the spread of nonnative species are significant adverse impacts associated with wildland fires.

Wildfires at SBMR are commonly caused by tracer fire and generally start in the impact area. Fire breaks surrounding the impact area can prevent wildland fires from escaping to undisturbed areas; however, fires do occasionally escape and are also occasionally started in other areas by other sources, such as cigarettes, vehicles, and other military activities. Wildland fires could spread and adversely affect biological resources throughout the ROI. Tracer rounds would be used at ranges within the Main Post but not within SBER or the SRAA, so the threat of fire there would be significantly lower than at the Main Post. The ranges at SBMR are designed so that all ammunition firing occurs within firebreak roads. Firing and mortar points are located to ensure that the maximum range of the weapon would not overshoot the impact area. For small arms ranges where tracer rounds are used, the ranges are laid out so that tracer burnout occurs before a round leaves the impact area. It is unlikely that wildfires would be ignited in areas not used for training because these areas are typically dominated by less flammable vegetation (this determination was developed during ESA Section 7 consultation).

The UAV would be used over much of the land area at SBMR but is not expected to affect biological resources during normal operation. However, due to the nature of the UAV, accidents would be possible and could cause wildfires.

In addition to vegetation loss, major adverse ecological effects of wildland fires include reduced watershed stability, soil erosion, increased risk of weed invasion, and loss of native habitat. Fires could destroy native plants and slow-moving animals, such as snails, and could displace mobile animals. BSAs within the ROI that could be affected by a wildfire are presented in Table 5-26. In addition, the following sensitive habitats are within the SBMR ROI: BSAs, federally designated critical habitat for O'ahu 'elepaio, and habitat used by numerous species of native Hawaiian land and tree snails. There is no assurance that fires or other threats associated with the Proposed Action would not reach or otherwise threaten populations of listed species within the SBMR ROI.

**Table 5-26**
**BSAs within the ROI**

| Biologically Significant Areas | Main Post ROI (acres) | SRAA ROI* (acres) | SBER ROI (acres) |
|---|---|---|---|
| BSA-1 | 51 | Not applicable | 50.5 |
| BSA-2 | 478.6 | Not applicable | 247.7 |
| BSA-3 | 30.1 | Not applicable | 1,211.7 |

Source: R.M.Towill Corp 1997b.

*SRAA does not contain any BSAs

The sensitive plants at some risk from SBCT fire-related threats are māhoe *(Alectryon macrococcus* var. *macrococcus)*, hāhā *(Cyanea grimseana obate), Delissea subcordata, Diellia falcata,* mehamehame *(Flueggea neowawraea), Hesperomannia arborescens,* aupaka *(Isodendrion longifolium), Labordia cyrtandrae,* 'ānaunau *(Lepidium arbuscula), Lobelia niihauensis, Phyllostegia mollis, P. kaalaensis,* ale, *Schiedea hookeri,* and 'olopū *(Viola chamissoniana* ssp. *chamissoniana)* (this determination was made during Section 7 Consultation).

The following sensitive wildlife are known to occur or are likely to occur in the ROI and are likely to be affected by the outbreak of a wildfire as the result of the Proposed Action: Oʻahu ʻelepaio, ʻiʻiwi, *Achatinella mustelina,* and the Hawaiian hoary bat. These species have been identified as occurring within areas of low to moderate fire risk and would be directly or indirectly affected through the loss of habitat disturbed by a fire outbreak. Impacts on these federally listed species are considered significant. However, the mitigation would substantially reduce the impacts.

*Regulatory and Administrative Mitigation 1.* The Army will implement all the terms and conditions defined in the Biological Opinion issued by USFWS for current force and SBCT proposed actions on O'ahu, including the O'ahu Implementation Plan. These measures will help avoid effects and will compensate for impacts on listed species that would result directly and indirectly from implementing the Proposed Action. The Biological Opinion is available upon request.

The IWFMP for Pōhakuloa and Oʻahu Training Areas was updated in October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts from wildland fires. The plan is available upon request.

### *Significant Impacts Mitigable to Less than Significant*

*Impact 2: Impacts from construction and training activities on sensitive species and sensitive habitat.* There would be long-term significant and mitigable impacts on sensitive (federally listed) species and their sensitive habitat, including on critical, habitat, as a result of SBCT training activities. Listed species potentially affected by the project action include the following:

- Plants: *Abutilon sandwicense, Alectryon macrococcus* var. *macrococcus, Alsinidendron trinerve, Chamaesyce rockii, Cyanea acuminata, C. grimesiana* spp. *obatae, C. koolauensis , Cyrtandra subumbellata, C. viridiflora, Delissea subcordata, Diellia falcata, Flueggea neowawraea, Gardenia mannii, Hesperomannia arborescens, Isodendrion longifolium, Labordia cyrtandrae, Lepidium arbuscula, Lobelia gaudichaudii* var. *koolauensis, L. niihauensis, Phlegmariarus nutans (Lycopodium nutans), Phyllostegia hirsuta, P. kaalaensis, P. mollis, Plantago princeps* var. *princeps, Pteris lidgatei, Sanicula purpurea, Schiedea hookeri, S. kaalae, Tetraplasandra gymnocarpa, Viola chamissoniana* spp. *chamissoniana, V. oahuensis;* and
- Wildlife: *Achatinella apexfulva, A. byronii, A. decipiens, A. leucorraphe, A. lila, A. mustelina, A. sowerbyana, A. swiftii, Paroreomyza maculata, Lasiurus cinereus semotus, Chasiempis sandwichensis ibidis,* and the Oʻahu ʻelepaio.

The proposed locations of restricted road mounted maneuvers and dismounted training is the same area where listed species have been known to occur (Figures 5-34 and 5-35). It is also near the Oʻahu ʻelepaio's federally designated critical habitat, as well as designated plant critical habitat (Figures 5-38 and 5-39). There are 4,620 acres of Oʻahu ʻelepaio critical habitat within the SBMR ROI, and 155 ʻelepaio pairs and additional individuals have been identified within the SBMR ROI (HINHP 2002; see Figure 5-37). There are also 179.71 acres of plant critical habitat within the ROI. No impacts from construction activities are expected to occur to listed species and their critical habitat since there would be no construction activities occurring in the vicinity of the critical habitat.

All sensitive plant species are at risk from trampling, particularly hāhā *(Delissea subcordata)*, aupaka *(Isodendrion longifolium)*, and ulihi *(Phyllostegia hirsuta)* (Gomez 2003), though this risk is low. Special status plant species have been identified as confirmed or potentially occurring within the SBMR ROI (Table 5-23). These species may propagate in the proposed SBMR ROI. Special status and rare wildlife species (determined to be heading to a decline based on population numbers or habitat loss) are either known to occur in the SBMR ROI or could occur, based on the presence of suitable habitat (see Table 5-24). These species use portions of the ROI for foraging, shelter, and nesting.

The proposed training includes road-mounted maneuvers (though there would be no off-road mounted maneuvers within federally designated critical habitat) and dismounted maneuvers. There would be an additional 810 Soldiers training as part of SBCT Transformation. There would also be an increase in the intensity of the training, with more ammunition being used in the ROI. This would result in direct and indirect impacts on listed species and their critical habitat by causing the take of federally listed species and the degradation of critical habitat. Listed snail species could be crushed by mounted and dismounted maneuvers. More vegetation would be trampled, both in new areas and to a greater extent. Erosion, noise, and the visual presence of humans and large machinery would increase. Long-term impacts on listed species and critical habitat include the potential for increased nonnative and invasive nonnative species due to habitat disturbance or people bringing these species to the area on their clothing or equipment, and the increased probability of fire (discussed further under Impact 1). Nonnative species threaten the viability of the ʻelepaio and its federally designated critical habitat by carrying diseases, out-competing it, preying on it, and altering its habitat.

Two species of picture-wing fly *(Drosophila* sp.*)* are known to occur at Puʻu Pane at SBMR. These have been proposed for federal listing as endangered species. All species of picture-wing flies have very specific host plants that they use for breeding and feeding, and over one third of the endemic host plants for these two species are already federally listed as endangered. These plants are scattered in areas that are under increasing pressure from human activities and they are also threatened by habitat damage from feral pigs and goats, nonnative species, and fire. All of these factors combined have aided the decline of the picture-wing flies. The project activities would affect these species by reducing the range of the host plants, which would decrease the available habitat for the picture-wing flies.

These impacts would combine to deter the listed species' use of lands surrounding the ROI. Impacts on these federally listed species may be mitigable to less than significant.

*Regulatory and Administrative Mitigation 2*. The Army will implement all the terms and conditions defined in the Biological Opinion issued by USFWS for current force and SBCT proposed actions on O'ahu, including the O'ahu Implementation Plan. These measures will help avoid effects and will compensate for impacts on listed species that would result directly and indirectly from implementing the Proposed Action. The Biological Opinion is available upon request.

The Army will implement land management practices and procedures described in the ITAM annual work plan to reduce erosion impacts (US Army Hawai‘i 2001a). Currently these measures include implementing a TRI program; implementing an ITAM program; implementing an SRA program; developing and enforcing range regulations; implementing an Erosion and Sediment Control Management Plan; coordinating with other participants in the KMWP; and continuing to implement land rehabilitation projects, as needed, within the LRAM program. Examples of current LRAM activities at KTA include revegetation projects involving site preparation, liming, fertilization, seeding or hydroseeding, tree planting, irrigation, and mulching; a CTP; coordination through the TCCC on road maintenance projects; and development of mapping and GIS tools for identifying and tracking progress of mitigation measures.

*Additional Mitigation 2.* The Army proposes to fence or flag where practicable any sensitive plant communities from activities that may take place in the ROI. The Biological Opinions outline fencing for the majority of the sensitive species. USARHAW will evaluate if additional fencing may be necessary.

*Impact 3: Impact from the spread of nonnative species on sensitive species and sensitive habitat.* In general, nonnative plant and animal species pose a threat to Native Hawaiian ecosystems. The proposed actions at SBMR would be expected to affect the introduction and spread of nonnative species in the following ways:

- Movement of troops and equipment into Hawai‘i from continental US or foreign ports, as well as from other islands or subinstallations within Hawai‘i, would increase the likelihood of nonnative plant and animal introductions;
- Construction can introduce nonnative species and other weeds through the use of sand and gravel that contains nonnative plant seeds; and
- Fires would put native plant species at competitive disadvantage.

The use of Helemanō Trail would introduce more invasive species to the area. This would have a minor indirect impact on sensitive species because the area where the trail is proposed is largely made up of agricultural lands and dirt roads. Construction of Helemanō Trail would draw more people to the trail. A long-term increase in the use of Helemanō Trail is associated with the Proposed Action. This includes increasing Stryker and conventional truck traffic on the proposed road. There would be an increase in the number of conventional Army trucks (trucks and HMMWVs) and Strykers used on roads to and from SBMR, WAAF, and the Helemanō Trail. There would be 161 trucks and 114 Strykers that would travel on the roads and trail, twelve times per year, with most traffic concentrated on the new trail (see Table 2-7).

The prolonged prohibition of hunting in certain areas because of unexploded ordnance has allowed populations of nonnative mammals, such as pigs, to expand. However, no new impact areas would be created in conjunction with the Proposed Action, so the Proposed Action will not cause any change in the growing ungulate populations. Increased troop transport among subinstallations and between islands could increase the likelihood of nonnative invertebrates colonizing new areas. Increased activity and disturbance could cause stress to neighboring higher habitat value areas and would assist in the establishment of nonnative species in the immediate and surrounding areas. Therefore, SBCT actions along Helemanō Trail could adversely affect the recovery of listed species in the SBMR ROI.

Fire exacerbates nonnative species spread and establishment. Hawaiian plants have not evolved to withstand fires because there is little natural cause of fire on the islands. As a result, nonnative species have a competitive advantage in surviving and propagating successfully after a fire. If native species withstand an initial fire, they are often destroyed by later fires influenced by the invasion of highly flammable grasses. The potential spread of nonnative species resulting from potential wildfires is considered a significant impact because nonnative species often out-compete native species and destroy native communities. Sensitive plant species likely to be affected by a SBCT-related spread of nonnative species in the ROI are listed in Table 5-27, along with their associated threat level.

**Table 5-27**
**Sensitive Plants Threatened by the Spread of Nonnative Species**

| Species Name | Percentage of Population within the ROI | Threat Level |
|---|---|---|
| Māhoe *(Alectryon macrococcus)* | 7 to 8 | Moderate to high |
| Hāhā *(Cyanea grimseana* ssp. *obate)* | 6 | Moderate |
| Hāhā *(Delissea subcordata)* | 9 | Moderate to high |
| Palapalai lau lii *(Diellia falcata)* | 1 | High |
| Mehamehame *(Flueggea neowawraea)* | 3 | Moderate to high |
| *Hesperomannia arborescens* | 94 | Low to moderate |
| Aupaka *(Isodendrion longifolium)* | 2 (SBMR, SBER) | Moderate for those populations in the lowland mesic forests<br>High in the areas where nonnative plants already dominate |
| Kamakahala *(Labordia cyrtandrae)* | 78 | Moderate |
| Lanaunau *(Lepidium arbuscula)* | 7 | High |
| Ulihi *(Phyllostegia mollis* and *P. kaalaensis)* | 3 and 29 to 33 individuals represented, respectively | Moderate for *P. kaalaensis*<br>High for *P. mollis* |
| ʻAle *(Plantago princeps* var. *princeps)* | 20 | Moderate |
| Maolioli *(Schiedea hookeri)* | 5 to 7 | High |
| ʻOlopū *(Viola chamissoniana)* | 5 | High |

Source: Gomez 2003

Four species of wildlife are likely to be affected by the spread of nonnative species: Oʻahu ʻelepaio discussed in Impact 1, ʻiʻiwi, *Achatinella mustelina*, and the Hawaiian hoary bat. For a comprehensive list of sensitive wildlife species with the potential to occur within the ROI see

Table 5-24. These species could occur within the area affected by fire, erosion, and training activities, each of which increases the likelihood of the spread of nonnative species to those areas.

The impact of SBCT actions on the spread of nonnative species would be lessened by instituting the Army's ongoing environmental programs. Measures identified in the Ecosystem Management Plan Report, O'ahu Training Areas (R. M. Towill Corp. 1998), and the O'ahu Training Areas INRMP (USARHAW and 25th ID[L] 2001a) for protection of biological resources on SBMR would continue as part of the proposed SBCT project actions. The programs outlined in Section 2.1.5 of Chapter 2 would help minimize damage to habitat, lower the likelihood that sensitive species individuals are disturbed, and maintain or restore the population level of sensitive species, particularly federally listed threatened and endangered species. The wash rack proposed at SBER would lower the chances of spreading nonnative plants, such as fountain grass, and invertebrates between training ranges.

*Regulatory and Administrative Mitigation 3.* As required in the terms and conditions of the Biological Opinions, the Army will implement the following:

- Educate soldiers and others potentially using the facilities and roads in the importance of cleaning vehicles, equipment, and field gear;
- Educate contractors and their employees about the need to wear weed-free clothes and to maintain weed-free vehicles when coming onto the construction site and to avoid introducing nonnative species to the project site;
- Prepare a one-page insert to construction contract bids informing potential bidders of the requirement; and
- Inspect and wash all military vehicles at wash rack facilities prior to leaving SBMR, KTA, or PTA to minimize the spread of weeds, such as fountain grass, and animal (invertebrate) relocations.

USARHAW will follow HQDA guidance developed in consultation with the Invasive Species Council and in compliance with Executive Order 13112, which determines federal agency duties for preventing and compensating for invasive species impacts. USARHAW will agree to all feasible and prudent measures recommended by the Invasive Species Council that would be taken in conjunction with SBCT action to minimize the risk of harm. Implementing an Environmental Management System will further improve the identification and reduction of environmental risks inherent in mission activities.

In accordance with USDA regulations and requirements, the USDA will inspect and certify cargo originating outside of Hawai'i to ensure that it is not carrying the brown tree snake or other reptiles before cargo for use on training ranges is transported.

*Additional Mitigation 3.* The Army proposes to use native plants in any new landscaping or planting efforts where practicable. When practicable, natural habitats would remain intact or adjacent areas would be restored as habitat.

*Less than Significant Impacts*

*Impacts from construction and training activities on general habitat and wildlife.* Habitat within the ROI is for the most part disturbed natural and introduced landscapes. Activities limited to this area would mostly affect nonnative species adapted to stressed or nonnative environments. Construction of the proposed ranges collectively would directly affect approximately 846 acres (see Table 5-28). Vegetation within the proposed footprints of these projects, which primarily includes nonnative grasses, shrubs, and pineapple fields, would be removed. Following construction of the proposed ranges, the Army would seed disturbed areas with native or noninvasive vegetation.

**Table 5-28**
**Impact on Vegetation Communities Resulting from Construction of Proposed Ranges**

| Project | Area of Impact (approximate acres) | Existing Vegetation Cover |
|---|---|---|
| QTR1 | 120 | Primarily denuded with areas of nonnative grasses and shrubs |
| BAX | 600 | Primarily denuded with areas of nonnative grasses and shrubs |
| UAC | 6 | Primarily denuded, existing buildings, nonnative grasses and shrubs. |
| QTR2 | 120 | Agricultural lands |

Source: This information was developed as a part of ESA Section 7 consultation.

Increased human presence and elevated noise levels in the ranges would displace various wildlife species, such as birds and rodents. Wildlife within the impact area and associated surface danger zones could be affected by ordnance or other munitions. The potential introduction of fire, which could affect wildlife, is discussed under Impact 1.

Off-road mounted maneuvers would occur throughout the western portion of SBER. Wildlife and vegetation found in this highly disturbed area is primarily nonnative. Ground-dwelling wildlife and vegetation would sustain adverse impacts as a result of the maneuvers.

Road-restricted mounted maneuvers would occur at the SRAA. The net conversion of the highly disturbed pineapple fields to fallow land with mounted maneuvers on the roadways would not amount to a significant loss of general wildlife or vegetation.

Troop and other foot traffic in predominantly nonnative areas are not expected to have a significant impact.

Nonnative wildlife and plants generally have a negative influence on the success of native plants and wildlife. For this reason, a loss to nonnative species, such as those commonly occurring in the project ROI, is not considered significant (see significance criteria Section 4.10).

*Threat to migratory birds.* The presence of the FTI antennas could significantly affect migratory bird species known to occur in the SBMR ROI, especially those that migrate at night

(USFWS 2000). Although the exact number of bird fatalities from tower collisions in Hawai'i is not known, birds are killed in large numbers worldwide by antenna support structures each year (USFWS 2000). This is a violation of the MBTA (16 USC 703-712), which prohibits taking or killing migratory birds. Tower size is also considered a factor, with towers taller than 200 feet (61 meters) responsible for the greatest number of bird fatalities (Manville 2000). Less than significant impacts are expected because monopole antennas will be under 100 feet (33 meters) and, where possible, will be sited on buildings or towers, and no guy wires will be used. A full description and a map of proposed locations of the FTI antennas are in Appendix D.

Migratory bird species known to occur at SBMR that could be adversely affected by the Proposed Action include the white-tailed tropicbird, black-crowned night heron, barn owl, golden plover, and northern cardinal (USARHAW and 25th ID[L] 2001a).

UAVs would fly over the training area, as discussed Section 5.4. The UAV activity is not anticipated to threaten migrating birds.

*Noise and visual impacts.* Training increases noise levels that could adversely affect the O'ahu 'elepaio or other vertebrates at SBMR. The increase in training and ammunition use would result in an increase in the associated noise output. A study at SBMR concluded that "artillery noise was judged to have a negligible effect on the behavior of 'elepaio" (VanderWerf et al. 2000). The report does note that previous research, Delaney and Pater et al. in 1999, determined that louder and closer noises resulted in more intense responses (VanderWerf et al. 2000). Louder artillery noises or the closer proximity of 'elepaio to artillery could result in more intensive disruption (VanderWerf et al. 2000). In addition to land-based noise, there would be additional aircraft in the training areas (C-17s, C-130s, and UAVs). Noise from these aircraft, displayed in Figure 5-25, would not substantially increase noise in the habitat and therefore is unlikely to alter wildlife behavior (VanderWerf et al. 2000). It is important to note that the research on this issue is not conclusive and further information is needed. Currently there is little documented evidence indicating that the increased noise as a result of SBCT training (see Section 5.6, Noise) would significantly disturb sensitive wildlife species. However, more information is needed to properly understand training-related noise effects on 'elepaio and other wildlife. This issue would be addressed through the ESA Section 7 consultation process. In addition to prudent and reasonable measures determined as part of USFWS consultation on this issue, the Army would comply with EO 13186 as described in *Threat to Migratory Birds*.

There are no visual impacts on biological resources from project activities.

### Reduced Land Acquisition Alternative

#### Significant Impacts

*Impact 1: Impacts from fire on sensitive species and sensitive habitat.* As described under the Proposed Action, impacts from fire would be significant. While less land area would be disturbed during construction of the SBMR ranges (because QTR2 would not be constructed in the SRAA), impacts from fire are still considered significant. Approximately 726 acres would be disturbed as a result of range construction instead of 846 acres, a difference of 120 acres. A lower likelihood of training-induced fire exists under this alternative than under the Proposed Action, but there remains an overall increase in fire risk from project activities at the Main Post and SBER. The mitigation measures will substantially reduce the impacts from fire but not to less than significant levels.

*Regulatory and Administrative Mitigation 1.* The Army will implement the mitigation measures listed under the Proposed Action.

### *Significant Impacts Mitigable to Less than Significant*

Significant biological resources impacts, mitigable to less than significant, associated with this alternative would be similar to biological resource impacts associated with the Proposed Action. However, mounted maneuvers would not occur at the SRAA, which would mean a decrease of 25,855 MIMs from the Proposed Action. RLAA does include mounted maneuvers at SBER, which would amount to an increase of 2,385 MIMs, compared to ongoing No Action activities. This would remain a significant and mitigable to less than significant impact on biological resources in the SBMR ROI.

Mitigation described for the Proposed Action would apply to the RLA Alternative and would reduce significant impacts to the less than significant level.

### *Less than Significant Impacts*

In general, there would be fewer impacts on biological resources as a result of implementing RLA because only approximately 100 acres would be acquired for military use, rather than 1,400 acres with the Proposed Action. Because 1,300 fewer acres would be acquired under RLA, there is less land area that could be disturbed by military activities.

Less than significant biological resource impacts would be identical to those under the Proposed Action, with the following exceptions:

- In general, potential impacts on general vegetation and wildlife from mounted and dismounted light maneuver training, identified under the Proposed Action and associated with the QTR2 and the 1,300 acres identified above, would not occur within the SRAA. As such, there would be only limited impacts on general vegetation and wildlife from construction in the SRAA and the impact would remain less than significant; and
- Potential noise impacts on wildlife species from using QTR2 for small arms fire and from using the 1,300 acres for general mounted and dismounted maneuver training would no longer be expected. There would be short-term construction-related noise that would affect general wildlife; this would be temporary and would be limited by SOPs and BMPs. As such, this impact would remain less than significant.

## ***No Action Alternative***

No Action would result in no new impacts on biological resources, but would involve a continuation of existing impacts. An in-depth analysis of current force training impacts on

SBMR biological resources can be found in the *O'ahu Training Areas INRMP* (USARHAW and 25th ID[L] 2001a) and the *Endangered Species Management Plan Report (ESMPR) for O'ahu Training Areas* (R. M. Towill Corp. 1997b). All terms and conditions detailed in the 2003 Biological Opinion for Routine Military Training and Transformation of the 2nd Brigade 25th ID(L) at US Army Installations on O'ahu (USFWS 2003d) will be enacted under this alternative as well. A synopsis of No Action Alternative impacts is given below.

### Significant Impacts

*Impacts from fire on sensitive species and sensitive habitat.* Several current force actions would continue to be potential sources of fires at SBMR, including tracers, explosives ordnance, and vehicle traffic (R. M. Towill Corp. 1997b). The live fire at ranges near Schofield Barracks Forest Reserve pose the largest threat to sensitive species and native species. The Army is addressing fire control under the IWFMP to minimize impacts from fire, and it would continue the following mitigation measures:

- Improve and clear vegetation from fuel breaks and access roads to decrease the likelihood of fire spread; and
- Implement protection and monitoring, as described in the ecosystem management plan, endangered management plan, and INRMP.

### Significant Impacts Mitigable to Less than Significant

*Impacts from construction and training activities on sensitive species and sensitive habitat.* There have been and would continue to be impacts on the listed plants and wildlife. Vehicle and dismounted maneuvers along with live-fire and nonlive-fire training at SBMR and WAAF occurs primarily on disturbed portions of the ROI that are of low value to Hawai'i's listed species. However, the effects of fire, spread of nonnative species, noise pollution and visual presence of humans in or nearby designated and sensitive habitats negatively affects listed species that use or would potentially use this area.

The Army has completed ESA Section 7 Consultation for the impacts on federally listed species and their designated critical habitat from current force and proposed SBCT training at SBMR. Measures outlined under the Proposed Action (including fencing, ungulate control, habitat management, and rat control) will be incorporated into the No Action. Ongoing programs that would lessen the impact on listed species and their designated critical habitat include the ecosystem management plan, endangered species management plan, and INRMP (USARHAW and 25th ID[L] 2001a; R. M. Towill Corp. 1997b). These measures would help avoid effects and would compensate for impacts on listed species that would result directly and indirectly from implementing the No Action.

*Impacts from the spread of nonnative species on sensitive species and sensitive habitat.* Nonnative plants and animals, some of which may be invasive, have likely been and would continue to be introduced and to spread and would also continue to be introduced into natural areas at SBMR as a result of current force training. In compliance with Executive Order 13112 on invasive species, the Army would continue to minimize the risk of harm caused by invasive species, including implementing an invasive plant monitoring program, to be detailed under the O'ahu Implementation Plan, and preventing secondary weed spread from fire by monitoring and eradicating newly dispersed weeds. Provisions are made for reducing these impacts in the *O'ahu Training Areas INRMP* (USARHAW and 25th ID[L] 2001a) by surveying for nonnatives, fencing out invasive mammals, increasing weed eradication, and evaluating and determining improvements for identifying threats and protection of rare vertebrates and invertebrates. Army environmental management (Section 2.2.4), including research, monitoring, and stabilization projects, would reduce these impacts to the less than significant level.

### Less than Significant Impacts

*Impacts from construction and training activities on general vegetation, wildlife, and habitat.* Construction would be undertaken on a case-by-case basis in support of current training. Mounted and dismounted training would continue at SBMR and changes would occur as dictated by future requirements. Present impacts from current force activities are less than significant. Measures outlined under the Proposed Action for protection of sensitive species and habitat would also benefit general species and habitat. Training impacts would continue to be managed to limit trampling and overall loss of habitat range (R. M. Towill Corp. 1997b).

*Threat to migratory birds.* Current force activities would continue to have a less than significant impact on migratory birds. Status quo activities in the ROI may incidentally affect migratory birds but are unlikely to severely disturb birds, considering the highly disturbed nature of the present training area.

*Noise and visual impacts.* Noise would continue to be produced as a result of current force activities. Noise would have an adverse impact on animals in the area (due to disturbance) but would not significantly affect their behavior and would not lead to a population level decline. Studies such as the *Final Report: A Study to Determine the Effects of Noise from Military Training on the Endangered O'ahu 'Elepaio* (HINHP 1998) show that Army related noise on O'ahu has not significantly affected species, including sensitive species such as the 'elepaio. There are no visual impacts under this Alternative.

# 5.11 CULTURAL RESOURCES

## 5.11.1 Affected Environment

### *Region of Influence*

The ROI for this project area would include SBMR, the SRAA, WAAF, and the alignment for construction of Helemanō Trail.

### *Native Hawaiian History and Tradition*

*Schofield Barracks and South Range Acquisition Area*

The central plateau, in which SBMR is situated, is associated with a number of legends and oral traditions (Anderson 1998; SRP 2002; Sterling and Summers 1978, 134-137; Tomonari-Tuggle 1997). Tomonari-Tuggle (1997, 8-12) researched the significance of the central plateau in Hawaiian tradition and found that the area was the site of sacred activities (Fornander 1969, II-85) as well as the residence of O'ahu chiefs (Nakuina 1897, 90). The traditional information recorded by McAllister (1933) concerning the former presence of three heiau corroborates the religious importance of the plateau. The central O'ahu plateau also served as a place of refuge for Hawaiian nobles shortly after contact (Kamakau 1992, 136). Sterling and Summers (1978) also mention that the heiau sites and their significance have been recorded by earlier researchers.

Native Hawaiian resources identified at SBMR and WAAF include numerous archaeological sites and natural settings like Mount Ka'ala and Kolekole Pass. The locations of the three former heiau, the Oahunui Stone, and some of the lo'i systems may be of importance to Native Hawaiians.

The West Range Impact Area contains a number of places mentioned in Hawaiian legends and histories. The three heiau discussed by McAllister (1933) and mentioned above lie within this area. Possible remnants of the Hale'au'au heiau have not been relocated following recent surveys, while the Kumakali'i Heiau in Pukaloa Gulch, and a heiau reported to have been also used for burials in Kalena Gulch, are reported to have been destroyed (Anderson 1998, 3-24, 3-33). Above the Schofield Barracks ordnance impact area, on top of Mount Ka'ala at the summit of the Wai'anae Mountains, lies a bog that McAllister recorded as a former fishpond.

Kolekole Pass is at the southwest end of the South Range and forms a low crossing point through the Wai'anae Mountains. A prehistoric trail crossed the pass linking Wai'anae Uka with Wai'anae Kai. Near Kolekole Pass within the South Range is the Kolekole Stone, which is known as a "sacrificial stone," but the story that victims were decapitated over this stone may be a fairly recent rendition. Older Hawaiians say the stone represents the Guardian of the Pass, a woman named Kolekole (Anderson 1998, 3-33; Social Research Pacific (SRP) 2003).

One traditional Hawaiian feature, the O'ahunui Stone, had been depicted on early survey maps as lying on the south side of Kaukonahua Stream on the southern boundary of SBER.

The stone was not found during archaeological surveys in the area where it is shown on the early maps. Some Hawaiians believe that the stone was moved and is now located in Waikakalaua Stream valley south of SBER (Robins and Spear 2002a, 2002b).

Mount Ka‘ala is mentioned in Hawaiian mythology as a mountain that the goddess Hi‘iaka, the sister of Pele, climbed on her way back to the island of Hawai‘i from Kaua‘i. From the top she could see the destruction that her sister Pele, enraged over her long absence, had wrought by causing a flow of lava over her lands in Puna (Anderson 1928, 274). According to Hawaiian traditions, the Ka‘ala bog, on the west side of the summit, was once a freshwater pond used as a fishpond. Kamaoha was the goddess of this pond, in which shore fish and a kind of mullet were caught. The informant who reported the pond to McAllister called it a luakini fishpond (1933), which might indicate its use only by chiefs.

Located outside SBMR are the birthing stones of Kūkaniloko, one of only two locations in the Hawaiian islands that were considered appropriate places for the births of children of kapu chiefs (the highest ranking nobles) and thus one of the most sacred places on the island. All women of the royal line were expected to give birth here. Kūkaniloko also served as a pu‘uhonua or place of refuge (Ii 1963, 135). Associated with Kūkaniloko was the now destroyed Ho‘olonopahu, a waihau heiau, where the umbilical cords of the newborn ali‘i were cut and sacred drums announcing the birth of ali‘i (chiefs or nobility) were stored (Fornander 1996, 272; Beckwith 1970, 377). At the vernal and autumnal equinoxes, the sun, when viewed from Kūkaniloko, would set directly behind the summit of Mount Ka‘ala. Thus, it has been suggested that these places may have been of importance in Hawaiian astronomy and calendric determinations (Kyselka 1993, in Tomonari-Tuggle and Yoklavich 2000, V-11).

In summary, ATIs on SBMR include Mount Ka‘ala, Kolekole Pass with the associated Kolekole Stone, the former location of the O‘ahunui stone, and the three heiau reported in McAllister. The remnant lo‘i field systems in the stream valleys might also be regarded as a significant complex. One of these may be Kukui-o-Lono, the location of a number of wetland taro fields, originally developed by the high chief Kukuiolono. Handy and Handy say that this was “a place famous in legend” (1972, 465). Two of the informants interviewed during the oral history studies for SBMR indicated that there are other known places of traditional significance on SBMR, mostly ahu, but they were unwilling to disclose the locations (SRP 2003).

Certain elements within Wai‘anae Uka contribute to the traditional landscape of the area. The stream valleys at the base of the Wai‘anae Range seem to have formed important agricultural locations separated from one another by upland forest areas that may have been used for hunting of birds and collecting of other forest resources. Trails crossed the area linking farmers with their fields at the local level and linking Wai‘anae Uka with Wai‘anae Kai across Kolekole Pass. Separate from the agricultural pursuits of the commoners were the activities of the ali‘i, or nobility, in this area. For them, Wai‘anae Uka and the surrounding ahupua‘a were the locations of sacred activities, especially the births of the highest ranking children, rituals at several heiau by kahuna (priests), and perhaps the making of astronomical observations from Kūkaniloko over Mount Ka‘ala. Certain resources collected in this area, such as the fish from the Mount Ka'ala luakini fishpond and the feathers of forest birds, were reserved for the chiefs. Training for warfare and lua, a Hawaiian martial art, also took place here, and it was in this area, particularly at the chiefly site of Lihue, where political power was exercised by the high chiefs.

#### *Wheeler Army Airfield*

Like SBMR, WAAF occupies the central plateau of O'ahu. Its location formed part of the area that comprised Wai'anae Uka and was important in the traditional activities, history, and lore discussed above in connection with SBMR. The area would have been near the prehistoric chiefly center of Lihue. Despite the traditional importance of this area, there are few indications of ATIs on WAAF. A limited archaeological survey has not identified any prehistoric or early historic Hawaiian sites. Previous studies did not identify sacred places or important traditional cultural places on WAAF (Belt Collins 2000a; Tomonari-Tuggle and Bouthillier 1994, 9-15).

#### *Access to Cultural Sites*

Access to cultural sites on Army land is now restricted, but the Army, in accordance with policy, provides access for legitimate reasons to traditional places. Such access is provided within the limitations imposed by mission requirements and public safety concerns. No formal policy governs access at SBMR, and access requests are handled on a case-by-case basis in coordination with Range Control.

### ***Historic Overview***

#### *Schofield Barracks Military Reservation*

Hawaiians lived in the central plateau of O'ahu hundreds of years before European contact. In pre-Contact times, the area had large villages and extensive agricultural complexes in order to support a large population and a political center at Lihue (Tomonari-Tuggle 1997, 2002).

The boundaries of SBMR, with the inclusion of the northern part of WAAF, correspond with the traditional Hawaiian land unit called Wai'anae Uka, a land-locked portion of the ahupua'a of Wai'anae, which extended from the west coast of O'ahu over the Wai'anae Mountains and across to the top of the Ko'olau Range. Stretching across the central plateau in a long band from the top of the Wai'anae Range to the top of the Ko'olau Range , Wai`anae Uka was relatively isolated from the rest of its ahupua'a. As a result the trail that connected Wai'anae Uka with Wai'anae Kai, the coastal portion of the ahupua'a, by way of Kolekole Pass, was of strategic importance. Kolekole Pass is not far from the base of Mount Ka'ala, the highest summit on O'ahu, an important place in Hawaiian religion, ceremony, legend, and perhaps celestial observations.

Wai'anae Uka is known in Hawaiian traditions as an important training ground for chiefs and was the location of important prehistoric battles. Archaeological evidence indicates the presence of traditional Hawaiian agricultural field systems, both dryland and irrigated taro wetland fields (lo'i) along the streams that flow through SBMR. Three heiau are known to have been located in the area.

Oral histories have identified this area as a training ground for warriors with several longhouses, although no specific localities have been identified (SRP 2003). The area around Kolekole Pass was used by young students studying the art of lua, which involved dislocating joints and replacing them (Alvarez 1982, 6).

In probably the mid to later 1600s the Oʻahu paramount chief Kualiʻi led his armies against the rebellious chiefs of Ewa and Waialua at a battle on the land of Kalena and the plains of Haleʻauʻau in what would now be the West Range Impact Area on SBMR (Fornander 1969, II-281).

Archaeological evidence indicates limited use of the upland plateau areas, although the scarcity of sites could partly reflect a higher rate of ground disturbance from modern use on the plateau from ranching and military training activities. Early historic descriptions indicate that lush native forest covered most of the plateau lands between the stream valley farms. These forests may have been used to hunt birds for food and feathers and to gather other upland resources, especially valuable woods such as koa and sandalwood.

Between about 1816 and 1830, under the direction of the Hawaiian chiefs, these forests were intensively cut to obtain sandalwood for trade to China (Kamakau 1992). In the 1830s a missionary described the area as one of "nearly naked plains" (Bishop 1916, 45). After the sandalwood boom ended, wood may still have been gathered as firewood to stoke the boilers of the whaling ships that called at Honolulu Harbor over the following 40 years (Kuykendall 1968). Following deforestation, the land was used for animal grazing. After 1850, the Crown leased much of the ʻahupua'a to rancher John Meek to raise cattle, sheep, and horses.

At the time of the Great Mahele (a major land reform, discussed in Section 3), the entire Waiʻanae ahupuaʻa was claimed as crown lands by Kamehameha III. Thus, there are no commoner claims or testimonies to provide evidence of the cultural use of the area at that time. Half of the ʻili (small land subdivision) of Kalena along Kalena Gulch was claimed by the aliʻi Pāhoa and the other half was awarded to John Meek. Kalākaua established Leilehua Ranch, building a house at the location of the present golf course clubhouse in the SBMR cantonment area. However, some small-scale agriculture must have continued in the stream valleys at least through the middle part of the 19th century, as early missionary records indicate the presence of villages large enough to support schools on the central plateau (Kamakau 1992).

In the late 1800s, James Dowsett owned the land that is now the Main Post and operated it as a ranch. After the annexation of Hawaiʻi in 1898, the United States took possession of the property and in 1909 established Schofield Barracks as a base for mobile defense troops. Construction began in 1913. Runways were added to the installation in 1914, and several schools were developed before and during World War I. Upon the end of the war the Hawaiian Division was established at SBMR, and substantial installation improvements were made (Tomonari-Tuggle and Bouthillier 1994).

In the late 1930s defense mobilization increased, and the installation's population swelled to 20,000. More construction took place, including the excavation of underground tunnel complexes. During World War II, SBMR became the Army's single largest garrison. Massive mobilization took place all over the islands, and SBMR housed tens of thousands of servicemen and women (Tomonari-Tuggle and Bouthillier 1994).

After the war, the Hawaiian Infantry Training Center was established at SBMR, and upon the end of the Korean War the 25th Infantry Division returned to its home post at SBMR, where it has remained the principal occupant, although it shares the post with other brigades from the Hawai'i National Guard and the US Army Reserves. The Army constructed a great deal of housing on the former open space areas at the west end of the cantonment area and built more housing during the late 1950s and 1960s (Tomonari-Tuggle and Bouthillier 1994).

*Wheeler Army Airfield*

During the prehistoric period, the lands on which WAAF is located formed part of the politically and spiritually important central plateau of O'ahu. The northern part of the installation falls within Wai'anae Uka, whose importance to Native Hawaiians was discussed at the beginning of this chapter. The southern part lies within the 'ili of Waikakalaua, which is now part of the ahupua'a of Waikele in 'Ewa district, but may once have been an 'ili of Wai'anae. The land may once have been part of Lihue, when it was a major chiefly center, although there is no evidence that any settlement was located on WAAF.

Traditional settlement in the area may have followed a pattern similar to that on SBMR, although no archaeological evidence has been found to substantiate this. Farming would have been concentrated in the gulches along the two main streams flowing through the base, Wai'eli and Waikakalaua. Agricultural features have been identified upstream in each gulch and downstream where they join to form Waikele Stream. The plateau lands were probably covered in native forest, including koa and sandalwood, and used for bird hunting and collection of wood and other forest products.

As part of the central plateau and the crown lands of Wai'anae Uka, the nineteenth century history of WAAF reflects that of SBMR, with sandalwood collection, harvesting of firewood for whaling ships, and ranching each in succession playing the major role in the area's economy. In the early 1900s pineapple cultivation became established on the flat plateau lands of WAAF and surrounding areas. To transport the pineapples, the O'ahu Rail and Land Company built a railway that made its way up to the central plateau through what would become WAAF.

WAAF was established as a military installation in 1922 on land identified as former Crown Lands of the Kingdom of Hawai'i. Until the late 1920s the runway field was simply a grass and dirt field. During the 1930s the field was upgraded and new buildings were constructed, including houses, hangars, and a fire station. WAAF was severely damaged during the Japanese attack on December 7, 1941, and after the attack two new runways were added. In 1947 WAAF was moved to US Air Force control and then put in caretaker status in 1948 until 1951, when the Korean War began. WAAF remained in Air Force control until 1991, when it was returned to the Army (Tomonari-Tuggle and Bouthillier 1994).

### *Previous Consultations and Reports*

*Traditional Cultural Properties Surveys*

Tomonari-Tuggle researched the significance of the central plateau of O'ahu in Hawaiian tradition and found that the area was the site of sacred activities, as well as the residence of O'ahu chiefs (Nakuina 1897, 90; Tomonari-Tuggle 1997, 8-12; Fornander 1969, II-85). The disturbed remnants of heiau (McAllister 1933) corroborate the religious importance of the plateau. The central O'ahu plateau also served as a place of refuge for ali'i, or Hawaiian nobility, early after contact (Kamakau 1992, 136).

SRP conducted an oral history study to locate TCPs and ATIs (as defined in Chapter 3, Section 3.11) at SBMR, as defined in Section 3. Through oral interviews, SRP was informed that there were a number of ATIs, but because of "fear of exposing knowledge about their location, [the informant] would not discuss what these were or where they were located" (SRP 2003, 30). The oral testimony included descriptions of several longhouses, which were training grounds for warriors. Informants also related the sanctity of the area, which once had stone structures of ceremonial significance, such as heiau and shrines. SRP concludes that SBMR includes several ATIs. In some cases, a natural place that may have limited or no archaeological remains may still be considered an ATI.

*Historic Buildings Surveys*

Patricia Alvarez prepared a history of SBMR in 1982. The 1993 Schofield Barracks Real Property Master Plan included a survey of all the buildings in the cantonment area (Belt Collins 1993). This was followed in 1996 by a feasibility study for upgrading quads C and D while preserving historic integrity (Belt Collins 1996). Mason Architects documented and evaluated all buildings as well as other historic structures in the SBMR cantonment area that were built before 1951 in connection with the development of the 2000 Schofield Barracks Cultural Resource Management Plan by Belt Collins Hawai'i (2000b). This plan provided guidance for managing historic buildings in the cantonment area of SBMR. Mason Architects also documented all historic buildings and structures at WAAF built before 1953 (Tomonari-Tuggle and Bouthillier 1994) and the results of this study were integrated into the 2000 WAAF Cultural Resources Management Plan (Belt Collins 2000a). USARHAW has also inventoried historic housing on six subinstallations, including SBMR, as part of the Residential Communities Initiative (RCI).

*Archaeological Surveys*

Previous archaeological survey work in the SBMR cantonment area has been conducted by Bouthillier et al. (1995), O'Hare et al. (1993), McIntosh et al. (1995a, 1995b), and Williams et al. (1995). Recently, Robins and Spear (2002a, 2002b) conducted Phase I, II, and III surveys at SBMR. Robins and Spear surveyed selected areas, including limited subsurface sampling. Belt Collins (2000b) wrote a cultural resource management plan covering the five archaeological sites/historic localities identified in the SBMR cantonment area. All five sites relate to military use or to the development of SBMR (IARII 2003).

Parts of SBER have been surveyed on foot; and additional areas have been surveyed from the air but that acreage is unknown. Archaeologists have also surveyed a linear trail 3.5 miles

(5.6 kilometers) long within SBER. Eleven sites (two agricultural sites and nine historic military sites) have been recorded (Robins and Spear 2002a, 2002b). A twelfth site, the O'ahunui Stone, has a site number but has not been located.

WAAF and surrounding areas in the central plateau have received archaeological investigations (Rosendahl 1977; Griffin and Yent 1977; Powell 1984; Hammatt et al. 1988; summarized in Tomonari-Tuggle and Bouthillier 1994, 47-48, as cited in IARII 2003). Compliance surveys have revealed few archaeological remains because this area has undergone extensive land modification, primarily from agricultural (pineapple cultivation), residential, and military use (Tomonari-Tuggle and Bouthillier 1994, 47). Cultural resources that have been found include enclosures, irrigation canals, rock alignments, and terraces (IARII 2003).

In 2003, Garcia and Associates (GANDA) completed surveys of the SRAA, the footprints of the BAX, QTR1, and footprints of all construction projects at SBMR, the Helemanō easement, and at WAAF (GANDA 2003e). This data was not available for the DEIS but is included here.

*Cultural Landscape Pilot Project*

To assist in planning for the development of an ICRMP for SBMR and WAAF, IARII conducted a pilot project to develop a GIS database for USAG-HI using a cultural landscape framework. The purpose of the project was to integrate natural and cultural resource data, military training data, and military land management variables into a GIS database compatible with that maintained by the ITAM program. This database would be used to implement the management procedures of the ICRMP. SBMR is one of only three US Army installations to participate in this pilot project (Tomonari-Tuggle et al. 2000).

### ***Known Prehistoric and Historic Resources***

*Schofield Barracks Military Reservation*

Table 5-29 provides an overview of prehistoric and historic resources identified at SBMR and WAAF, as well as their NRHP status. Table 5-30 provides a list of identified historic properties at SBMR, WAAF, the SRAA, and the Helemanō Trail alignment.

Two SBMR properties are listed on the National Register of Historic Places: the Schofield Barracks Confinement Facility (Stockade) and the Schofield Barracks Historic District (Figure 5-41). The Schofield Barracks Historic District includes 176 contributing buildings as well as 10 other contributing sites, structures, and objects, including Macomb Gate and Entry, Carter Hall, and the Health Clinic. The 1924 fire station was also evaluated as eligible. An additional 104 buildings built before 1951 that lie outside the Historic District have been recommended as eligible. Forty additional buildings are now or will be over 50 years old by 2007. Surveys conducted at the following project locations did not reveal any cultural resources: Virtual Fighting Training Facility (S2), Tactical Vehicle Wash (S6), Information Systems Facility (S9), and Mission Support Training Facility (S10).

**Table 5-29**
**Summary of Known Cultural Resources at Schofield Barracks Military Reservation, South Range Acquisition Area, and Wheeler Army Air Field**

| | Total Archaeological Sites | Sites Listed, Eligible, or needing DE | Area Surveyed for Archaeological Sites | Buildings over 50 years Old | Buildings Listed, Eligible, or Needing DE |
|---|---|---|---|---|---|
| **Main Post (SBMR, SBW, and SBS)** | 90 | 85 (DE) | 820 acres (332 hectares) | 439 | 177 listed<br>193 DE |
| **SRAA** | 53 | 53 (DE) | 120 acres (48.6 hectares) | None | Unknown |
| **East Range** | 11 | 11 (DE) | 890 acres (360 hectares) | Unknown | Unknown |
| **WAAF** | 5 | 1 (DE) | 50 acres (20.2 hectares) | 273 | 7 listed<br>264 DE |
| **Helemanō Trail** | None | None | Unknown (entire easement) | 0 | 0 |

Source: IARII 2003
Note: "DE" or "determination of eligibility" means a site or building that has not yet been found ineligible for the NRHP and therefore must be treated as eligible pending such a finding.

**Table 5-30**
**Known Cultural Resources at Schofield Barracks Military Reservation, South Range Acquisition Area, and Wheeler Army Air Field**

| Location | State Site No. | Site Description |
|---|---|---|
| SBS | 8-0214 | Kolekole Stone |
| SBW | 4-0212 | Luakini fishpond |
| SBW | 8-9516 | Elou Cliff trail |
| SBW | 50-80-04-0215 | Haleauau heiau (destroyed) |
| SBW | 50-80-04-0217 | Heiau (destroyed) |
| SBW | 50-80-08-0213 | Kumakaliʻi heiau (destroyed) |
| SBE | 50-80-09-0204 | Single stone |
| SBMR | Schofield Barracks Historic District | Historic district |
| SBMR | Stockade | Historic building |
| SBMR | Fire Station | Historic building |
| SBS | 50-80-08-5385 | Road section |
| SBS | 50-80-08-5386 | Alignment |
| SBS | 50-80-08-5387 | Mound complex |
| SBS | 50-80-08-5388 | Terrace/mound complex |
| SBS | 50-80-08-5389 | Terrace/mounds/align |
| SBS | 50-80-08-5390 | Mounds |
| SBS | 50-80-08-5391 | Terrace/mound/encl |
| SBS | 50-80-08-5392 | Agricultural fields |
| SBS | 50-80-08-5393 | Field terrace/berms/ʻauwai |
| SBS | 50-80-08-5394 | irrigation pondfield/ʻauwai |
| SBS | 50-80-08-5395 | Historic road |
| SBS | 50-80-08-5396 | ʻAuwai |
| SBS | 50-80-08-5399 | Alignments |

**Table 5-30**
**Known Cultural Resources at Schofield Barracks Military Reservation, South Range Acquisition Area, and Wheeler Army Air Field** *(continued)*

| Location | State Site No. | Site Description |
|---|---|---|
| SBS | 50-80-08-5397 | C-shape |
| SBS | 50-80-08-5400 | Terrace |
| SBS | 50-80-08-5401 | ‘Auwai |
| SBS | 50-80-08-5407 | Alignment |
| SBS | 50-80-08-5408 | ‘Auwai |
| SBS | 50-80-08-5409 | Road |
| SBS | 50-80-08-5410 | Stream terraces |
| SBS | 50-80-08-5412 | Mound |
| SBS | 50-80-08-5413 | Enclosure/align/mounds/walls |
| SBS | 50-80-08-5414 | Linear depression |
| SBS | 50-80-08-5415 | Dry land agricultural terraces |
| SBS | 50-80-08-5416 | Terraces/enclosure |
| SBS | 50-80-08-5417 | Terraces/mounds |
| SBS | 50-80-08-5418 | Agricultural complex |
| SBS | 50-80-08-5419 | Terraces with ’auwai |
| SBS | 50-80-08-5420 | Terrace/mound |
| SBS | 50-80-08-5421 | Irrigation agricultural complex |
| SBS | 50-80-08-5422 | Terrace/mound complex |
| SBS | 50-80-08-5424 | Mounds |
| SBS | 50-80-08-5423 | Agricultural complex |
| SBS | 50-80-08-5425 | Wall section |
| SBS | 50-80-08-5426 | Mounds |
| SBS | 50-80-08-5427 | Agricultural terrace complex |
| SBS | 50-80-08-5428 | Mounds |
| SBS | 50-80-08-5429 | Terrace/enclosure |
| SBS | 50-80-08-5430 | Mound |
| SBS | 50-80-08-5431 | Mound/L-shape |
| SBS | 50-80-08-5432 | Road alignment |
| SBS | 50-80-08-5433 | ‘Auwai |
| SBS | 50-80-08-5434 | Terrace/berms/’auwai |
| SBS | 50-80-08-5435 | Terrace/mounds |
| SBS | 50-80-08-5436 | Mounds/terraces |
| SBS | 50-80-08-5437 | Mound |
| SBS | 50-80-08-5438 | ‘Auwai |
| SBS | 50-80-08-5439 | Mound |
| SBS | 50-80-08-5440 | Mound |
| SBS | 50-80-08-5441 | Mound |
| SBS | 50-80-08-5447 | Terraces/’auwai |
| SBS | 50-80-08-5448 | enclosure/mounds/terrace |
| SBS | 50-80-08-5449 | Terraces/’auwai |
| SBS | 50-80-08-5462 | Roads |
| SBS | 50-80-08-5505 | Excavated ditch |
| SBS | 50-80-08-5506 | Alignment |
| SBS | 50-80-08-5507 | Rock shelter |

**Table 5-30**
**Known Cultural Resources at Schofield Barracks Military Reservation, South Range Acquisition Area, and Wheeler Army Air Field** *(continued)*

| Location | State Site No. | Site Description |
|---|---|---|
| SBS | 50-80-08-9528 | Platform |
| SBW | 50-80-04-0215 | Haleauau heiau |
| SBW | 50-80-04-0216 | House site |
| SBW | 50-80-04-0217 | Heiau |
| SBW | 50-80-04-5379 | ‘Auwai |
| SBW | 50-80-04-5380 | Terraces |
| SBW | 50-80-04-5402 | Terrace |
| SBW | 50-80-04-5403 | Field terrace complex |
| SBW | 50-80-04-5404 | Field terraces |
| SBW | 50-80-04-5405 | Field terraces |
| SBW | 50-80-04-5406 | Field terraces |
| SBW | 50-80-04-5442 | Alignments |
| SBW | 50-80-04-5445 | Terrace/mound agricultural complex |
| SBW | 50-80-04-5446 | Terraced field complex |
| SBW | 50-80-04-5502 | Wall |
| SBW | 50-80-04-5503 | Walled/terrace fields and berm |
| SBW | 50-80-04-5512 | Excavated ditch |
| SBW | 50-80-04-5513 | Irrigation field system |
| SBW | 50-80-04-5514 | Mound and enclosure |
| SBW | 50-80-04-5515 | Mound |
| SBW | 50-80-04-5516 | Mound |
| SBW | 50-80-04-5517 | Mounds |
| SBW | 50-80-04-5518 | Wall |
| SBW | 50-80-08-0213 | Kumakali‘i heiau |
| SBW | 50-80-08-5381 | Terraces |
| SBW | 50-80-08-5443 | Tunnel |
| SBW | 50-80-08-5444 | Terrace/align |
| SBW | 50-80-08-9516 | Trail |
| SBW | 50-80-08-9527 | Walled/terrace |
| SBW | *50-80-04-215 | Hale‘au‘au heiau |
| SBW | *50-80-04-216 | Enclosure |
| SBW | *50-80-04-217 | Kalena Gulch heiau |
| SBW | 50-80-04-5379 | Excavated ditch |
| SBW | 50-80-04-5380 | Field complex |
| SBW | 50-80-08-5381 | Field complex |
| SBW | 50-80-08-5392 | Field complex |
| SBW | 50-80-08-5393 | Field complex |
| SBW | 50-80-08-5394 | Field complex |
| SBW | 50-80-08-5395 | Alignment |
| SBW | 50-80-08-5396 | Excavated ditch |
| SBW | 50-80-08-5432 | Alignment |
| SBW | 50-80-08-5433 | Excavated ditch |
| SBW | 50-80-08-5434 | Field complex |
| SBW | 50-80-08-5447 | Field complex |

**Table 5-30**
**Known Cultural Resources at Schofield Barracks Military Reservation, South Range Acquisition Area, and Wheeler Army Air Field** *(continued)*

| Location | State Site No. | Site Description |
|---|---|---|
| SBW | 50-80-08-5449 | Field complex |
| SBW | 50-80-04-5512 | Excavated ditch |
| SBW | 50-80-04-6552 | Terrace |
| SBW | 50-80-04-6553 | Terrace |
| SBW | 50-80-04-6554 | Terrace complex |
| SBW | 50-80-04-6555 | Mounds |
| SBW | 50-80-04-6556 | Concrete structure |
| SBW | 50-80-04-6557 | Terrace complex |
| SBW | 50-80-04-6558 | Rock piling |
| SBW | 50-80-04-6559 | Alignment |
| SBW | 50-80-04-6560 | Terrace complex |
| SBW | 50-80-04-6561 | Terrace complex |
| SBW | 50-80-04-6562 | Alignment-mound complex |
| SBW | 50-80-04-6563 | Enclosure |
| SBW | 50-80-04-6564 | Terrace |
| SBW | 50-80-04-6565 | Terrace complex/petroglyph |
| SBW | 50-80-04-6566 | Ditch |
| SBW | 50-80-04-6567 | Retaining walls |
| SBW | 50-80-04-6568 | Concrete structure-rock piling |
| SBW | 50-80-04-6569 | Ditch |
| SBW | 50-80-04-6570 | Stone structure/road/ditch |
| SBW | 50-80-04-6571 | Retaining wall |
| SBE | 50-80-09-0204 | Single stone |
| SBE | 50-80-09-5382 | Tunnel/bunker |
| SBE | 50-80-09-5383 | Terrace |
| SBE | 50-80-09-5384 | Reservoir/ditch/tunnel |
| SBE | 50-80-09-5411 | Pecked boulder |
| SBE | 50-80-09-5461 | Concrete foundation |
| SBE | 50-80-09-5500 | Foundation/structure |
| SBE | 50-80-09-5501 | Foundations |
| SBE | 50-80-09-5508 | Foundation |
| SBE | 50-80-09-5509 | Reservoir |
| SBE | 50-80-09-5510 | Foundation |
| SBE | 50-80-09-5511 | Foundation |
| SRAA | 9528 | Platform |
| SRAA | 5436 | Terrace/mound complex |
| SRAA | 5437 | Mound |
| SRAA | 5438 | Excavated ditch |
| SRAA | 5439 | Mound |
| SRAA | 5440 | Mound |
| SRAA | 5441 | Mound |
| SRAA | 50-80-08-5436 | Feature complex |
| SRAA | 50-80-08-5437 | Mound |
| SRAA | 50-80-08-5438 | Irrigation ditch |

**Table 5-30**
**Known Cultural Resources at Schofield Barracks Military Reservation, South Range Acquisition Area, and Wheeler Army Air Field** *(continued)*

| Location | State Site No. | Site Description |
|---|---|---|
| SRAA | 50-80-08-5439 | Mound |
| SRAA | 50-80-08-5440 | Mound |
| SRAA | 50-80-08-5441 | Mound |
| SRAA | 50-80-08-6462 | Dam complex |
| SRAA | 50-80-08-6463 | Feature complex |
| SRAA | 50-80-08-6464 | Concrete foundation |
| SRAA | 50-80-08-6465 | Artifact scatter |
| SRAA | 50-80-08-6466 | Road retaining wall |
| SRAA | 50-80-08-6467 | Feature complex |
| SRAA | 50-80-08-6468 | Concrete foundations |
| SRAA | 50-80-08-6469 | Feature complex |
| SRAA | 50-80-08-6470 | Culvert system/ road |
| SRAA | 50-80-08-6471 | Road retaining wall |
| SRAA | 50-80-08-6472 | Feature complex |
| SRAA | 50-80-08-6473 | Wall with mounds |
| SRAA | 50-80-08-6474 | Building complex |
| SRAA | 50-80-08-6475 | Feature complex |
| SRAA | 50-80-08-6476 | Cistern |
| SRAA | 50-80-08-6477 | Feature complex |
| SRAA | 50-80-08-6478 | Habitation complex |
| SRAA | 50-80-08-6479 | Feature complex |
| SRAA | 50-80-08-6480 | Cistern |
| SRAA | 50-80-08-6481 | Feature complex |
| SRAA | 50-80-08-6482 | Feature complex |
| SRAA | 50-80-08-6483 | Feature complex |
| SRAA | 50-80-08-6484 | Mound complex |
| SRAA | 50-80-08-6485 | Feature complex |
| SRAA | 50-80-08-6486 | Feature complex |
| SRAA | 50-80-08-6487 | Enclosure |
| SRAA | 50-80-08-6488 | Mound complex |
| SRAA | 50-80-08-6489 | Retaining wall |
| SRAA | 50-80-08-6490 | Wall |
| SRAA | 50-80-08-6491 | Mound complex |
| SRAA | 50-80-08-6492 | Feature complex |
| SRAA | 50-80-08-6493 | Platform |
| SRAA | 50-80-08-6494 | Feature complex |
| SRAA | 50-80-08-6495 | Building complex |
| SRAA | 50-80-08-6496 | Mound |
| SRAA | 50-80-08-6497 | Complex |
| SRAA | 50-80-08-6498 | Alignment |

**Table 5-30**
**Known Cultural Resources at Schofield Barracks Military Reservation, South Range Acquisition Area, and Wheeler Army Air Field** *(continued)*

| Location | State Site No. | Site Description |
|---|---|---|
| SRAA | 50-80-08-t100 | Feature complex |
| SRAA | 50-80-08-t101 | Feature complex |
| SRAA | 50-80-08-t102 | Feature complex |
| WAAF | N/A | Historic landmark |
| WAAF | N/A | Historic district |

Notes: SBS = Schofield Barracks South Range; SBE = Schofield Barracks East Range; SBW = Schofield Barracks West Range; SBMR = Cantonment area.
* Recent surveys could not re-locate these sites.
Source: IARII 2003; GANDA 2003e

Archaeological sites dating to the military use of the cantonment include three underground structures, a deposit of 20th century trash along the upper edge of Wai‘eli gulch (Bouthillier et al. 1995), railroad remains northwest of McMahon Road (McIntosh et al. 1995a), a terrace facing of large angular basalt boulders at the edge of Wai‘eli Stream at the southern edge of Martines Field (Williams et al. 1995), and a buried 5-cm-thick basalt gravel and asphalt paving, located along Wilson Avenue near its intersection with Cadet Sheridan Road (Tomonari-Tuggle 1997, 52-53). Five archaeological sites have been identified within the cantonment area, all of them related to military use of the property (IARII 2003). These have not been recommended as eligible to the NRHP. The four intensive surveys covering 177 acres (71.6 hectares) of the cantonment area recorded no prehistoric sites.

SBER is evaluated as an area of low probability for archaeological resources because much of it has been affected by erosion and ground disturbing activities and unaffected areas yielded few archaeological sites (Anderson 1998, 3-39). Pedestrian surveys documented 11 archaeological sites in SBER: two Native Hawaiian sites (a pecked boulder and a terrace with aligned stones) and nine historic military sites (three small complexes of structures, one concrete structure, three concrete foundations, a tunnel/bunker, and a reservoir/ditch/tunnel complex) (Robins and Spear 2002a, 8-9, 2002b, 8). All sites are recommended as eligible for National Register listing under criterion D.

Twenty-nine archaeological sites have been identified in the Schofield Barracks West Range (Robins and Spear 2002b). Of these, 24 are prehistoric and early historic Native Hawaiian sites, two are Native Hawaiian historic period sites, two are historic sites, and one is of unknown age. The sites of Native Hawaiian origin include heiau, agricultural terraces, ‘auwai (irrigation channels), fishponds, enclosures, stone alignments, and roads. Most are located in the stream gulches. Robins and Spear (2002a, 2002b) recommend that all 29 sites be considered eligible for NRHP listing.

**Figure 5-41**
Historic Districts at Schofield Barracks Military Reservation and Wheeler Army Airfield

The SRAA has been completely surveyed for the presence of cultural resources. A large portion of the land in the eastern and southern portions of the parcel is under intensive pineapple cultivation. Seven sites had been previously recorded in the SRAA. Rosendahl (1977) recorded Site 50-80-08-9528, a possible historic platform. Robins and Spear (2002a, 198-203) recorded Sites 50-80-08-5436 to -5441, which consist of dry land agricultural mounds and terraces. These sites are associated with late prehistoric agricultural activities and possibly with cattle ranching. In 2002, GANDA completed survey work in the SRAA and identified forty-six sites (GANDA 2002b).

The Schofield Barracks South Range has a total of 53 known archaeological sites. These consist of 45 traditional Native Hawaiian prehistoric or early historic sites, five historic period sites, one military site, and two sites of unknown period. Most sites are located in the stream gulches where they are at least partially protected from the impact of training activities on the plateau lands above (Anderson 1998, Robins and Spear 2002a, 2002b). While investigating sites recorded in previous archaeological work, IARII discovered three additional sites.

### *BAX / QTR 1 / McCarthy Flats*

A survey in 2003 (GANDA 2003e) revealed twenty new sites in the BAX/QTR1 project area. Three previously recorded sites (50-80-04-215, -216, and -217) could not be re-located. This brings the total of sites identified to 34, including the 14 previously identified sites. Thirteen of the newly discovered sites appear to be traditional Hawaiian, with four possibly dating to the historic era. Tentative functional determinations include habitation (Sites 6561, 6565 and 6568), irrigation (Site 6566), animal husbandry (Site 6563), and wetland and dryland agriculture (Sites 6552, 6554, 6555, 6557, 6559, 6560, 6562, 6564, and 6565). Petroglyphs were also identified at Site 6565 adjacent to a habitation structure. The Site 6560 complex was not recorded during the survey because it is in an area deemed off-limits due to the presence of high explosive 40mm ordnance. Several isolated artifacts were collected from the upper plateaus, including three poi pounders, two *ulu maika* (gaming stones), and an adz fragment.

The remaining seven sites are from the historic period: an irrigation ditch (Site 6569), erosion control walls (Sites 6567 and 6571), a WWII military bunker (Site 6556), and roads (Sites 6553 and 6570). Site 6570 also includes a water collection or distribution station. Site 6558 is a remnant stone structure containing historically cut stones.

Of the 34 sites, four wetland agricultural complexes (Sites 5392 to 5394 and 5396) and one wetland agricultural complex in Hale‘au‘au Gulch (Site 6565) are recommended for preservation. The remaining 29 sites are recommended for additional work to determine significance.

### *Wheeler Army Airfield*

WAAF contains a National Historic Landmark, which includes a portion of the apron, a barracks building, five hangars, and one support facility (Figure 5-41). All housing at WAAF dating from 1932 to 1950 has been found to be NRHP eligible. An NRHP nomination form has been prepared for the Wheeler Historic District, which includes 242 eligible buildings.

Five historic archaeological sites have been identified on the installation; one is considered eligible for the NRHP (Tomonari-Tuggle and Bouthillier 1994). Surveys at WAAF to upgrade it for C130 Aircraft (S14) and at the Multiple Deployment Facility (S13) did not reveal any cultural resources.

*Helemanō Trail*

Recent survey work by GANDA in 2003 did not reveal any archaeological sites within or near the HMR easement. Sites in the general area were recorded by Fankhauser who found historic agriculture and historic communication sites having to do with HMR's use as a communication facility during World War II. Although no sites or other cultural resources within the estimated boundaries of the Helemanō Trail easement are known, Fankhauser did record an earth oven exposed in a plantation irrigation trench outside of HMR (Fankhauser 1987).

### *Potential for Unknown Resources*

Archaeological sensitivity maps of SBMR have been compiled from several sources (Figures 5-42, 5-43). Possible railroad tracks are located to the northwest of McMahon Road on the upper edge of Waikōloa Gulch (IARII 2003). The whole northern edge of the SBMR cantonment area, including the McMahon parcel, is identified as a potentially sensitive archaeological area. Both Belt Collins (2000b) and Tomonari-Tuggle (1997) identify undeveloped portions of Kaukonahua Gulch within the Schofield Barracks cantonment area as an archaeologically sensitive area (IARII 2003). A 1911 map reproduced in Robins and Spear (2002a, Figure 17, from Gomes [1911]) indicates that there is a burial site in Kaukonahua Gulch; any surveys in that area should include oral historical research on the possibility of burials (IARII 2003).

## 5.11.2 Environmental Consequences

### *Summary of Impacts*

Table 5-31 summarizes impacts on cultural resources. Significant impacts on archaeological resources would occur from range and facility construction and from training activities. Additional significant impacts on ATIs would occur from facility construction and use of the SRAA for training activities. The significant impacts primarily relate to the construction phase of SBCT-related projects and range uses in the West and South ranges, the BAX, and the SRAA. As explained in the mitigation sections below, the severity of these impacts will be mitigated by implementing the PA found in Appendix J.

Mitigation measures include surveys, avoidance of archaeological sites and properties of importance to Native Hawaiians. Mitigation measures for demolition of or damage to eligible historic buildings will include following the Secretary of the Interior's standards during rehabilitation or documentation of eligible buildings in compliance with established federal standards.

**Figure 5-42**
Sensitive Archaeological Areas Schofield Barracks Main Post and South Range Acquisition Area

**Figure 5-43**
Archaeological Sensitivity Areas Schofield Barracks East Range

**Table 5-31**
**Summary of Potential Cultural Resources Impacts at SBMR/WAAF**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Impacts on historic buildings | ⊙ | ⊙ | ○ |
| Impacts on archaeological resources from range and facility construction | ⊗ | ⊗ | ○ |
| Impacts on archaeological resources from training activities | ⊘ | ⊘ | ⊙ |
| Impacts on archaeological sites from construction of fixed tactical internet | ⊙ | ⊙ | ○ |
| Impact on ATIs | ⊗ | ⊗ | ○ |
| Impacts on archaeological sites from road or trail construction | ⊙ | ⊙ | ○ |
| Impacts on archaeological sites from road use | ○ | ○ | N/A |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
+ = Beneficial impact
N/A = Not applicable

Less than significant impacts include the risk to undiscovered archaeological sites in areas of low potential for subsurface archaeological resources, the risk to sites from FTI construction, and the risk to historic architecture and landscapes from installation of cables and conduits. These impacts will be mitigated by complying with the Secretary of the Interior's Standards for Rehabilitation of Historic Buildings, as described in the PA in Appendix J.

### *Proposed Action (Preferred Alternative)*

#### Significant Impacts

*Impact 1: Impacts on archaeological resources from range and facility construction.* Facility and range construction involves grubbing vegetation, grading site surfaces, excavating subsurface, and moving heavy construction equipment. All of these activities, particularly excavation, could result in direct damage to or destruction of archaeological resources.

SBMR contains numerous significant archaeological sites. USARHAW will conduct the mitigations described below in accordance with the PA, which will reduce the severity of these impacts but not to less than significant levels.

*Regulatory and Administrative Mitigation 1.* Before construction, the Army will complete the evaluation of any archaeological sites within areas subject to range and facility construction. Sites determined to be eligible for the NRHP will be flagged for avoidance. The projects will be designed to avoid all eligible and unevaluated archaeological sites, to the full extent practicable. GIS and GPS information will be given to project designers and range control to ensure that sites are considered in project design. If it is not possible to avoid archaeological sites, the Army will consult in accordance with the PA to determine the appropriate mitigation for the damage to the sites, such as data recovery or other mitigation measures. To address the accidental discovery of archaeological sites, human remains, or cultural items, the Army has developed an IDP as part of the PA.

*Impact 2: Impacts on Areas of Traditional Importance*. SRP (2003) conducted a TCP survey, as defined in Section 3.11.2, at SBMR, including the associated ranges. Archaeological surveys of construction areas and the range areas may not have identified TCPs or places of traditional importance to Native Hawaiians, even though some archaeological sites may constitute an ATI. Activities relating to the construction of the BAX, UACTF, and QTR1, and the use of QTR2, could result in destruction or damage, or restrict access to previously unknown properties of traditional importance to Native Hawaiians. Native Hawaiians consider range and training activities inappropriate and disrespectful uses of the land that disturb and change the character and feeling of spiritual places.

Acquisition of the SRAA and its subsequent use for military training could interfere with Native Hawaiian access to and use of sites on the parcel for traditional or religious purposes. Oral testimony indicates there are ATIs on the property, and some of these resources qualify as TCPs. Converting the area to military training purposes could result in limited Native Hawaiian access to some sites and might result in inadvertent physical damage or destruction of the sites. In order to protect such resources, a survey of the proposed construction and range areas for TCPs or ATIs has been conducted via pedestrian survey, archival research, oral interviews, and site visits with knowledgeable Native Hawaiians. USARHAW is taking a proactive role in trying to identify ATIs through its community outreach programs and activities, and plans to continue with these activities. Two FTI antenna support structures will be placed on Mount Kaʻala and one near Kolekole Pass. While the proposed FTI antenna support structures have been located to avoid archaeological resources, these areas have been identified as important elements of the cultural landscape of Waiʻanae Uka. While the Kolekole antenna would be erected on top of an existing antenna support structure, the Mount Kaʻala sites would require new construction and may be considered to have an adverse visual effect.

Noise impacts described in Section 5.6 of this chapter would not have an impact on potential ATIs at Mount Kaʻala and Kolekole Pass because the noise contour maps show no noise impacts in these areas, and access would be limited to times when no ordnance would be firing.

Construction of the UACTF is identified for an area near Kolekole Pass, on or adjacent to the Elou Cliff Trail, a traditional trail identified as a potential ATI. Previous reconnaissance surveys have failed to identify any remnants of the trail. The mitigation measures below will reduce the severity of the impact but not to less than significant levels.

*Regulatory and Administrative Mitigation 2.* Facility construction or training area uses will be designed to avoid identified traditional places and to limit visual impacts on TCPs by site location, design, and orientation, where feasible. If it is not possible to avoid identified TCPs or ATIs because of interference with the military mission or risk to public safety, the Army will consult with the SHPO and Native Hawaiians in accordance with the PA to identify impacts and to develop appropriate mitigation measures. Mitigation for impacts on the cultural landscape could include consulting with Native Hawaiians and having construction overseen by a cultural monitor.

The Army will continue to provide Native Hawaiians with access to traditional religious and cultural properties, in accordance with AIRFA and Executive Order 13007, on a case-by-case basis. This access program will be expanded to include new land acquisitions.

The Army previously identified Native Hawaiian burial sites in the SBCT ROI. The Army completed notification and consultation for these burial sites, in accordance with NAGPRA, and left these human remains in place. To address any impacts on any burial sites, or an inadvertent discovery of Native Hawaiian human remains or funerary objects, the Army will abide by all notification and consultation requirements outlined in Section 3 of NAGPRA.

### *Significant Impacts Mitigable to Less than Significant*

*Impact 3: Impacts on archaeological resources from training activities.* Use of the BAX, the UACTF, and the new training areas in the SRAA could result in significant adverse impacts on archaeological resources.

Over 50 archaeological sites have been identified within the SRAA, the BAX contains over 30 sites, and the UACTF is known to be located in an area with possible cultural resources (Elou Cliff Trail). Potential impacts from the proposed training activities include damage to sites from subsurface excavations related to troop training (e.g., field fortifications, emplacement of obstacles), increased access by ground troops into the two ranges, off-road vehicular movement, possible damage from live fire. Maneuver training using tactical vehicles within the training areas would have a high potential to damage sites. The presence of large numbers of personnel could affect resources through vandalism or accidental damage.

Additionally, as discussed under geological resources, Strykers exert a greater amount of force on the ground than do vehicles previously used on training areas at SBMR. Off road mounted maneuvers with Strykers could result in greater direct impact on any remaining archaeological sites in all of the training areas, or in greater indirect impacts through contribution to erosion, as compared with No Action. At least 80 archaeological sites or distinct features have been identified in the West and South ranges (not including the SRAA); while these sites may have been affected by the existing uses of the training areas, use of the Strykers may cause more extensive damage. Implementation of the mitigation measures below would reduce significant impacts to less than significant levels.

*Regulatory and Administrative Mitigation 3*. The Army will evaluate archaeological sites within training areas related to SBCT. Sites determined to be eligible for the NRHP and sites pending evaluation will be identified and avoided through protective measures, to the full extent practicable. If avoidance of identified archaeological sites or newly discovered sites is not feasible, the Army will consult in accordance with the PA to determine the appropriate mitigation for the damage to the sites, such as data recovery . To address the accidental discovery of archaeological sites, human remains, or cultural items, the Army has developed an IDP as part of the PA .Less than Significant Impacts

*Impacts on historic buildings*. The construction of the Range Control Facility at SBMR would require demolishing buildings and constructing one large facility for range control activities on O'ahu. These buildings are not within the Schofield Barracks Historic District, but two of the buildings to be demolished (Buildings 2056 and 2276) are or will soon be 50 years of age and therefore may be eligible for the NRHP. In accordance with the PA, the buildings to be demolished will be evaluated for eligibility for the NRHP. If they are eligible, the Army would document the buildings in accordance with the standards of the Historic American Building Survey and the Historic American Engineering Record (HABS/HAER), in consultation with the SHPO, Historic Hawaii Foundation, and other interested parties.

*Impacts on archaeological sites from construction of FTI*. Most of these antenna sites would require new construction. The antenna support structures require a 15-foot (4.6-meter) by 20-foot (6.1-meter) concrete pad supporting an equipment support structure and shed. Construction of the pads, sheds, and support structures would require vegetation grubbing, site grading and leveling, some subsurface excavation, and the use of heavy construction equipment. These activities could damage or destroy previously undiscovered archaeological resources, as described above. The Army has conducted pedestrian surveys of the areas designated for construction. Archaeological sites identified through this survey and previously located sites within the project area will be flagged and avoided. If any archaeological resources were discovered during construction, all activity in the area of the site will stop, and the Army will comply with the provisions of the IDP contained in the PA.

*Impacts from road or trail construction*. Construction of Helemanō Trail involves purchasing approximately 17 acres (6.9 hectares) of land in a perpetual easement and constructing a 15-foot-wide (4.6-meter-wide) road with 3-foot-wide (0.91-meter-wide) shoulders on both sides. Wherever possible, the road would follow existing dirt and paved roads or pass through areas that have been previously disturbed by pineapple cultivation. The potential impact of this transformation project on cultural resources is relatively low, because the road would largely cross areas that have been under intensive commercial agriculture. The survey did not reveal the presence of archaeological sites within the easement. Accidental discoveries of archaeological materials during construction would be mitigated by compliance with the IDP contained in the PA.

### *No Impacts*

The upgrade of the airfield at WAAF for C-130 aircraft operations is adjacent to the WAAF National Historic Landmark District. The project is located on the south side of the main runway, and it does not appear that construction of the apron improvements would adversely affect the integrity of the landmark. Although there are World War II bomb craters within the Proposed Action's ROI, any proposed construction would avoid these resources.

Use of Helemanō Trail is unlikely to result in any impacts because the area is low in archaeological potential, and there are no sites reported.

### *Reduced Land Acquisition Alternative*

Reduced land acquisition would produce the same impacts at SBMR as the Proposed Action, except the reduced amount of land acquired for training range uses would result in fewer impacts on undiscovered archaeological resources in the SRAA at SBMR and could slightly reduce interference with Native Hawaiian access and use. Construction of QTR2 at PTA rather than SBMR would involve a minor overall reduction of impacts on archaeological resources at SBMR.

### *No Action Alternative*

#### *Less than Significant Impacts*

*Impacts on archaeological resources from training activities.* Under No Action, impacts on cultural resources would continue at current levels; these impacts include ongoing impacts on archaeological resources on range and training areas. Such impacts could be caused by training activities such as ground troop activities, off-road vehicle movement, and subsurface excavations, as well as impacts from live fire exercises. Units involved in excavation activities are frequently accompanied by archaeologists to redirect digging away from archaeological sites or monitor digging for cultural resources. Archaeological resources on the ranges are monitored following exercises to document adverse effects on the sites. Based on this monitoring, archaeological staff at USARHAW have concluded that ongoing current training does not result in significant impacts on cultural resources on the training areas.

Under No Action, current force training would continue and USARHAW will continue efforts to inventory eligible historic properties in compliance with Section 110 of the NHPA, and current force-related project planning would comply with Section 106 and its implementing regulations. Construction of new current force facilities would be managed in compliance with installation cultural resources management policies and Section 106 of the NHPA, as well as NAGPRA and ARPA. Impacts on cultural resources would be mitigated in compliance with these regulatory requirements.

## 5.12 HUMAN HEALTH AND SAFETY HAZARDS

### 5.12.1 Affected Environment

The following section addresses current human health and safety hazards such as the use and storage of hazardous materials and wastes at Main Post, SBER, WAAF, and the proposed SRAA. The section addresses specific Army regulations pertaining to the use and storage of hazardous materials and wastes and wildfire management, in addition to the regulations discussed in Chapter 3.12 and Appendix N of this document. The site-specific Proposed Action areas in Main Post, SBER, WAAF, and the SRAA do not accumulate high concentrations of biomedical waste, so this waste stream is not addressed.

#### *Hazardous Materials and Waste Management*

The Army maintains updated material safety data sheets for all hazardous materials used at SBMR and WAAF. The Transfer Accumulation Point at SBER Building 6040 stores hazardous materials and wastes used and generated at Main Post, SBER, and WAAF.

##### *Schofield Barracks Military Reservation*

SBMR maintains site-specific spill prevention, control, and countermeasure plans for all fuel storage and delivery facilities, vehicle and equipment maintenance facilities, building and grounds maintenance facilities, and hazardous materials and waste storage areas. The plans cover the following specific facilities:

- Army and Air Force Exchange Stations (AAFES) filling stations;
- Super Station centralized, industrial filling station;
- Schofield-SBER TAP;
- Motor pools/tactical equipment maintenance facilities;
- Individual motor pools/tactical maintenance facilities;
- 536th Support maintenance shop, automotive section and 536th Engineers (7th Maintenance BN, 45th Support Group);
- Director of Logistics Maintenance Division, USAGHI Vehicle and Armament Repair;
- DPW Area Engineer Equipment Pool;
- Directorate of Logistics (DOL) Maintenance Shop 6;
- Minor facilities with heating oil tanks;
- Backup generators at many cantonment area buildings;
- Minor facilities with gasoline/diesel fuel tanks; and
- Minor facilities with POL and hazardous materials storage.

##### *Wheeler Army Airfield*

WAAF maintains site-specific spill prevention, control, and countermeasure plans for the following facilities:

- BDE hot fuel point;
- E Company 214th Aviation(AVN) maintenance facility;
- A, B, C, D Company aircraft maintenance facilities;
- H Company aircraft maintenance facility;
- DOL jet petroleum (JP)-4 fuel storage facility;
- 25 ID AVN BDE JP-4 storage facility;
- 5th Squadron, 9th Cavalry, 25th aviation maintenance facility;
- 4/25 AVN Regiment aviation maintenance facility;
- 4/25 AVNBDE tactical equipment maintenance shop; and
- HHC, 25 ID AVN BDE tactical equipment maintenance shop.

### *Specific Health and Safety Hazards*

The following sections address specific human health and safety hazards of concern, such as hazardous materials and wastes, that may be used, stored, or transported within the SBMR, WAAF, and the SRAA. Hazardous materials and wastes can affect the environment and often have specific regulations that govern their use, storage, and disposal.

#### *Ammunition*

Four designated ammunition holding areas (AHA) on SBMR are used as temporary storage by the training units; these are shown in bold print on Table 5-32. At completion of training, unused ammunition is returned to the ASP, located on WAAF in buildings 1538 and 1551. The Naval Magazines at Lualualei resupplies ammunition to WAAF (Belt Collins 1993, IV-27). These buildings act as permanent ordnance storage for all of USAG-HI (Borja 2002a). Permanent ammunition storage is not authorized on SBMR.

Explosives quantity distance regulations (TM 9-1300-206) are imposed on ammunition storage facilities for the safety of personnel and supplies. All explosives and ammunition storage is conducted within the ASP on WAAF under the supervision of the US Army Support Command, Hawai'i DOL. For safety reasons, 105mm artillery propellant is reduced from charge 5 to charge 3 prior to transportation from the WAAF ammunition supply point to an SBMR artillery range ammunition transfer point. A visual check of propellant charges is conducted at that point before the ammunition and propellant are delivered to the guns (Belt Collins 1993, IV-27). The unused propellant may be burned at one designated burn pit north of Area X. An area 50 feet (15.2 meters) downwind of the burn pit is kept clear of personnel to minimize exposure to fumes from the burn pit (Belt Collins 1993, IV-27).

Residues from burned propellant are the only hazardous wastes temporarily stored at the range burn site in a designated HWSSP. When the HWSSP reaches capacity, it is brought to the 90-day TAP facility on SBER, pending disposal by the DRMO-HI.

**Table 5-32**
**Ranges and Ordnance on Schofield Barracks Military Reservation**

| RANGE | AUTHORIZED USE AND AMMUNITION | FIRING POINTS |
|---|---|---|
| Grenade House | Hand grenades (HE, Smoke, Practice), Pistols 9mm, 22, .38, .45 Cal., 5.56mm., 7.62mm Match round. M203 40mm TP, Demolition Effect Simulators (DES), 5.56mm SRTA. | 6 rooms |
| Military Operations in Urban Terrain Assault Course | 5.56mm, M-203 40mm TP, Pistols 9mm, .22, .38, .45 Cal., DES, 5,56 SRTA. | 5 mockups |
| KR-3 ATP | Ammunition Transfer Point. | |
| KR-1A | Hand Grenade Combat Practice. M-228 Training Fuse Grenades | 7 stations |
| KR-5 Infantry Battle Course | 5.56mm, 7.62mm, M-203 40mm TP, Pistols 9mm, .22, .38, .45 Cal., 7.62mm Sniper, Claymore, Bangalore, Grenades HE/Smoke CS/HC, Dragon IIE M222, AT-4, TOW (inert), JAVELIN (inert), DES. 7.62mm Door gunnery, Aerial gunnery 20mm, 60/81mm SRTA, 5.56mm SRTA. **AHA #3 is located on the south-southeast edge of this site.** | Scenario Required |
| IBC Trench | 5.56/7.62mm, 5.56mm SRTA, 9mm, .45, .38, .22 Cal., M-203 40mm TP, Grenades, DES, 60/81mm SRTA (Scenario Req.). | 5 bunkers |
| IBC Village | 5.56mm, 7.62mm, Pistols 9mm, .45, .38, .22 Cal., M-203 40mm TP, Grenades, DES, 5.56mm SRTA (Scenario Req.). | 5 bldg |
| KR-6 Squad Defense Course | 5.56/7.62mm, 40mm TP, Claymore, Pistols 9mm, .22, .38, .45 Cal., DES, 60/81mm SRTA (1 firing point). 5.56mm/.50 Cal. SRTA. | 5 |
| Combat Pistol Range (CPR) | Pistols Qualification/Familiarization. 9mm, .22, .38, .45 Cal. | 10 |
| KR-8 | Qualification/ Familiarization. M-73, M-74, M-202 (Flash), MK-172, AT-4, Inert SMAW, MK-19 (M-918 TP), **Powder Burn Site (2 burning pans).** | 2 LAW/AT-4<br>2 MK-19 |
| KR-9 | Qualification/Familiarization. M-79, M-203 40mm HE/TP/ SMK/ILLUM. | 4 |
| CR-1 | Automated Record Fire, NBC, and Night Fire. 5.56mm Rifle, 60/81mm SRTA (1 firing point). | 9 |
| CR-2 | Automated Field Fire, NBC Fire. 5.56mm Rifle, 60/81mm SRTA (1 firing point), .50 Cal. SRTA (3 Points). Record Fire/Field Fire. | 10 |
| CR-2A | 25 Meter Zero. 5.56mm, 7.62mm, Pistols 9mm, .22, .38, .40, .45 Cal., Shotgun, Rod & Gun Club Small arms. | 15 |
| CR-3 | 25 Meter Zero. 5.56mm, 7.62mm Rifle, .50 Cal SRTA (10 Meter Zero/Qual). | 65 |
| MF-2 | Multi-Purpose. Machine-Gun. FAM/QUAL. 5.56mm 7.62mm, (7.62mm Sniper Match round), 50 Cal. Qual. (Lanes 1-4) and OH58D static or running, 60/81mm SRTA (1 firing point), -.50 Cal. SRTA (10 Meter Zero/Qual). | 7<br>-50 Cal/4 Pos<br>Helo- 1 lane |
| MF-2 Engineer Demolition | Engineer Demo. Block, Shape, Crater Charges. (Demolition up to 300 pounds [136 kilograms] maximum). | 1 |
| MF-3 | Record Fire. 5.56mm Rifle. | 18 |
| MF-4 | Zero. 5.56mm Rifle, .50 Cal. DRTA (10 Meter Zero/Qual). | 60 |
| MF-5 CPR | Pistols 9mm to .45 Cal. | 10 LNS |
| Ambush Site # 1 | 5.56mm, 7.62mm, Claymores, M203 40mm TP, Pistols 9mm, .22, .38, .45 Cal. DES (Scenario Required). | |
| Pointman Course #1 | 5.56mm, Pistols 9mm, .22, .38, .45 Cal., Shotgun, 5.56mm SRTA (Scenario Required). | 7 |
| Ambush Site # 2 | 5.56mm, Claymore, Pistols 9mm, .22, .38, .45 Cal., M-203 40mm TP, DES, 5.56mm SRTA (Scenario Required). | |

**Table 5-32**
**Ranges and Ordnance on Schofield Barracks Military Reservation** *(continued)*

| RANGE | AUTHORIZED USE AND AMMUNITION | FIRING POINTS |
|---|---|---|
| Grenade House | Hand Grenades (HE, Smoke, Practice), Pistols 9mm, .22, .38, .45 Cal., 5.56mm, 7.62mm Match round. M203 40mm TP, DES, 5.56mm SRTA. | 6 rooms |
| Pointman Course #2 | 5.56mm. Pistols 9mm-1, .22, .38, .45 Cal. Shotgun, 5.56mm SRTA (Scenario Required). | 6 |
| MF-5 Engineer Demo | Shape, Cratering Charge (up to 1.50 pounds [.68 kilograms] maximum), Bangalore (No Target), M19/M21 Mines. | 1 Pit Area |
| Convoy Ambush | 5.56mm. 7.62mm. Pistols 9mn.1, .22, .38, .45 Cal. M-203 40mm TP. Claymore Mine. DES, 5.56mm SRTA. | 1 Lane |
| Infantry Demolition | Infantry Demo. Fragmentation Grenades, Claymore. (Demolition up to 1 pound [.45 kilogram] maximum per pit) **AHA #4 is located on the southern edge.** | 3 pits |
| FP-101 | Artillery Indirect Fire. 105mm maximum charge 3 only. | |
| FP-102 | Artillery Indirect Fire. 105mm maximum charge 3 only. | |
| FP-103 | Artillery Indirect Fire. 105mm maximum charge 3 only. | |
| FP-104 | Artillery Indirect Fire. 105mm maximum charge 3 only. | |
| FP-Halo | Artillery Indirect Fire. 105mm maximum charge 3 only. | |
| FP-202 (Dry) | Artillery Indirect Fire. Dry Training only. **AHA #2 is located on the northern most edge.** | |
| FP-207 | Mortar Indirect Fire. 60mm Handheld, and Base Plate Mortar. | |
| FP-210 | Mortar Indirect Fire. 81mm Mortar. | |
| FP-211 | Artillery and Mortar Indirect Fire. 105mm maximum (charge 3 only), 81mm Mortar. | |
| FP-212 | Artillery Indirect Fire. 105mm maximum (charge 3 only). | |
| FP-213 AVS | Ammunition Verification Site. | |
| FP-216 | Mortar Indirect Fire. 60mm/81MM Mortar. | |
| FP-217 | Mortar Indirect Fire. 60mm/81MM Mortar. | |
| FP-303 | Artillery Indirect Fire. 105mm maximum (charge 3 only). (Firing Point on Left side of Road.) **AHA#1 located immediately south of this site.** | |
| FP-304 | Artillery Indirect Fire. 105mm/155mm maximum (charge 3 only). (Firing Point on Left side of Road.) | |
| FP-306 | Artillery Indirect Fire. 105mm/155mm maximum (charge 3 only). | |
| FP-307 | Artillery Indirect Fire. 105mm/155mm maximum (charge 3 only). | |
| FP-308 | Artillery Indirect Fire. 105mm/155mm maximum (charge 3 only). Laser: OH58D (All, in and out by Air only). | |
| Skeet Range | Rod and Gun Range. Shotguns. | 2 lanes |
| CATM (US Air Force Range) | Small Arms Range. Shotguns, Pistols 9mm, .22, .38, .45 Cal. 5.56mm. | 21 |
| Collective Training Facility CTF MOUT | Small arms blank ammunition. 5.56mm SRTA on 2 buildings, 9mm Paint Bullet (Static Targets, Force on Force), 60/81mm SRTA (1 firing point). | 18 buildings. |
| OP X-Ray | Laser: AN/GVS-5, G/VLLD, AIM-1EXL. | 1 Position |
| OP Tiger | Laser: AN/GVS-5, LTD, G/VLLD, AIM-1EXL. | 1 Position |
| OP Kolekole | Laser: LTD,G/VLLD, AN/GVS-5, AN/PAQ-3. | 1 Position |

Source: Borja 2002a.

Range KR-8, listed on Table 5-32 in bold print, is the burn site for SBMR. The site was selected and constructed in accordance with Section 17-5, Department of Army Pamphlet 385-64, Ammunition and Explosive Safety Standards. The burn site is operated under the following restrictions (Table 5-33):

- All burn sites have a means of collecting remnants produced by the burning operation;
- Propellants to be burned are unconfined and spread evenly over the burn pan. The depth of the propellant would not exceed 3 inches (7.62 centimeters); and
- A burn pan would be used only once per 24-hour period.

Surface danger zones are associated with live ammunition firing at range training facilities. SBMR's surface danger zones exist roughly within an arc formed by Area X (the eastern boundary), Trimble Road (the southern boundary), and the Wai'anae Mountain Range as the western boundary. The direction of fire is generally west to north. The area supports small arms, mortar, and artillery training. No live tube-launched, optically tracked, wire-guided missile, air-to-ground, or ground-to-air firing is conducted at SBMR ranges (Belt Collins 1993, IV-27). In the past two years, there have been no problems involving the public and the storage, transportation, and use of ammunition for training at SBMR (Borja 2002b).

**Table 5-33**
**Burn Site Specifications**

| Burn Site | Estimated Amount of Lbs./burn | Estimated Frequency of Burns/Week | Type of Propellants | Burn-Pan Dimensions | Pan Quantity |
|---|---|---|---|---|---|
| SBMR | 100-200 | 1 | M1, M8, M9, M10 | 5'9 "x8'10"x33" | 2 units |

Source: US Army 1999

Results from recent range soil sampling revealed metal, explosives, and SVOC levels above EPA Region IX residential and industrial PRGs on SBMR. Although metals such as aluminum and iron occur naturally in Hawaiian soils, byproducts of munitions, such as lead and RDX, contribute contaminants that could affect health and safety impacts to the natural environment. Section 5.8, Water Resources, and Section 5.9, Geology, Soils, and Seismology, provide a more detailed discussion of investigation results and effects on surface water and soils. (The investigation study is provided in Appendix M1.)

No live-fire exercises occur at SBER, and no surface danger zones exist because the range is used for bivouac, maneuver, and dummy fire training activities (US Army 1993, IV-27). Exercises at SBER use pyrotechnics and blank ammunition. The last training incident involving the public occurred approximately three years ago at the northwest end of SBER. Smoke from a smoke grenade blew into the Wahiawā community, and some children had to be examined at a hospital (Borja 2002b).

No live-fire areas exist at WAAF. The airfield has an ammunition storage point with an established explosive safety quantity-distance arc (Belt Collins 1994, 4-73 to 4-74). The safety arc around the ammunition storage point is in the south-central portion of the installation.

Table 5-32 lists all SBMR ranges, how each range is used, what type of ammunition is used on each range, and what the respective firing points are for each range. Figure 5-44 shows the layout of SBMR with the ranges and ammunition holding areas identified.

### Installation Restoration Program Sites

SBMR was placed on the National Priorities List in 1990, primarily as a result of elevated TCE levels discovered in four wells supplying potable water. TCE levels in the wells exceeded the health advisory level of 2.8 parts per billion (ppb) established by the HDOH and the federal limit of 5.0 ppb (although the 5.0 ppb EPA federal limit was not established until 1987) (Belt Collins 1993, IV-21). Since 1986, air strippers at the pump station have been in operation to remove TCE from water extracted from the contaminated wells prior to its use in the distribution system. According to DOH, TCE levels in the treated water have been reduced to below regulatory thresholds (US Army 1994, 17). In August 2000 SBMR was taken off the National Priorities List (Blandford 2002).

Effective March 15, 1993, the Deputy Assistant Secretary of the Air Force (Environment, Safety, and Occupational Health) and the Deputy Assistant Secretary of the Army (Installations and Housing) exchanged WAAF (formerly US Air Force) for Fort Kamehameha Military Reservation, Hawai'i (formerly US Army) (USARHAW 2002c). The Air Force was responsible for cleaning up the Wheeler IRP sites until 2000, at which time the responsibility was turned over to the Army (Fukuda 2002). Appendices K-2 and K-3 discuss the SBMR and WAAF IRP sites in further detail.

In addition to the IRP sites at SBMR and WAAF, a Superfund site lies outside the installation boundaries on land owned by Campbell Estates and leased to the Del Monte Corporation (Figure 5-45). In November 1998, Del Monte completed the Superfund Remedial Investigation. Del Monte has also completed a Baseline Human Health Risk Assessment (May 2000), an Addendum to the Remedial Investigation Report (April 5, 2002), and a Phytoremediation Treatability Study (May 9, 2002). Based on these investigations, in September 2003, the EPA issued a ROD establishing certain remedial actions to clean up the Superfund site south of SBMR. These investigations also confirmed that the parcel north of SBMR did not pose a threat to human health or the environment, and the parcel was removed from the list on January 13, 2004 (USEPA 2004).

### Lead

The properties of, and regulations for, lead are described in detail in Section 3.12 of this document. Lead survey information for SBMR and WAAF is maintained on the DPW lead and asbestos database.

**Figure 5-44**
Ordnance Range Locations at Schofield Barracks Main Post

**Figure 5-45**
Approximate Location of the Del Monte Superfund Site

### Asbestos

The properties of, and regulations for, asbestos are described in detail in Section 3.12 of this document. Current asbestos survey information for the SBMR/SBER/WAAF/South Range installation is maintained on the DPW lead and asbestos database.

### Polychlorinated Biphenyls

Efforts are ongoing to assess and remediate possible PCB contamination sources throughout SBMR (including WAAF and SBER). A survey to determine the concentration of PCBs in the electrical distribution equipment on military installations in Hawai'i was conducted in 1991. The survey phase of this project included the collection and analysis of dielectric fluid and recorded pertinent data from approximately 1,500 pieces of electrical equipment (Power Systems Analysis 1991, 9-10). The study revealed that there were PCB-containing transformers and electrical equipment throughout SBMR.

Devices at SBMR that are found to contain regulated levels of PCB are being removed and upgraded with non-PCB devices, or are being retrofilled or removed, drained, packaged, and disposed of in accordance with 40 CFR Part 761 (PRC 1995, 4).

The OU3 IRP investigation, further discussed in the IRP section, addressed PCB contamination at the pest control shop, car care center, acid pits, trenches and pits, maintenance areas, motor pools, and storage areas on SBMR.

As previously stated, waste products that are deemed hazardous are placed into 55-gallon (208-liter) containers, collected from the generating sites, and retained at the DOL operating transfer accumulation point for no more than 90 days. The materials are removed by a contractor for recycling. In general, old electrical transformers that may contain PCBs are expeditiously processed for disposal but still require storage for short periods (Belt Collins 1993, IV-18).

### Electromagnetic Fields

The general public typically is not allowed in areas that could contain EMF hazards from Army equipment. Equipment producing EMF that could pose a serious health risk is operated under strict constraints, in site-approved areas, and by qualified personnel (Moreno 2002). Mobile radar equipment is owned by Division Artillery and consists of a radar-set designed to detect incoming artillery and projectiles. It is operated and managed by the Forward Area Defense section.

The Schofield Barracks Real Property Master Plan identifies a military-affiliated radio station (MARS) on SBMR (Belt Collins 1993, IV-28). It is in the vicinity of the Range Control facility and produces EMF that could pose a serious health risk. Signs warning of hazards from electromagnetic radiation to personnel are posted around the perimeter of the cleared antenna field. No official radiation studies appear to have been performed that could confirm the adequacy of this clear zone. Some satellite terminals producing EMF that could pose a serious health risk are on the western side of Kunia Road, south of the Kunia Tunnel entrance (Moreno 2002).

There are two Remote Automated Weather Systems (RAWS) on SBMR and one RAWS on SBER. The RAWS, typically in remote wildland areas on installations, requires personnel to be on-site only for maintenance and not for operations.

The WAAF Real Property Master Plan identifies the majority of emitting equipment at WAAF as low-powered, very high frequency, or ultra high frequency (Belt Collins 1994, 4-88). Ground control radar is operated by Air Traffic Control at the airfield (Moreno 2002). This equipment produces EMF that could potentially pose a serious health risk.

### *Petroleum, Oils, and Lubricants*

A federal facility agreement (FFA) was signed by the US Army, the USEPA, and the HDOH establishing four Operable Units (OUs) to investigate potentially contaminated sites in the Main Post and SBER. Chemicals contained in petroleum hydrocarbons, oil and grease, solvents, battery fluids, pesticides, and PCBs were the primary potential constituents of concern that were targeted for analysis in samples collected in the OU3 investigations (Uribe & Associates 1996, 2-8). The remedial investigation activities conducted at the OU3 sites included surface geophysics, shallow and deep soil-gas sampling, surface soil sampling, deeper soil sampling, surface water sampling, or sediment sampling. The results of the investigation indicated that no current or potential threat to human health or the environment exists at OU3, and no remedial action is necessary. The car care center (also known as the Auto Hobby Center) adjacent to the AAFES filling station, motor pools, and maintenance areas on SBMR were all included in this study.

### *Underground Storage Tanks*

Most industrial operations use the "Super Station" centralized motor pool southwest of Lyman Road at Building 2805 on SBMR. All fuel for industrial use is transported from the HAFB Fuel Farm via Tesoro and stored in ASTs at the Super Station (Akasaki 2002a).

Two AAFES retail filling stations are located on SBMR at buildings 80 and 1167. Each distributes different grades of unleaded gasoline, with diesel fuel sold at the first station. These tanks are listed along with other existing and historical USTs in Appendix K-4.

There are eighteen motor pools at SBMR. The primary function of these facilities is vehicle maintenance. Although motor fuels were previously stored and distributed at these motor pools for military vehicles, all fueling for industrial purposes now takes place at the Super Station. Most of these motor pool facilities have a designated waste storage/holding area for shop and vehicle servicing wastes. Normally, the waste products are temporarily collected at a far corner of each motor pool, which is surrounded with sandbags for leak containment and cordoned with barbed wire (Belt Collins 1993, IV-18). The waste is separated into hazardous waste, such as lithium batteries or RCRA chemicals, and non-regulated waste, such as recyclable oil. The hazardous waste is brought to the HWSSP, while the recyclable materials are brought to the Recyclable Material Shop Storage Point (RMSSP) (Akasaki 2002a).

Prior to 1970, military personnel at WAAF used an extensive underground fuel storage and distribution system disseminating from the Waikakalaua Fuel Storage Annex (FSA) at the southern tip of WAAF. The FSA held over 1.7 million gallons (6.4 million liters) of fuel and distributed aviation gas and automotive gas to additional fuel storage points on WAAF. The system was largely abandoned in 1972 and was taken out of service completely in 1994. The large storage tanks at the FSA are in place but not used. Satellite storage tanks connected to the system are largely removed (USACE 2001b, 51).

All in use and permanently out of use USTs and leaking underground storage tanks (LUSTs) at SBMR and WAAF are listed in Appendix K-4. Additionally, this table provides the facility, site location, responsible party, construction, maximum capacity, content, inspection, and remediation status information for all LUSTs.

### *Aboveground Storage Tanks*

Many USTs are being upgraded to ASTs. Appendix K-4 lists location, capacity, and content information for all ASTs at SBMR and WAAF. This table also provides containment and leak protection information.

The Super Station uses four ASTs. Additionally, ASTs are used by many buildings on base to store liquid petroleum gas (LPG), also known as propane, to fuel hot water heaters. Some motor pools use ASTS to store diesel fuel or used oil in conjunction with vehicle maintenance.

Several ASTs located on WAAF in the area of the aircraft runway contain diesel or aviation gas (AVGAS). The Hot Fuel Point is located at the east end of the airfield, near the baseball diamonds. Although this facility is technically not a permanent fuel point and is designed to be mobile, it is used as an ongoing hot fueling station for helicopters of the 25th Aviation Brigade. The entire fuel system is above ground. Two ASTs located on WAAF are used to store chlorine and hydrogen peroxide, respectively. These tanks are located in the Schofield Wastewater Treatment Plant and are maintained by DPW. The hydrogen peroxide AST is currently not in use.

Emergency generators are located throughout the Main Post, SBER, and WAAF. Many of these units contain integrated tanks to store fuel as opposed to being connected to separate ASTs. A separate list of these units is maintained by the DPW (McGinnis 2002).

### *Oil-Water Separators, Wash Racks, and Grease Traps*

The DPW maintains a list of all OWSs, grease traps, and wash racks on SBMR. This list is provided in Appendix K-4, with location and inspection information. Facilities are inspected regularly by the USAG-HI Environmental Compliance Office (ECO), and DPW is responsible for maintenance of these devices (McGinnis 2002).

### *Pesticides/Herbicides*

Various types of pesticides, including insecticides, herbicides, fungicides, avicides (bird poison), and rodenticides, have been used at SBMR to maintain the grounds and structures, and prevent pest-related health problems. An entomologist oversees the pest management program, maintains pesticide inventories, approves pesticide application procedures, and reviews pesticide use documents. Since the mid-1980s, the Land Management Branch has subcontracted pesticide application for the installation.

Pesticides and herbicides are primarily stored in four locations on SBMR, as follows (Yamamoto 2002):

- The Pest Control Shop (Building 2628) is on Kolekole Avenue in the DPW building complex, is properly signed, is kept locked, and is equipped with a ventilation fan. The pest control shop does not have any floor drains and has concrete secondary containment;
- The SBER Environmental Shop (Building 1595) is on Santos Dumont Avenue. Less than seven gallons (less than 26.5 liters) of pesticides are maintained by the natural resources program at this facility;
- Pesticides for Kalākaua Golf Course, on the corner of Humphrey Road and Kolekole Avenue, are stored in Building 2101. The storage area is kept locked. The floor of the caged area is concrete and has concrete secondary containment; and
- The pesticides for Leilehua Golf Course are stored in a ventilated, outdoor hazardous materials locker by the Golf Course Maintenance Facility (Building 6028) on SBER. The locker is kept locked except when accessing product. The locker provides for secondary spill containment, and is equipped with lights and a ventilation fan.

Additionally, glyphosate (trade name Roundup) is stored in the G3 Range Maintenance Facility (Building 1125A) at the intersection of Beaver Road and O'ahu Street.

Pesticides and herbicides are also sold and distributed at the Family Housing Self-Help store (located south of Kolekole Avenue on the Kalākaua Golf Course in Building 2104), the AAFES (located just inside Foote Gate on Kolekole Avenue in Building 80), the commissary (located on the northeast corner of Trimble Road and Glennan Street), and the Veterinary Treatment Facility (located in Building 936, off Lyman Road just beyond the Super Station). All pesticides and herbicides sold on the base are registered by the USEPA for general use; restricted use products are not sold. Some of the products sold and distributed on base include small consumer-size packages of bait stations for ant and cockroach control, glue traps for cockroach and mouse control, snap traps for mouse and rat control, and aerosol insecticide for crawling and flying insect control. A spill cleanup kit is on hand in the retail locations and store personnel are familiar with the use of the cleanup kit and with installation spill contingency procedures. Contractors are not allowed to store pesticides on base (Yamamoto 2002).

Appendix K-5 provides a list of all pesticides and herbicides stored and used on base, some of which are also used on other USAG-HI installations but are stored only at SBMR.

*Wildfires*

There is a high fire danger at some SBMR ranges because the rugged terrain limits accessibility for fire suppression (USARHAW and 25th ID[L] 2001a, 632 and 675-676). Fires are most common east of the fire access road. Highly flammable plants are particularly abundant throughout the moist habitat areas, especially below 3,000 feet (914.4 meters). Tracer rounds, pyrotechnics, and indirect fire such as illumination rounds are the most common ignition sources, and most wildland fires originate in the ordnance impact area.

Two RAWS on SBMR aid in determining weather conditions and the threat of wildfires. Figure 5-46 shows the location of fire management facilities and a future dip pond for northern SBMR. The Schofield Fire Station was constructed in 1924 and has three inadequately sized vehicle bays and limited sleeping accommodations (Belt Collins 1993). SBMR has two commercial pumpers and two military field firefighting vehicles.

Chapter 7 of the IWFMP describes the SBMR fire management area (USARHAW and 25th ID[L] 2003, 7-81). A fire history was compiled for Schofield Barracks to the extent possible. There were frequent gaps in important information, particularly in the number of acres burned and the ignition source. According to *Wildland Fire Risk and Management on West and South Ranges Schofield Barracks, O'ahu,* recent record keeping has been kept current (Beavers et al. 2002a). Based on available data, approximately 90, 110, and 130 fires were identified at SBMR in 1998, 1999, and 2000, respectively.

Fire at Schofield Barracks has been frequent in the past decade due in large part to the installation being extensively used (USARHAW and 25th ID[L] 2003, 7-81). Additionally, most types of ammunition, including highly flammable munitions (such as white phosphorous and tracers) are authorized for use. Few fires have burned outside of the firebreak road, indicating that it is a substantial barrier to the spread of fire. Between 1993 and March 2001, eight fires were identified outside of the fire break (Beavers et al. 2002a).

The total number of fires per month illustrates that the end of the summer requires the greatest fire management vigilance, though there is also a fairly high incidence in March, April, and May (USARHAW and 25th ID[L] 2003, 7-81). Most fires were ignited between 11:00 AM and 3:00 PM. The median fire size is 0.5 acre (0.2 hectare). During the time when the extent of acres burned was recorded, only a fraction of the fires were larger than 10 acres, and the largest fire on record was 300 acres (121 hectares).

The greatest number of fires have been ignited at MF-2, in the impact area, and at KR-5 (USARHAW and 25th ID[L] 2003, 7-81). These three locations were responsible for almost half of all fires. The most significant cause of ignitions at Schofield Barracks has been tracers, which account for just over 50 percent of all recorded fires.

**Figure 5-46**
Fire Management Facilities at Schofield Barracks Main Post

Three wildfire areas have been designated based on existing and planned firebreaks and roads (USARHAW and 25th ID[L] 2003, 7-84 and 7-85). The cantonment area was not included. Each area was assigned an ignition potential, fuels hazard, and habitat value based on the best currently available information. As a result, the impact area has a moderately high wildfire prevention priority. The south range and northern and western SBMR have a moderate wildfire prevention priority.

Fire protection in the fire management area includes firebreaks and fuels modification (USARHAW and 25th ID[L] 2003, 7-87). There is one existing firebreak at SBMR and two more are planned. The existing break surrounds the ordnance impact area and has been in place for many years. Where necessary, it will be upgraded to standard. The first proposed firebreak will surround the MF ranges and will connect to firing point 308. Two alternatives are being studied at this time. One or both of them will be constructed, depending on feasibility, defensibility, and funding. The second proposed firebreak will contain the south range and will use existing roads, which will be improved to firebreak standards. Prescribed burning has been conducted in the past and will continue in the future, primarily within the ordnance impact area. Mechanical, hand, and chemical treatments are in use and are planned for all of the firebreaks.

Schofield Barracks Range Control is responsible for retrieving weather data from the Schofield RAWS located at Range CR-1 (USARHAW and 25th ID[L] 2003, SBMR-10, and SBMR-26). The burn index, as determined by the fire danger rating system, will be used to rank fire danger to determine restrictions on pyrotechnic use, if any, in the ordnance impact area, maneuver training areas, and fixed ranges. The fire danger rating system uses the following three colors to characterize fire conditions at SBMR:

- Green (normal caution). There are no weapons use restrictions.
- Yellow (caution because fires will start easily). For this fire danger period, no tracers, white phosphorus, or illumination rounds are allowed.
- Red (extreme caution because a fire would be difficult to control). Blanks and ball ammunition are allowed only on CR and MF Ranges, and no other live-fire is allowed. No pyrotechnics, smoking, or warming/cooking fires are allowed. Maneuver training is allowed.

There is a high fire danger at SBER because the rugged terrain limits accessibility for fire suppression (USARHAW and 25$^{th}$ ID[L] 2001a, 520 and 564-565). Also, flammable dry grassland areas border much of the native habitat. A number of wildfires have been documented at the range, even though there is no live-fire training. Some of these fires were started by pyrotechnics, such as hand flares or smoke grenades. However, USARHAW no longer allows aerial pyrotechnics (star clusters/parachute flares) or smoke grenades to be used at SBER. SBER depends on the closest responding forces (such as the City and County of Honolulu Fire Department) for first response and immediate Federal Fire Department/Range Control response. One RAWS on SBER aids in determining weather conditions and the threat of wildfires.

Chapter 7 of the IWFMP describes the SBER fire management area (USARHAW and 25th ID[L] 2003, 7-67). From 1994 to 1998 and 2000 to 2002, a total of 14 fires were reported at SBER, ranging in size from hundredths of a hectare to 4 hectares and totaling 23 acres (9.3 hectares). The most common cause was various types of pyrotechnics. Not enough data is available for a full analysis, but there were no other apparent trends.

Two wildfire areas have been designated, based on the location of the most currently used training areas, and existing roads (USARHAW and 25th ID[L] 2003, 7-71 and 7-73). Each area was assigned an ignition potential, fuels hazard, and habitat value, based on the best currently available information. As a result, eastern SBER has a low-to-moderate wildfire prevention priority, and western SBER has a moderately high wildfire prevention priority.

Figure 5-47 shows the location of fire management facilities. Fire protection in the fire management area includes firebreaks and fuels modification (USARHAW and 25th ID[L] 2003, 7-75). There are no firebreaks at SBER, though there are a number of roads that will serve as fire control lines during fire suppression. They will not be kept at firebreak standards and will be maintained only to the extent necessary for vehicle access. The Army will use mechanical crushing, herbicide application, and prescribed burning (where applicable) whenever possible and necessary. Where it is not possible to crush fuel or conduct prescribed burns, the Army will consider clearing select areas and removing fuel by hand. No fuels management is planned at this time.

Schofield Barracks Range Control is responsible for retrieving weather data from the RAWS located at ER-3B (USARHAW and 25th ID[L] 2003, SBER-10 and SBER-26). The burn index, as determined by the fire danger rating system, will be used to rank fire danger to determine restrictions on pyrotechnic use, if any, in the maneuver training areas or fixed training areas. Using the fire danger rating system, green and red characterize the fire conditions at SBER.

Chapter 7 of the IWFMP describes the SRAA fire management area (USARHAW and 25th ID[L] 2003, 7-93). USARHAW does not own the SRAA, so no military ignited fires have occurred there. Agricultural burning has been practiced here in the past, but no fire records are available.

Fire protection in the fire management area includes firebreaks and fuels modification (USARHAW and 25th ID[L] 2003, 7-96). According to the IWFMP, one firebreak is planned for SRAA. There are also a number of existing roads that will serve as firebreaks during fire suppression. They will not be kept at firebreak standards and will be maintained only to the extent necessary for vehicle access. The Army will use mechanical crushing, herbicide application, and prescribed burning (where applicable) whenever possible and necessary. Where it is not possible to crush fuel or conduct prescribed burns, the Army will consider clearing select areas and removing fuel by hand.

**Figure 5-47**
Fire Management Facilities at Schofield Barracks East Range

Figure 5-46 shows the location of proposed fire management facilities. There is no RAWS at SRAA. Schofield Barracks Range Control is responsible for retrieving weather data from a RAWS (USARHAW and 25th ID[L] 2003, SRAA-5). The burn index, as determined by the fire danger rating system is used to rank fire danger to determine restrictions on pyrotechnic use, if any, in the maneuver training areas, and/or fixed training courses at SRAA. Using the fire danger rating system, green and red characterize the fire conditions at SBER.

WAAF is in a developed area between Kunia Road and Kamehameha Highway. Little vegetation in the project area could be involved in a wildland fire. WAAF has a two-company fire house, crash-fire-rescue vehicles, conventional pumpers, and one field firefighting vehicle (Belt Collins 1994, 4-91). Fire companies posted at SBMR can augment firefighting support at WAAF.

Helemanō Trail would be north of Wahiawā and would use as much of the existing agriculture roadways as possible. With the exception of a wooded area around Wilson Lake, much of the trail would be on relatively flat terrain and clear of dense vegetation capable of being consumed by a wildfire.

### 5.12.2 Environmental Consequences

#### *Summary of Impacts*

This section discusses potential human health and safety hazard impacts of implementing the Proposed Action and alternatives at SBMR and WAAF. Significant impacts mitigable to less than significant that would occur under the Proposed Action and RLA Alternative are as follows:

- Due to a 25 percent increase in munitions under these alternatives and the results of recent soil analyses on SBMR, ammunition presents a significant contamination risk to range soils. Remedial cleanup would take place when training areas are permanently closed.

- Potential UXO exposure during maneuvers and construction activities creates a significant threat to workers and Army personnel.

- Construction and demolition at SBMR could expose workers to lead-based paint or lead-containing construction materials, creating a significant health and safety risk. In addition, construction of the BAX and UACTF would involve movement of soils that could release lead to the environment, creating a significant impact.
- Construction and demolition at SBMR could expose workers to asbestos-containing materials, which could be a significant health and safety risk.
- The addition of four live-fire ranges under the Proposed Action and three ranges under the RLA Alternative, as well as a higher level of live-fire training at SBMR, would present a significant wildfire risk.

All other human health and safety hazard issues were considered as having either a less than significant impact or no impact at all. Impacts, methodology, and factors determining significance are discussed in Section 4.12.1. Table 5-34 summarizes the potential human health and safety hazard impacts that have been identified in this analysis. As discussed in Section 5.12.1, no ordnance impact areas are being introduced to this installation.

**Table 5-34**
**Summary of Potential Human Health and Safety Hazard Impacts at SBMR/WAAF**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Hazardous materials management | ⊙ | ⊙ | ○ |
| Hazardous waste management | ⊙ | ⊙ | ○ |
| Ammunition | ⊘ | ⊘ | ⊙ |
| Unexploded ordnance | ⊘ | ⊘ | ⊙ |
| General training | ⊙ | ⊙ | ⊙ |
| Installation restoration program sites | ⊘ | ⊘ | ○ |
| Lead | ⊘ | ⊘ | ⊙ |
| Asbestos | ⊘ | ⊘ | ○ |
| Polychlorinated biphenyls | ○ | ○ | ○ |
| Electromagnetic fields | ⊙ | ⊙ | ⊙ |
| Petroleum, oils, and lubricants | ⊙ | ⊙ | ○ |
| Pesticides/Herbicides | ⊙ | ⊙ | ○ |
| Biomedical waste | ⊙ | ⊙ | ○ |
| Radon | ○ | ○ | ○ |
| Wildfires | ⊘ | ⊘ | ⊙ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table.
Mitigation measures would only apply to adverse impacts.

<u>LEGEND:</u>

| | | | | | |
|---|---|---|---|---|---|
| ⊗ | = | Significant | + | = | Beneficial impact |
| ⊘ | = | Significant but mitigable to less than significant | N/A | = | Not applicable |
| ⊙ | = | Less than significant | | | |
| ○ | = | No impact | | | |

### *Proposed Action (Preferred Alternative)*

#### <u>*Significant Impacts Mitigable to Less than Significant*</u>

<u>*Impact 1: Ammunition*</u>. Recent range studies at SBMR have revealed elevated levels of munition byproducts, such as lead and RDX, above USEPA Region IX residential and industrial PRGs at each installation (the investigation report is included in Appendix M1), which indicates that additional risk based investigations may need to be conducted. Sections 5.8, Water Resources, and 5.9, Geology, Soils, and Seismology, provide more detailed analyses of specific effects on surface water and soils. As defined in the Military Munitions Rule, ammunition used for its intended purpose on military ranges is not considered a regulated hazardous material. This material, however, may be an environmental hazard and is

therefore considered significant. In addition, under the Proposed Action, the quantity of ammunition rounds fired during Army training on all Army training ranges in Hawai'i would increase from 16 million to 20 million rounds per year, a 25 percent increase, primarily consisting of small arms munitions (97 percent of the total increase). The proposed increased level of training could elevate contamination levels in range soils by 25 percent over the contamination generated by current force training. However, the analysis showed that where the contamination occurs, it is not running off the site. In addition, the Soldiers will not be conducting foot maneuvers in this area and will not be exposed to the contaminants. Only government personnel or government contractors specifically trained and certified to travel safely in the ordnance impact area will regularly access the contaminated areas.

Management of the increased quantity of ammunition and other ammunition-related issues associated with SBMR are discussed under less than significant impacts. The mitigation measures below will reduce the impact of ammunition to less than significant levels.

*Regulatory and Administrative Mitigation 1.* All government personnel or government contractors accessing ordnance impact areas will continue to follow OSHA and Army standards and guidelines to minimize health and safety impacts from exposure to any contaminants or ordnance. The general public will be allowed in or near ordnance impact areas only at times and in group sizes approved by USARHAW Command. Army trained and certified personnel would escort the general public at all times. Access is limited to only those areas deemed safe by USARHAW Range Control.

The Army will undertake additional risk based investigations as appropriate in the event any active range is closed and transferred out of DoD control. Based on the results of this health risk-based analysis, all remediation necessary to mitigate an imminent threat to human health and the environment would be undertaken at such time.

*Additional Mitigation 1.* No additional mitigation has been identified.

*Impact 2: Unexploded ordnance*. Of the 25 percent increase in ammunition under the Proposed Action, only 1.3 percent of the total increase would be from UXO-producing munitions (mortars, artillery, and grenades). UXO could affect the construction of the proposed BAX and UACTF. Construction would involve moving soils potentially contaminated with UXO from prior activities in the range impact area. The presence of UXO within the construction area could potentially lead to a significant safety impact. Additionally, training operations at the BAX and UACTF could potentially contaminate the range with UXO, creating a safety risk to personnel. In addition to the below mitigation measures, the Army would continue to educate Soldiers on identifying UXO and proper safety procedures for handling UXO, as explained in Chapter 3, Section 3.12. The mitigation measures below will reduce the significant impact to less than significant.

*Regulatory and Administrative Mitigation 2.* Before construction begins, the Army will employ qualified personnel to conduct a UXO survey of the proposed construction area. If the risk of encountering UXO is low, then UXO construction support will be used. If the risk of encountering UXO is high, then UXO will be cleared to ensure the site safety. The Army will document UXO surveys and removal actions in full accordance with applicable laws, regulations, and guidance. The Army will clear UXO if rounds are fired outside of designated ordnance impact areas or present an immediate threat to human health or safety.

*Additional Mitigation 2.* No additional mitigations have been proposed.

*Impact 3: Installation restoration program sites.* Construction and operational activities associated with the Proposed Action would not affect the IRP, with the exception of the TCE monitoring program on WAAF. The proposed Multiple Deployment Facility at WAAF is sited in the area of TCE monitoring well MW 2-3. This well (as seen in Figure K-5-2) is used for long-term monitoring of the TCE plume under SBMR and WAAF. Even though the plume has diminished in size, long-term monitoring continues as part of the IRP. The mitigation measures below will reduce the significant impact to less than significant.

*Regulatory and Administrative Mitigation 3.* No mitigation measures were identified.

*Additional Mitigation 3.* The Army proposes to build the WAAF facility to incorporate an existing monitoring well into the design, as long as construction does not affect the well by either contaminating, destroying, permanently sealing or otherwise preventing future well sampling. Technicians would have access to this well in order to continue the monitoring program. As the well currently exists within the apron/runway vicinity, the location is not believed to be a significant hindrance because the wellhead could be flush-mounted in the apron surface, similar to those at civilian gasoline service stations.

*Impact 4: Lead.* Construction activities associated with the Proposed Action could involve lead exposure to workers at SBMR. The workers could be exposed to LBP and pipes during demolition or grading at specific project sites within the installation. There are eight buildings proposed to be demolished for the construction of the Range Control Facility at Schofield Barracks: 1124, 1125, 1150, 1181, 1192, 2108, 2056, and 2276. Only two of these buildings have been surveyed for the presence of lead (Buildings 1150 and 2108). Lead was found in Building 2108. Implementing the mitigation below would reduce the impacts to less than significant.

Additionally, the construction of the QTR1, BAX, and UACTF would redistribute material from the berms onto retained firing range berms. In this manner, the material would be readily available for re-establishment of the berms at a future point to be determined. The berms used to stop projectiles fired at the ranges are expected to contain significant quantities of lead and potentially UXO. Recent soil studies of the SBMR ranges confirmed elevated levels of lead in the soils, above EPA Region IX residential and industrial PRGs (see Appendix M1 for the investigation report). The presence of lead may cause additional soils to become contaminated due to vehicle and equipment movement and soil erosion. Additional contamination would increase the volume of soil that needs to be remediated in the future. The mitigation measures below will reduce the significant impact to less than significant.

*Regulatory and Administrative Mitigation 4.* The Army will expand existing programs for LBP to any SBCT-related activities that would affect older structures that had the potential use of LBP throughout the installations. Lead is managed in place for existing structures. In the event of demolition or renovation projects affecting such structures, a survey is required prior to demolition/renovation and appropriate actions must be taken to prevent the release of these substances into the environment. Construction workers must be properly trained/certified to handle these materials and any debris must be tested by TCLP and disposed of according to the results. The Army will retain lead-contaminated soils from existing berms on-site and will use the soils in the construction of new berms associated with the UACTF. If lead-contaminated soils were not reused at the site for new berm construction, the soils would be remediated for lead, in accordance with applicable federal and state standards.

*Additional Mitigation 4.* No additional mitigations have been proposed.

*Impact 5: Asbestos exposure.* Construction activities associated with the Proposed Action could involve the exposure of workers to friable asbestos at the project sites. The workers could be exposed to asbestos during demolition or grading. Each of the buildings proposed for demolition as part of the Range Control Facility project under the Proposed Action have been surveyed for ACM, with the exception of Buildings 1181 and 1192. Buildings 1150, 2108, and 2056 contain ACM. ACM was banned from manufacturing in the 1970s; therefore, no ACM would be used as building material during construction or during SBCT operations. There would be no significant impacts from asbestos, nor would mitigation be required when using construction materials. The mitigation measures below will reduce the significant impact to less than significant.

*Regulatory and Administrative Mitigation 5.* The Army will expand existing programs for asbestos throughout the installations to any SBCT-related activities that would affect older structures that could have been built using asbestos. Asbestos is managed in place for existing structures. In the event of demolition or renovation, a survey is required prior to demolition/renovation and appropriate actions must be taken to prevent the release of asbestos into the environment. Construction workers must be properly trained/certified to handle these materials and any debris must be tested by TCLP and disposed of according to the results.

*Additional Mitigation 5.* No additional mitigations have been proposed.

*Impact 6: Wildfires.* Following the establishment of Helemanō Trail, units would transport materials and equipment via military vehicles. Transportation of personnel and use of flammable or combustible materials such as fuel or ordnance (i.e., weaponry or equipment) could increase the potential for starting a wildfire, especially in areas not previously used frequently. However, the IWFMP does not address fire management actions for Helemanō Trail. The use of the trail by the Army would increase potential sources of wildfire ignition from Army training in areas that don't have established fire management actions, such as fire prevention and fire suppression. Unlike training activities conducted on installations, the trail would not always be near an installation where access to Army fire suppression resources would be readily available. A wildfire could damage animal and plant communities, damage cultural resources, and contribute to soil erosion by removing vegetation. This mitigation would reduce wildfire impacts to less than significant.

*Regulatory and Administrative Mitigation 6*. The IWFMP for Pōhakuloa and O'ahu Training Areas was updated in October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts from wildland fires. Public and firefighter safety is the first priority in every fire management activity. The plan considers the potential need for firebreaks and/or fuel breaks at each installation, along with other safety concerns. The plan is available upon request.

### *Less Than Significant Impacts*

*Hazardous materials management*. The Proposed Action would not significantly increase hazardous materials use at SBMR. Short-term impacts would be associated with construction activities at the project sites. Construction-related activities would require the use of hazardous materials in excess of existing quantities. However, contract specifications control the purchase amount, use, and storage of hazardous materials and require compliance with federal, state, and local requirements and with installation policy on hazardous materials.

A new chemical would be used in conjunction with the proposed Stryker training as part of the JBPDS. A sodium azide ($NaN_3$) solution is used to preserve suspected biological agent samples during combat maneuvers. Only simulated biological agents will be used during training in Hawai'i. Between one and two liters of sodium azide would be contained within plastic bottles and carried in each Stryker. Although sodium azide is considered toxic in its pure form (Dako 1997), the sodium azide solution to be used would be 0.5 percent sodium azide and 95.5 percent water. Only trained personnel would handle this material. As the Strykers would be maintained at SBMR, this material would be managed at this location.

The US Army follows strict SOPs for storing and using hazardous materials. Therefore, no new procedures would need to be implemented to store or use the construction-related hazardous materials. The additional quantities of hazardous materials would be removed at the completion of construction. Hazardous materials would be handled in accordance with existing regulations and installation-wide protocol for hazardous materials management. The increased amount of hazardous materials due to operations of the proposed Motor Pool facility (combined with a Hazardous Material Storage Facility) would result in an increased throughput in the Hazardous Materials Control Center (HMCC) located on SBER. USAG-HI has a model facility, however, and would be able to handle the increased hazardous materials throughput. The increase is not significant. In addition, the Army conducts routine inspections of all facilities containing hazardous materials to ensure compliance. Hazardous materials would not pose a significant impact, and mitigation would not be necessary.

Although the proposed Helemanō Trail would be composed primarily of gravel, road grades steeper than 10 percent would be paved with asphalt or concrete to ensure safety in all weather conditions. (Details on these materials are summarized in Chapter 4.) These materials would also be used in manufacturing supporting appurtenances, such as guardrails and signs. These projects are depicted on Figures 2-8 and 2-15.

*Hazardous waste management*. Activities related to the Proposed Action would not significantly affect hazardous waste management on SBMR. Construction of facilities may result in temporary generation of small amounts of hazardous waste (e.g., POLs and universal waste such as batteries and spent fluorescent bulbs). Operational activities associated with the Proposed Action would not significantly affect hazardous waste management on SBMR.

As previously mentioned, a new waste stream will be introduced with the Stryker vehicles and will be managed through SBMR. Sodium azide is used in the Stryker vehicles to preserve suspected biological agent samples during combat maneuvers. Only trained personnel would handle this solution, but spills are always a possibility. Proper containment is practiced to prevent release to the environment. Following analysis, the waste solution would be disposed of in accordance with RCRA regulations. Per Federal regulations, sodium azide and compounds containing the product are classified as P105 wastes and would be disposed of using this classification as per 40 CFR 261.33. This is not considered a significant impact as increased regulatory requirements would not be instated. Other "off-specification" commercial chemicals, such as mercury, benzene, and chemicals within pesticides, are currently disposed of through the same federally regulated practices through USAG-HI.

USAG-HI has an installation-wide program for hazardous waste management and disposal using the 90-day TAP facility. The SBCT would be required to manage and dispose of hazardous waste generated by operations through DRMO in accordance with regulations and installation-wide protocol regarding storage, use, and disposal. Hazardous waste associated with construction activities would cease being generated at the completion of construction. The additional hazardous waste generated on SBMR by the Proposed Action would not result in a significant increase to the total amount of hazardous waste generated, managed, and disposed from the installation. Therefore, there would be no significant construction-related or operational impacts, and no mitigation would be required.

*Ammunition*. Four live-fire ranges are to be built at SBMR under the Proposed Action. The projects are as follows:

- A standard QTR1 would be constructed on McCarthy Flats on SBMR. The range complex would include 12 lanes of combat pistol and Military Police qualification targets, 24 lanes of rifle modified record fire lanes with 12 multipurpose machine gun/sniper lanes, and 50 lanes of basic 10/25 mortar firing range.
- A new QTR2 with a total of 22 firing points would be constructed under the Proposed Action within the proposed SRAA. Ten lanes would be used for modified record fire and 12 lanes would be used for a standard automated Combat Pistol Qualification Course.
- A BAX designed for company gunnery training and qualification requirements of weapons systems of the proposed SBCT is projected to be constructed on the west side of Beaver Road and north of Trimble Road on the pre-existing range complex and range impact area, as illustrated on Figures 2-8 and 2-10. The range would support dismounted Infantry Platoon tactical live-fire operations with or without supporting vehicles.

- The UACTF would replace the MOUT Assault Course on the Kolekole Ranges.

Proposed construction of these ranges would result in an increased use of ammunition at these sites and an introduction of live-fire training to the SRAA site.

The numbers of other weapon systems would also increase with the elevated level of training proposed in the transformation. Although the Proposed Action would generate a significant increase of ammunition use (an additional 4 million rounds) due to the elevated level of training and expansion in military force, management of artillery and ammunition would not change. Two new types of weapon would be introduced to the ranges at SBMR as a result of transformation, the 105mm cannon on the MGS and the 120mm mortar. Handling and storage methods, disposal protocols, and safety procedures would continue to be conducted in accordance with existing regulations. No new conventions would need to be instated. The increase in ammunition, introduction of the 105mm and 120mm weapon systems, and construction of these four ranges under the Proposed Action is not expected to generate a significant impact.

Environmental mitigation and UXO cleanup is required at these ranges and would be separately funded by Operation and Maintenance, Army (OMA) prior to the start of construction. The one exception is QTR2, which is projected to be constructed on newly acquired land and therefore does not require clearance.

The Army proposes to construct the Range Control Facility within the cantonment area on Beaver Road, as shown on Figures 2-9 and 2-11. This facility would provide a consolidated command and control facility to monitor and coordinate all range activities and operations, including ammunition use, at all Army training areas on Oʻahu. The Army follows strict SOPs when handling ordnance. Ammunition to be used during training is brought to the range with the unit and stored in temporary AHAs. The disposal of ordnance is regulated by RCRA as explained in Chapter 3, Section 3.12, of this document. Excess ordnance not used during training is either brought back with the unit to be stored at the permanent ASP on WAAF or manually burned at the site. Residues from the manual burn activity are stored in hazardous waste receptacles and brought to the 90-day temporary TAP facility for disposal by DRMO. Additionally, the Army conducts routine inspections of all facilities containing hazardous materials to ensure compliance. Therefore, there would be no significant impacts from ammunition, and no mitigation would be required.

Range sampling and contamination impacts are discussed under the Significant Impact section, above.

*General training*. Transformation activities relevant to this class or type of activity include military training on training lands outside of developed (e.g., cantonment) areas. Such training would include non live-fire training, mounted maneuver training, and other non live-fire dismounted military training. A slight increase in transformed live-fire training would occur on existing ranges. The increase would be maintained and managed by existing administration in accordance with federal and Army protocol, therefore creating no additional significant impact.

As further explained in Chapter 4, Section 4.12, in order to protect the public during range training, SDZs have been and would be included in the range design, in accordance with Army Pamphlet 385-64, *Ammunition and Explosive Safety Standards*. Additionally, in order to protect Army personnel during range training, Soldiers and officers are given safety manuals, operation-specific field manuals, and range-specific briefings prior to the training, with a complete discussion of safety procedures while training.

General SBCT training issues associated with the QTR1, QTR2, BAX, UACTF, and the SRAA would not likely result in any significant impacts. These training activities may expose additional areas to potential leaks, spills, or drips from military training equipment. USARHAW would, during any on-site operational activities within a specific project area, implement standard operating procedures to minimize the potential for spills or other harm to the environment. Therefore, there would be no significant impacts from training operations, and no mitigation would be required.

*Installation Restoration Programs sites*. The SRAA is part of the EPA-designated Del Monte Superfund Site. This Superfund investigation originated at the Del Monte well in the town of Kunia (south of SBMR, and south of the SRAA). The Del Monte farmland parcel just south of SBMR (north of Kunia Village) is included in the Superfund study (Figure 5-45). The site includes former USTs and buried drums of chemicals, such as methyl bromide (USEPA 2003), although no chemicals were detected at levels considered to be a threat to human health or the environment or that require cleanup (Rosati 2003). Under an agreement with the EPA, Del Monte conducted a remedial investigation, a baseline human health risk assessment, and addendum to the remedial investigation report, and a phytoremediation treatability study. Based on the results of these studies, the EPA issued a ROD in September 2003, establishing specific remedial actions to rectify the Superfund site. The Army's proposed acquisition of SRAA would in no way interfere with the progress of Del Monte remedial programs designated by EPA.

The parcel just north of SBMR (Poamoho Village), to be acquired under the Proposed Action as part of the development of Helemanō Trail, was previously included in the Superfund listing but was removed in January 2004, following several rounds of investigations resulting in confirmation that the site did not pose a threat to human health or the environment. For these reasons, the proposed acquisition areas are not considered significantly affected by the ongoing Superfund remedial programs.

*Electromagnetic fields.* Two of the proposed project actions could potentially introduce EMF to SBMR, the VFTF and the FTI. Each of these facilities would consist of communications and radar transmitters. In the VFTF, the equipment would be contained within a control room. The FTI is a group of antennas, similar to cellular phone towers, strategically placed throughout the installation and training areas, whereby radios within military vehicles would be able to receive communication signals to process both voice and data. The antennas would be located at current antenna sites when possible. Two of the FTI sites would be just outside the boundary of the installation.

The general public is typically not allowed in areas that could contain EMF hazards from Army equipment and, therefore, would not be inadvertently exposed to EMF. FTI sites would be appropriately fenced to prevent trespassing and exposure to any harmful EMF. Signs would be posted around the perimeter of all potentially harmful EMF sources to warn people about the EMF source. DOD Instruction 6055.11 and Army Pamphlet 385-64, as well as other Army regulations pertaining to EMF, would be followed in the operation of the new facilities to protect personnel, as is the current practice. Only trained personnel would work with equipment emitting EMF. There would be no significant impact to the public from exposure to EMF, and no mitigation would be necessary.

*Petroleum, oils and lubricants*. Several projects included in the Proposed Action would pose less than significant POL impacts on SBMR. Each project is discussed in detail in Appendix D. The projects are as follows:

- The Tactical Vehicle Wash facility is designed to accommodate an 18.3-meter-long by 3.7-meter-wide vehicle and would have four wash stations. Treatment would include oil and grease removal, grit removal, and organic control. An OWS would be provided to treat any residual water that did not go through the main system. Waste oil would be skimmed from the surface of the OWS on a regular basis, properly containerized and labeled, and disposed of through DRMO;
- The Multiple Deployment Facility would be constructed at WAAF to support deployments from multiple airfields. This facility would include a 6,000-square-foot vehicle maintenance facility, a de-fueling facility, a 2,479 square foot vehicle holding area, and a wash rack connected to an OWS to remove any residual oils from the wastewater;
- The apron upgrade at WAAF would require the use of petroleum asphalt. According to the material safety data sheet (MSDS) filed under the OSHA 29 CFR 1910.1200, incomplete combustion can yield carbon monoxide and oxides of sulfur and nitrogen and various hydrocarbons. Although no association has been established between industrial exposure to petroleum asphalt and cancer in humans (Quikrete 2002a), skin contact and breathing of mists, fumes, and vapor should still be avoided by the construction team. This project would be sited on the existing apron on the west side of WAAF just north of Airdrome Road, as shown on Figures 2-9 and D-7; and
- The Motor Pool facility (combined with a Hazardous Material Storage Facility) on the SRAA is designed to accommodate an increase of 400 vehicles. Motor pool infrastructure relevant to this section would include petroleum, oil, and lubricant facilities, OWSs, and hardstand and organizational vehicle parking areas. The waste oil from the OWSs would be skimmed regularly, as is consistent with existing protocol, for proper disposal by DRMO.

Increases in POL storage, use, and handling demands directly related to transformation activities do not include the increased number of Soldiers' privately owned vehicles (POVs), which would not use the project motor pool. POVs would continue to use the on-base AAFES fueling facilities discussed in Section 5.12.1 for fueling and maintenance. These facilities are designed to withstand the increase POL needs. The existing USTs would be refueled as needed to support the increased population needs. No new tanks would be installed.

Construction activities would not be likely to result in any specific impacts. These construction activities may expose additional areas to potential, construction equipment leaks, spills, or drips, this would be a less than significant, short-term adverse impact.

Per SOPs, USARHAW would, during any on-site construction activities within a specific project area, undertake the following measures to minimize the potential for spills or other harm to the environment:

- Implement applicable spill response and contingency plans following any release to the environment. This includes reporting spills to the appropriate local, state, and federal government agencies as required based on the type and volume of the release;
- Refuel construction equipment on relatively flat, paved surfaces when possible. Refueling activities would be conducted during periods when no precipitation is falling. Secondary containment would surround the transfer area to prevent an accidental release from leaving the immediate area. Transfers would not be conducted near navigable bodies of water, including storm sewer inlets, unless necessary; and
- Maintain construction equipment to prevent drips or leaks from hoses or reservoirs, which contain hazardous materials or waste.

No storage tanks are located within the project areas and no new storage tanks would be installed as a result of the Proposed Action. Operations at these facilities would practice best management practices and follow USEPA and USAG-HI protocol for use and handling of hazardous materials such as POLs. DPW maintains a spill contingency plan and an SOP plan that outline proper operating and emergency response procedures and responsibilities. Additionally, the Army conducts routine inspections of all facilities containing hazardous materials to ensure compliance. Therefore, there would be no significant impacts from POLs, and no mitigation would be required.

Although Helemanō Trail would be composed primarily of gravel, road grades steeper than ten percent would be paved with petroleum asphalt or concrete. These materials would also be used to install appurtenances, such as guardrails and signs. Although OSHA does not categorize petroleum asphalt as carcinogenic to humans, serious health problems can result from extended exposure. The construction team would avoid coming into skin contact with and breathing mists, fumes, or vapors. Construction and disposal would be conducted in accordance with federal, state, and local regulations.

*Pesticides/Herbicides*. QTR2 would be constructed on existing agricultural fields within the proposed SRAA where past pesticides have been used. The total acreage of the SRAA is approximately 1,400 acres (567 hectares). As this would be newly acquired land, pest control on the land would be maintained by DPW in accordance with the USAG-HI IPMP. Pesticide products would continue to be stored at the centralized Pest Control Shop located on SBMR. Therefore, there would be no significant impacts from pesticides, and no mitigation would be required.

*No Impacts*

*Polychlorinated biphenyls*. Construction and operational activities associated with the Proposed Action would not generate impacts from PCBs. The Army has been committed to removing or retrofilling all electrical equipment containing regulated amounts of PCBs. If PCBs are encountered, the devices would be properly handled in accordance with USEPA regulations. As per subsection 6(e) of the TSCA of 1976, no new PCB-containing equipment would be installed as part of this alternative. Therefore, there would be no impacts, and no mitigation would be required.

### Reduced Land Acquisition Alternative

All of the impacts and mitigation identified above for the Proposed Action would be the same for RLA, except for those pertaining to hazardous materials and waste management, UXO, general training, and pesticides. Therefore, only these impacts are addressed below.

*Significant Impact Mitigable to Less than Significant*

*Unexploded ordnance.* As this alternative relocates QTR2 from SRLA to PTA, live-fire training would not take place on SRAA. As no live-fire training would be introduced, the potential for UXO in the SRAA area would be eliminated. The potential for UXO in other training areas, as discussed under Proposed Action remains, however, and the impacts from UXO remain significant but mitigable to less than significant with the aforementioned mitigation measures.

*Less than Significant Impacts*

Other human health and safety hazard impacts associated with Reduced Land Acquisition would be largely improved at SBMR, as compared to the Proposed Action, due to the decreased impacts of ammunition, training, herbicides, and construction-related materials and waste management on the SRAA. These improvements do not change the significance impact level, however, as other projects on SBMR present less than significant (and significant but mitigable in the case of UXO) impacts. These issues are listed below:

*Hazardous materials management.* Hazardous materials management at SBMR overall would decrease, as materials need for training and upkeep of QTR2 would be eliminated.

*Hazardous waste management.* Hazardous wastes management at SBMR overall would decrease, as wastes generated from training and maintenance of QTR2 would be eliminated.

*General training.* Under Reduced Land Acquisition, the SRAA would only consist of 100 acres (40.5 hectares) for placement of the motor pool, as compared to 1,400 (567 hectares) acres under the preferred alternative. The QTR2 range would be set at PTA and live-fire training would not take place on SBSR. Furthermore, as there would be no training areas located in the SRAA, the potential for military training equipment leaks, spills, or drips to the environment would be eliminated.

*Pesticides/Herbicides.* The Reduced Land Acquisition Alternative reduces the land to be acquired from 1,400 acres (567 hectares) to 100 acres (40.5 hectares). This reduction consequently reduces the amount of pesticides used on SBMR as pest management would not be needed on the SRAA, with the exception of minimal pest control around the proposed motor pool to be set on the subject 100 acres (40.5 hectares) to be acquired.

### No Action Alternative

The current baseline of impact conditions would continue under No Action. No increase in hazardous material use or waste generation would occur. Seven less than significant impacts under No Action would primarily be due to continued practices at existing levels: ammunition, UXO, general training, lead, EMF, and wildfires.

*Training Related Impacts.* As training would continue by current forces on SBMR, impacts from the training and munitions use would continue to effect the land. Existing types and quantities of ammunition and ordnance would continue to be used. The 105mm cannon and the 120mm mortar would not be used. As UXO would remain a potential presence, EOD specialists would continue to implement abatement procedures to minimize potential exposure of current forces to UXO during training. USARHAW would continue following existing SOPs to minimize the potential for spills or other harm to the environment resulting from training efforts. Current forces would continue to train on SBMR, which would distribute lead and other contaminants resulting from training from small ammunition firearms into retained firing range berms. The presence of these contaminants may further contaminate soils due to vehicle and equipment movement and soil deposition. Finally, continued use of Army land for training under No Action would prolong the threat of wildfires. The WFMP and its FMAs and wildland fire SOPs, all of which are designed to prevent and manage wildfires, would continue to be followed. These impacts from continued training at existing levels would remain a less than significant impact, and no new mitigation would be required.

*Electromagnetic Fields.* EMF sources would not be introduced to the installation or areas outside the installation under No Action, but existing sources of electromagnetic radiation as well as future projects containing EMF would remain a risk. SOPs would continue to be followed in order to prevent exposure to the public or the environment.

## 5.13 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

### 5.13.1 Affected Environment

SBMR is within the Wahiawā CCD. The population of the Wahiawā CCD represented approximately 4.4 percent of the population of Honolulu County in 2000. Between 1990 and 2000 the population of this area decreased by 12.6 percent (Table 5-35) (US Census Bureau 1990a, 2000a). Only 31.0 percent of the housing in this district was owner-occupied, and 12.6 percent were vacant in 2000 (US Census Bureau 1990a, 2000b). The Wahiawā CCD had one of the highest percentage Hispanic populations in Honolulu County (12.8 percent) and a total minority population of 26,235 (68.4 percent) (Table 5-35). The population identified as Asian/Pacific Islander was the largest minority ethnic group and made up 34.2 percent of the population (Table 5-35) (US Census Bureau 1990a, 2000a). Approximately 31 percent of the population of Wahiawā CCD was under the age of 18 in 2000, one of the highest percentages in Honolulu County. However, between 1990 and 2000 the population under the age of 18 decreased by 9.1 percent (US Census Bureau 1990a, 2000c).

**Table 5-35**
**Wahiawā CCD Population Percentage by Race/Ethnicity**

| Race/Ethnicity | Percent of Total Population 1990 | Percent of Total Population 2000 | Percent Change in Actual Population 1990-2000 |
|---|---|---|---|
| White | 42.6 | 31.6 | -35.0 |
| Black or African American | 14.0 | 11.0 | -31.3 |
| Native American, Eskimo, Aleut | 0.7 | 0.7 | -17.1 |
| Asian and Pacific Islander | 37.8 | 34.2 | -20.9 |
| Other and Two or More Races | 4,9 | 22.5 | 301.2 |
| Hispanic[1] | 10.0 | 12.8 | 11.5 |
| Minority[2] | 57.4 | 68.4 | 4.1 |

Sources: US Census Bureau 1990a, 2000a
[1]Persons of Hispanic origin may be of any race.
[2]Minority includes Black or African American; Native American, Eskimo, and Aleut; Asian and Pacific Islander; and Other and Two or More Races.

In 2000, the ROI (i.e., Honolulu County) civilian labor force totaled about 423,600 (HDLIR, 2002). The ROI unemployment rate averaged 3.9 percent in 2000, lower than the state of Hawai'i's average unemployment rate of 4.3 percent, and just below the national rate of 4.0 percent.

The primary sources of employment in the ROI were the services, government, and retail trade sectors, which together accounted for 73 percent of total employment (BEA 2002a). Thirty-one percent of all jobs were in the services sector. The services industry includes establishments primarily engaged in providing a variety of services, such as hotels and other lodging places; establishments providing personal, business, repair, and amusement services; health, legal, engineering, and other professional services; educational institutions;

membership organizations; and other miscellaneous services (OSHA, 2001). The government sector accounted for about 25 percent of total employment in the ROI. Of that 25 percent, 9 percent were federal military jobs, 5 percent were federal civilian jobs, another 9 percent were employed by the state, and the remaining 2 percent were employed by with local government. Retail trade is the third largest employment sector, accounting for approximately 18 percent of total employment. Leading industry clusters in the ROI include agri-business (e.g., production of sugar and pineapple, fish harvesting), tourism, and national defense (Enterprise Honolulu 2003).

As of September 2001, SBMR employed approximately 12,000 personnel (HDBEDT 2003). About 10,100 were military personnel, 300 were civilian personnel, and the remaining 1,600 were other personnel (non-appropriated employees, government contractors, or foreign nationalists). SBMR accounts for approximately 9 percent of all government jobs in the ROI, and about 15 percent of the total federal government jobs in the ROI.

The per capita personal income (PCPI) of the ROI was $29,960 (US DOC, BEA, 2002). This was higher than the state of Hawai'i's PCPI of $27,851, and just above the national PCPI of $29,469.

Six public schools serve the students at SBMR: Solomon Elementary School and Hale Kula Elementary School on SBMR; Wheeler Elementary School on WAAF; Wheeler Intermediate School on WAAF; Leilehua High School in the town of Wahiawā; and Mililani High School in the town of Mililani. Solomon Elementary School is located on SBMR and has an enrollment of approximately 790 students in pre-kindergarten through fifth grade (NCES 2002). Hale Kula Elementary School, also on SBMR, serves about 640 students in pre-kindergarten through fifth grade (NCES 2002). Wheeler Elementary School on WAAF has about 750 students in pre-kindergarten through 5th grade (NCES 2002). About 670 students attend Wheeler Intermediate School on Wheeler Army Airfield, which serves grades six through eight (NCES 2002). Leilehua High School in Wahiawā has an enrollment of about 1,780 students in grades nine through 12 (NCES 2002). About 50 percent of the students at Leilehua High School are from military families stationed on SBMR and the Naval Communication Station in Whitmore (Leilehua High School 2002). Mililani High School in Mililani also serves grades 9 through 12 and has about 2,280 students enrolled (Tamongdon 2003).

Public schools in Wahiawā that serve children living off-post are Helemanō Elementary School, 'Iliahi Elementary School, Ka'ala Elementary School, Wahiawā Elementary School, Wahiawā Middle School, Leilehua High School, and Mililani High School. These schools, like the schools on SBMR and WAAF, are part of the Honolulu County School District.

## 5.13.2 Environmental Consequences

### *Summary of Impacts*

Long-term significant but mitigable effects on schools would be expected as a result of the Proposed Action. The Proposed Action would result in approximately 760 additional school-age children living on-post or near the post. The addition of 760 new students would strain the capacity and resources of the schools, the extent of which would depend on the age distribution of the additional children, whether the children would live on-post, and when the school districts would be notified about changes in student population at affected schools.

The Proposed Action would be expected to have less than significant beneficial effects on population, employment, income and business volume in Honolulu County and the Wahiawā CCD, resulting from construction, staff additions, and the resultant increased expenditures that would stimulate the economy within the ROI. Chapter 4 discusses the EIFS model results. Only the results pertaining to Honolulu County would be applicable to SBMR.

No Action would have no impacts on socioeconomic or environmental justice factors or on the protection of children. Table 5-36 summarizes the socioeconomic and environmental justice impacts at SBMR.

**Table 5-36**
**Summary of Potential Socioeconomic and Environmental Justice Impacts at SBMR/WAAF**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Population | ⊙+ | ⊙+ | ○ |
| Employment | ⊙+ | ⊙+ | ○ |
| Income | ⊙+ | ⊙+ | ○ |
| Economy (Business Volume) | ⊙+ | ⊙+ | ○ |
| Housing | ⊙ | ⊙ | ○ |
| Schools | ⃠ | ⃠ | ○ |
| Environmental justice | ⊙ | ⊙ | ○ |
| Protection of children | ⊙ | ⊙ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | | | |
|---|---|---|---|---|---|
| ⊗ | = | Significant | + | = | Beneficial impact |
| ⃠ | = | Significant but mitigable to less than significant | N/A | = | Not applicable |
| ⊙ | = | Less than significant | | | |
| ○ | = | No impact | | | |

### ***Proposed Action (Preferred Alternative)***

*Significant Impacts Mitigable to Less than Significant*

*Impact 1: Schools.* Long-term adverse effects on schools would be expected as a result of the Proposed Action alternative. The Proposed Action would result in 810 additional Soldiers at

SBMR accompanied by approximately 502 spouses and 1,053 children. Of the estimated 1,053 children, approximately 760 would be of school age (between 5 years and 18 years of age), assuming the age distribution of Soldier dependents is similar to that of the rest of the nation. Approximately half of this school-age population would attend elementary schools, while the remaining children would be split between middle school and high school. Accordingly, this would equate to about 380 additional elementary school students, and approximately 190 middle school students and 190 high school students. As described in Section 5.13.1, two elementary schools (both on post) with a current enrollment of approximately 1,440 students, one off post middle school with about 668 students, and one off post high school with approximately 1,778 students are the primary providers of public school education for dependents of SBMR Soldiers. A small number of students attend private schools or attend schools outside the local district. Nonetheless, the potential addition of 380 elementary school students would represent a 26 percent increase over current enrollment. Enrollment in the local middle and high schools would increase by about 28 percent and 11 percent, respectively.

The impact of the additional students would vary with the school. Currently, the intermediate school has an enrollment of less than 700, but has a physical capacity of about 1,000 (Matsukawa 2003). Similarly, Hale Kula Elementary School has an enrollment of about 540, significantly down from its peak enrollment of 1,200 (Ferreira 2003). Solomon Elementary School is at near capacity with its current enrollment (Matsukawa 2003). Leilehua High School's current enrollment is below capacity (Toyota 2003), but some type of accommodation might be needed to serve the additional students, depending on the size of future enrollments.

*Regulatory and Administrative Mitigation 1.* Federal aid will be made available to local school districts to compensate them for the increased burden through the Impact Aid Program. Such aid may take the form of basic support payments or grants for construction of new facilities to house new students who are dependents of Soldiers located at SBMR. Additional teachers would need to be hired to maintain the current student-to-teacher ratios.

*Additional Mitigation 1.* The Army proposes to notify the school districts as soon as possible before personnel increases to give them time to secure funding and hire new teachers and to assist in providing these new facilities. Although the local school districts receive additional funding for each military dependent attending public school, it is likely that the school districts would bear some of the costs for additional teachers and physical space, if needed. The RCI Office, as the lead department for planning Army Family Housing, closely coordinates future student requirements with the State Department of Education. To this end, the RCI Project Manager has been working with HDOE district superintendents. On behalf of the Army, the RCI Project Manager works with the DOE, to generate school enrollment projections with as much accuracy as possible. The development partnership plans its facilities work years in advance, coordinating with the DOE. Depending on future enrollments and funding levels, the Proposed Action could still adversely affect school budgets, but the impact would be less than significant.

### *Less than Significant Impacts*

*Population, employment, income, and business volume*. Short- and long-term direct and indirect minor beneficial effects to population, employment, income, and business volume in Honolulu County and the Wahiawā CCD would be expected as a result of construction, staff additions, and training associated with the Proposed Action. The expenditures and employment associated with the construction of training ranges and associated facilities would increase Honolulu County sales volume, income, and employment, as determined from EIFS model results (see Table 4-14). The expenditures associated with these projects were spread out over a five-year period since the construction is scheduled to take place between 2004 and 2008. The EIFS model, its inputs, outputs, and significance measures (RTVs), are discussed in more detail in Appendix L. The economic benefits would last only for the duration of the construction period. These changes in the specific economic parameters (sales, income, employment, and population) would fall within historical fluctuations and would be considered minor.

The Proposed Action would involve the acquisition of up to 1,400 acres of land currently under cultivation for pineapples. Some portion of the land acquired would no longer be useable for pineapple production. This area would be used by the military as rangeland. Economic effects could include reduction in crop production and a decrease in taxes paid to local and state government entities by landowners. Some employment could be affected. The impact would likely be minor given the size of the land parcel and the minimal role agricultural production plays in the ROI economy. Furthermore, agriculture accounts for only 0.5 percent of employment and only 0.4 percent of earnings in Honolulu County and 1.7 percent of employment and 0.8 percent of earnings statewide (BEA 2002a). Since World War II, the role of the pineapple industry to the state economy declined in place of tourism and defense.

Long-term minor direct and indirect beneficial effects would be associated with the addition of 810 military personnel, 502 spouses, and 1,053 dependents (approximately 760 of the 1,053 would be primary or secondary school-age children) to SBMR. Assuming they would come from outside the ROI, the additional population would generate a small increase in overall spending on good and services, which in turn would stimulate further economic activity in the region (i.e., small additional increases in hiring by suppliers of these goods and services). Specifically, the added population would rent or purchase housing and spend money on food, clothing and other types of goods and services in the ROI, during the course of their residency. The overall impact of the additional population on the economy would be minor given that the proposed action would add much less than 1 percent to the current ROI population.

*Population.* Implementing the Proposed Action would have a less than significant population impact. It would increase the Honolulu County and the Wahiawā CCD population by 2,365 (810 Soldiers, 502 spouses, and 1,053 children). This represents a less than one percent change in the population of Honolulu County and a 6 percent change to the population of the Wahiawā CCD, if the new population were to relocate entirely within this CCD. No mitigation would be required.

*Employment*. Implementing the Proposed Action would have a less than significant beneficial impact on employment. Employment changes would be direct and indirect, short-term and long-term. The direct long-term change in local employment would be the increase in Soldiers to be based at SBMR as a result of transformation and employment associated with the construction of training ranges and associated facilities, which would temporarily increase employment. The federal military employed 49,829 Soldiers in the ROI in 2000; the addition of 810 Soldiers at SBMR under the Proposed Action would be an increase of 1.6 percent in military employment in Honolulu County and an increase of 0.1 percent of total employment in Honolulu County. Subsequent indirect increases in employment are produced by the multiplier effect, resulting from increased spending by the additional staff and construction employees. Increased military employment and construction employment both would be within the capacity of the ROI economy to absorb and would not be considered significant. No mitigation would be required.

*Income.* Implementing the Proposed Action would have a less than significant impact on income. Changes in income represent the wage and salary payments made to construction workers and to the resident workforce. The Proposed Action would have the beneficial effect of increasing the total income of Honolulu County. No mitigation would be required.

*Economy (business volume).* Implementing the Proposed Action would have a less than significant beneficial impact on business volume. Changes in local business activity resulting from transformation include direct business volume and induced business volume. Direct business volume is the change in the dollar value of sales in the retail and wholesale trade sector and receipts in the services sector resulting from local purchases by civilian and military personnel, as well as construction and procurement expenditures. Induced business volume is the additional business activity generated as a result of the direct change in sales. The Proposed Action would have the beneficial effect of increasing business volume in Honolulu County. Chapter 4 indicates that the changes related to the Proposed Action would be within the historic RTV range and would not be considered significant. No mitigation would be required.

*Housing*. Implementing the Proposed Action would have a less than significant impact on housing. The increased military population at Schofield Barracks would create a small increase in the demand for housing. Approximately 9.3 percent of the housing units (29,538) in Honolulu County were vacant in 2000. Of this total About 41.3 percent (12,203 units) were for rent and 8.7 percent (2,572 units) were for sale. In 2000 in Wahiawā CCD, 12.6 percent (1,485 units) of housing was vacant, 27.2 percent (404 units) of which was for rent and 5.9 percent (87 units) was for sale (US Census Bureau 2000b). The Proposed Action would increase the military population of SBMR and the surrounding housing market, and the available housing stock in the ROI (i.e., Honolulu County) would accommodate the demand for housing. No mitigation would be required.

*Economic impacts to Environmental Justice*. Short-term and long-term indirect minor adverse effects on environmental justice populations could occur. No minority or low-income residences would be displaced by land acquisition, training modifications, or new construction as a result of SBCT Transformation. While noise from construction project sites or vehicle maneuver areas could have adverse noise impacts on nearby private residences or schools (see Section 4.6.3, Summary of Noise Impacts) the construction would be short-term, lasting only for the duration of the construction project. Noise impacts from vehicle maneuver training would be long-term. However, this type of training is currently occurring at SBMR. The magnitude of the noise would not be expected to warrant mitigation measures (see Section 4.6.3, Summary of Noise Impacts). Noise will increase as a result of an increase in munitions use however the increase will have a less than significant effect on environmental justice populations.

As discussed in more detail in Section 5.5, the substantial increase in fugitive $PM_{10}$ emissions from military vehicle use at SBMR, the likelihood of exceeding the federal 24-hour standard, and the potential impacts to quality of life to surrounding communities combined may result in a significant air quality impact at SBMR under the Proposed Action. Feasible mitigation measures are available to reduce the magnitude of this impact, especially for vehicle travel on unpaved roads, and will reduce these impacts to less than significant. These air quality impacts could affect the residential communities of Mililani Town and especially Wahiawa because of the location of those two communities near the SBMR training areas and because of prevailing wind patterns. These communities house some Army families stationed at SBMR and WAAF, many of whom are members of Hispanic or Asian minority groups. Neither Wahiawa nor Mililani, however, has a greater than state average of either low-income populations or Native Hawaiians. Kunia Village and Poamoho Village have large percentages of Native Hawaiian and low-income residents, but these communities will not be significantly affected by fugitive $PM_{10}$ emissions due to their distance from SBMR training areas. Air emissions, therefore, would not disproportionately affect Native Hawaiian, low–income, or other local ethnic minority groups.

Increased military traffic on public roads around SBMR would also accompany the proposed action. When military actions are conducted in areas accessible to the public, such as public roadways, the risk associated with the operations could extend to civilians. Risks to the public and military personnel inherent in training and day-to-day operations would be minimized or avoided through adherence to existing Army-wide, unit and installation, and other applicable safety regulations and procedures.

Potential effects to Native Hawaiian cultural resources or to Hawaiian homelands are addressed in the cultural resources section.

*Protection of Children.* Short-term and long-term indirect minor adverse effects on the health and safety of children could occur. As described under Environmental Justice above, noise sources or increased military traffic associated with the Proposed Action could result in less than significant adverse impacts on nearby schools or residences. Increased noise from munitions would not cause any change to noise levels at schools.

Although the risk is low, it is possible for the health of children to be affected by Proposed Action through exposure to smoke or noise, for example. Risks to children inherent in training and day-to-day operations would be minimized or avoided through adherence to existing Army-wide, unit and installation, and other applicable safety regulations and procedures. Exercises at SBMR use pyrotechnics and blank ammunition. The last training incident involving the public occurred approximately three years ago at the northwest end of SBMR (see Section 5.12, Hazardous Materials). Smoke from a smoke grenade blew into a residential community and some children had to be examined at a hospital (Borja 2002b).

Construction and training activities would, for the most part, take place in areas that are off-limits to the general public. Restricted areas would continue to be posted with signs, enclosed by a fence, or stationed with guards. Strict adherence to applicable safety regulations and procedures would continue to protect the health and safety of children.

### *Reduced Land Acquisition*

Significant impacts would be the same as those under the Proposed Action.

#### *Significant Impacts Mitigable to Less Than Significant*

*Impact 1: Schools.* As described under the Proposed Action, Reduced Land Acquisition would have long-term significant adverse effects on schools. The nature and magnitude of school impacts and mitigation would be the same as those for the Proposed Action.

*Regulatory and Administrative Mitigation 1.* Mitigation measures are the same as those discussed under the Proposed Action.

*Additional Mitigation 1.* Mitigation measures are the same as those discussed under the Proposed Action.

#### *Less than Significant Impacts*

The socioeconomic impacts for Reduced Land Acquisition would be similar to those described in detail under the Proposed Action. Reduced Land Acquisition would be expected to have beneficial effects on population, employment, income and business volume, resulting from new construction, staff additions, and the resultant increased expenditures that would stimulate the economy within the ROI. Reduced Land Acquisition would have less than significant adverse effects on these resources and on housing, the protection of children, and environmental justice.

Reduced Land Acquisition would involve the conversion of fewer acres of land currently under cultivation for pineapples to military use than under the Proposed Action. This would represent a slightly smaller impact to the regional economy than the Proposed Action.

*Employment, Income, and Economy (Business Volume).* The shift in construction and construction expenditures from SBMR to PTA would likely result in slightly lower indirect employment increases in Honolulu County under Reduced Land Acquisition than under the Proposed Action. The effect on employment of Reduced Land Acquisition would be less than significant.

The shift in construction and construction expenditures from SBMR to PTA would likely result in slightly lower induced increases in business volume in Honolulu County under

Reduced Land Acquisition than under the Proposed Action. The effect on business volume in Honolulu County of Reduced Land Acquisition would be less than significant.

### *No Action*

*No Impacts*

Implementing No Action at SBMR would not change the local economy or population, and no impacts on population, employment, income or the economy are anticipated. No effects on housing are expected because the number of people requiring housing on- or off-post would not change as a result of No Action. No effects on environmental justice are expected. No Action would not alter the existing health and safety, housing, or economic conditions of minority or low-income populations in Wahiawā CCD or Honolulu County. No effects on children are expected because No Action would not present any change in the public health or safety risk that could affect children. The Army would continue to provide measures to protect the safety of children, including using fencing, limiting access to certain areas, and providing adult supervision.

# 5.14 PUBLIC SERVICES AND UTILITIES

## 5.14.1 Affected Environment

### *Police, Fire, and Emergency Medical Services*

The Federal Fire Department, under the supervision of Commander, US Naval Station Pearl Harbor, provides fire protection to Army installations on O'ahu. A one-company fire station is at SBMR, and a two-company fire station is at WAAF. Two commercial pumpers and two military field fire-fighting vehicles are based at the SBMR station, and crash fire rescue and commercial pumper equipment is based at WAAF (Belt Collins 1993).

Medical services available to all personnel at Schofield Barracks include access to TAMC in Honolulu, which provides a full complement of medical facilities, including medical evacuation by helicopter from outlying training areas and ranges. Medical services at SBMR include an outpatient clinic and two family planning clinics (Army Medical Command 2002). The acute care clinic provides basic ambulance services around the clock; after 9 PM, patients requiring emergency care are routed to TAMC.

### *Water Distribution*

Potable water is supplied to SBMR, WAAF, US Army Field Station Kunia, HMR, and a Wahaiwā radio station by a well and water treatment facility located between the H-2 Freeway and Kamehameha Highway, across from the Wheeler gate (Belt Collins 1993). This facility produces and treats 4.0 to 9.0 MGD. The SBMR distribution and storage system is supplied via a 24-inch (61-centimeter) main, and East Range receives water through a 12-inch (30-centimeter) submain connected to the 24-inch (30-centimeter) main. The State of Hawai'i DLNR permit allocates a 12- month moving average of 5.648 MGD to the Army from the groundwater aquifer, approximately 640 feet (195 meters) below the ground surface. The average ranges from a low of 3.849 MGD in January to high of 6.948 MGD in September. The average for 2002 was 5.346 MGD, and the current average is at 5.4 MGD and is increasing. The water is pumped from the deep well by four pumps at a rate of 2,000 gallons (7,571 liters) per minute and is chlorinated before flowing into five air stripper towers where trichloroethane is removed. The water is then chlorinated a second time and injected with a fluoride solution before it enters a 200,000-gallon (757,082-liter) underground well for storage. This clear well contains seven booster pumps that transmit water into the distribution systems and storage tanks at the Army installations served by the SBMR system. Five of the booster pumps have a capacity of 1,400 gallons (5,300 liters) per minute, and two booster pumps, which were constructed in 1993 and serve the East Range exclusively, have a capacity of 1,040 gallons (3,937 liters) per minute (C. H. Guernsey & Company 2001).

The distribution system is divided into a low zone for the network, which runs north and east to serve the eastern portion of the Main Post and SBER, and a high zone for the western network, which extends to the western portion of the Main Post. Two 2-million-gallon (7.5-million-liter) steel tanks store water for the low zone, and two booster pumps send water to two 1-million-gallon (3.8-million-liter) concrete tanks in the high zone (Belt Collins 1993).

Based on a demand factor of 1.3 per person and a domestic allowance of 150 gallons (568 liters) per capita per day, the domestic daily demand was estimated at 4.13 MGD in the 1993 real property master plan. With the additional demands of NAVCAM 85, Helemanō Housing Area, UH Farm, golf course irrigation, and industrial demands, the required daily demand on the water system identified in the 1993 real property master plan was 5.23 MGD, of which the average estimated daily demand of SBMR was 3.059 MGD. Peak daily demands were estimated at 2.5 times the average.

Fire flow is the required number of gallons per minute at a specified pressure at the site of a fire for a specified period of time. The minimum required fire flow is two flows of 1,000 gallons (3,785 liters) per minute for two hours or one flow of 2,000 gallons (7,571 liters) per minute for three hours (Belt Collins 1993).

#### *Wastewater and Stormwater*

Wastewater is conveyed from SBMR to the treatment plant at WAAF using a gravity system with pipes ranging in diameter from 4 to 21 inches (10 to 53 centimeters). The WAAF plant is a secondary treatment facility that was constructed in 1976 and has been upgraded to a capacity of 4.2 MGD. The Army is planning to upgrade the treatment level from secondary to advanced tertiary. Completion of the necessary upgrades is expected in 2004. The system does not have redundant backup, so continuous maintenance is required so that spills are avoided (C. H. Guernsey & Company 2001).

#### *Solid Waste Management*

Based on the waste and recycling streams generated during the third quarter of 2002, SBMR generates an estimated 1,720 tons of industrial solid waste annually, which represents about 50 percent of the total estimated annual industrial waste stream generated by Army installations in Hawai‘i (USARHAW 2002a). SBMR is the only area in the ROI for the proposed project that has a recycling program; the recycling facility is at Building 1087B (Ching 2002a).

#### *Communications*

Verizon Hawai‘i provides commercial telephone service to the housing areas, mainly from direct buried lines, which are deteriorated and have virtually no useful life remaining. ATT-HITS provides official phone service to the Army in duct lines, recently installed by the Army. The Army is responsible for repairing and maintaining the official lines and for providing underground ducts for the commercial phone lines (C. H. Guernsey & Company 2001).

#### *Electricity and Natural Gas*

Two substations, Castner and Menoher, provide electric power to SBMR. These substations are supplied by one 44-kilovolt (kV) HELCO tap, and the service point is at the Castner substation. The 44 kilovolts are transformed to 7,200 volts at each substation. The Castner substation is made up of two main busses: Castner A, which is fed by two 5-megavolt-ampere (MVA) transformers and distributes power on six feeders, and Castner B, which is fed by two 5-MVA transformers and distributes power on 10 feeders. The Menoher substation is fed by one Army-owned 44-kV overhead line from Castner substation. The

Menoher bus is fed by two 5-MVA transformers and distributes power on five feeders. Most of this equipment is old, so the rate of failure, replacement, and outage is expected to be higher than average (Belt Collins 1993). If Menoher were to be shut down for any reason, much of the housing at SBMR would be without power. A HELCO backup 44-kV line from the Mikilua circuit along Kolekole Avenue was constructed to serve the Menoher substation, but the connections to the Castner substation cannot be closed while the backup line is in use or the breakers will be blown off-line due to the difference in impedance in the backup line (C. H. Guernsey & Company 2001).

The system capacity, as identified in the 1993 real property master plan, is 30,000 kVA. At the time this document was produced, this provided an excess capacity of 8,111 kVA, mainly from the Castner A (at 74 percent capacity) and Menoher (at 47 percent capacity) busses. Projected future loads were estimated at 4,822 kVA. Both Castner A and Menoher are expected to accommodate future loads, but Castner B (currently at 98 percent capacity) would be above capacity. Anticipated system upgrades that would increase system voltage from 7.2 kV to 12.47 kV would accommodate the projected future loads (Belt Collins 1993). A replacement for the Menoher substation is nearly completed and has twice the previous capacity but was not yet in use at the time of the electric utilities assessment for SBMR in 2001. New larger transformers and modern vacuum switchgear will be installed at Castner substation in 2002, and an $11 million system repair project is underway at SBMR (C. H. Guernsey & Company 2001).

### 5.14.2 Environmental Consequences

#### *Summary of Impacts*

Less than significant long-term adverse effects would be expected from the Proposed Action (Table 5-37), which would increase the number of local residents by 2,365. The additional population and the building space and facilities to be constructed, as well as any increases in training, would increase demand on utilities and services. Additional utilities would be provided for the projects that would require increased capacity; otherwise, existing systems would be expected to have adequate capacity to provide for these changes.

Similarly, No Action would be expected to have less than significant long-term adverse effects on public utilities. No changes to police, fire, and emergency services would occur; other effects are detailed below.

#### *Proposed Action*

##### Less Than Significant Impacts

*Police, fire, and emergency medical services.* Minor long-term adverse effects on law enforcement, fire protection, and emergency medical services would be expected. The increase in population and increased training activities could increase the demand for these services, but the services are expected to be adequate to accommodate such an increase. There would be no change in jurisdiction for any law enforcement agencies or fire departments.

**Table 5-37**
**Summary of Potential Public Services and Utilities Impacts at SBMR/WAAF**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Police, fire, and emergency medical services | ⊙ | ⊙ | ○ |
| Water distribution | ⊙ | ⊙ | ○ |
| Wastewater and stormwater | ⊙ | ⊙ | ○ |
| Solid waste management | ⊙ | ⊙ | ○ |
| Communications | ⊙ | ⊙ | ○ |
| Electricity and natural gas | ⊙ | ⊙ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant

⃠ = Significant but mitigable to less than significant

⊙ = Less than significant

○ = No impact

\+ = Beneficial impact

N/A = Not applicable

*Water distribution*. Minimal long-term adverse effects would be expected from the Proposed Action. The additional population would place an increased demand on the potable water system. Based on a demand factor of 1.3 per person and a domestic allowance of 150 gallons (568 liters) per capita per day as provided in the 1993 Real Property Master Plan (Belt Collins 1993), the increase in demand for a maximum population increase of 2,365 would be 461,175 gallons (1,745,737 liters) per day, which represents an increase of approximately 15.1 percent over the estimated daily demand of 3.059 million gallons per day (mgd) for SBMR.

Approximately 5.648 MGD are allocated to Army facilities from the well and water treatment facility across from Wheeler Gate, of which a total average daily demand to the system of 3.839 MGD was estimated with no golf course irrigation and 4.789 MGD with golf course irrigation. The remaining allocation of about 1.809 MGD without golf course irrigation and 0.859 MGD with golf course irrigation would be available to cover fire flows and this increased demand. Pressure inadequacies in the low service zones serving the Main Post could be worsened by the increased demand, but these can be improved by ensuring that at least two clear well pumps are in operation. In addition, the 1993 Real Property Master Plan identified that off-site water improvements would address this problem (Belt Collins 1993).

The facilities to be constructed, as well as any increases in training, likely would increase the demand for water at SBMR. Water for the UACTF, BAX, QTR1, and QTR2 would be trucked in, and no water lines, distribution systems, or wells would be required. No water would be required for the upgrade of WAAF for C-130 operations. Water would be supplied to the range control facility by connecting with an existing line to the east of the proposed facility. The motor pool is expected to use 17.6 million gallons (66.6 million liters) per year or a daily average of 48,219 gallons (182,529 liters), which represents about 1.2 percent of the average daily consumption without golf course irrigation. A water tank would be constructed as part of the motor pool project (see Figure 2-8). The tactical vehicle wash would have a wash station using reclaimed water to minimize overall usage, and the station would recycle water. The multiple deployment facility at WAAF is expected to use 730,000 gallons (2,763,351 liters) of water annually, or a daily average of 2,000 gallons (7,571 liters), which is less than 1 percent of the average daily demand without golf course irrigation. The VFTF is estimated to need 14,000 gallons (52,996 liters) of water per year. The motor pool, multiple deployment facility, and VFTF are expected to use a total of 18.3 million gallons (69.3 million liters) per year. The capacity of the existing system is expected to accommodate these changes.

*Wastewater and stormwater.* Minimal long-term adverse effects would be expected from the Proposed Action. The additional population would be expected to place an increased demand on the wastewater system. Domestic users generate approximately 92 percent of the wastewater, and the remaining 8 percent is generated by industrial discharges. The SBMR wastewater treatment plant has a design capacity of 4.2 MGD and processes an average daily flow of 2.6 MGD from SBMR, WAAF, Camp Stover Kunia Military Reservation, Leilehua Golf Course, and HMR. Based on these capacity and daily flow rates, even at the maximum population increase, wastewater generation is not expected to increase beyond the capacity of the system. At the average annual per capita wastewater generation of approximately 123.95 gallons (469 liters) per day from SBMR family housing, as described in Appendix A of the 1993 Real Property Master Plan (Belt Collins 1993), wastewater flow to the SBMR wastewater treatment plant would increase by 0.29 mgd.

The building space and facilities to be constructed, as well as any increases in training, likely would increase the amount of wastewater generated at SBMR. Sanitary wastewater at the UACTF, BAX, QTR1, and QTR2 would be collected in aerated vault latrines and removed by pumper truck, so no sewage collection system or septic fields would be required. Sewage at the range control facility would be collected by connecting with an existing line on the site. The existing gravity collection system would be used at the motor pool. The tactical vehicle wash would have wash stations using reclaimed water to minimize overall water usage, and the station would recycle water to minimize wastewater disposal. Wastewater would flow through a sediment basin, an equalization basin, and a secondary treatment system, designed to remove oil, grease, and grit and to control organics. Any wastewater not flowing through the main system would be sent to an oil-water separator. Concrete curbing and a trench drain would control the flow of wastewater. The facility would be covered to limit rain infiltration and disposal of excess wastewater. No water would be required for the upgrade of WAAF for C-130 operations, and no additional wastewater would be generated. The multiple deployment facility at WAAF and the VFTF at SBMR would connect to the system by gravity flow. These changes are expected to be within the capacity of the existing system.

The Proposed Action would create impervious surfaces covered by buildings and paving. Drainage from these surfaces would be controlled using grading, curbs, drains, gutters, and other standard construction practices to minimize stormwater pollution and runoff.

*Solid waste management.* Minimal long-term adverse effects would be expected from the Proposed Action. The additional population would be expected to place an increased demand on the solid waste collection and disposal system. Residents of the family housing areas of HMR, Āliamanu, SBMR, WAAF, and Fort Shafter generate approximately 2,600 tons of solid waste per quarter (10,400 tons per year). Only a small portion of the waste generated would go to Waimānalo Gulch Landfill because the Army diverts 90 percent of the waste stream to Hpower, a waste-to-energy, and only the ash produced would be deposited at the landfill.

The building space and facilities to be constructed would generate construction and demolition waste that could reduce the useful life of the landfill; however, this reduction would be negligible, and recycling would minimize this waste stream. A minimal increase in solid waste is expected as a result of increases in training. This increase would be minimal because new training would be similar to existing training, and the only increase would be the waste generated by the increase in the number of Soldiers training. These changes are expected to be within the capacity of the existing waste collection and disposal system.

*Communications.* Buried telephone lines supplying telecommunications to the housing areas at SBMR are already in poor condition and are scheduled for maintenance or replacement in the five-year plan. The addition of new users to these lines or the installation of new lines would not affect the condition of these existing lines. The official phone line service is unusable due to a lack of documentation, a situation that would not be altered by the increase in personnel and dependents.

Many of the new facilities to be constructed under the Proposed Action include providing new communications and information systems. These include the UACTF, the motor pool, BAX, QTR1 and QTR2, the multiple deployment facility, FTI, the new range control facility, and VFTF.

Army staff have conducted an electromagnetic compatibility study for the Proposed Action , which considers over 65,500 frequency records from the civil sector and other federal government agencies. The results indicated no significant interference problems should be encountered on O‘ahu from operating the FTI system (US Army Development Test Command 2003).

*Electricity.* Minimal long-term adverse effects are expected from the Proposed Action. The additional population would be expected to place an increased demand on the electrical distribution system. As identified in the utility risk assessment for SBMR (C. H. Guernsey & Company 2001), major electrical system upgrades, which began in 1997, are being completed, and additional upgrades are planned, improving the capacity of the substations. However, the distribution system continues to have problems, including aged direct buried aluminum conductors that need to be replaced and unfinished metering replacement at the housing area, that could affect the system's ability to supply existing and additional electric power demands. At the time the Real Property Master Plan (Belt Collins 1993) was produced, the system load was 21,889 KVA for 13,510 people in family housing and 37,700 employed on the post (Belt Collins 1993). The addition of a maximum of 2,365 staff and dependents would not likely exceed the capacity of the upgraded system, particularly because the number of personnel at SBMR has decreased to 16,602.

The building space and facilities to be constructed, as well as any increases in training, would require additional electricity. The increased electricity demand caused by additional construction and expansion and increased training would likely be handled by the upgraded electrical system infrastructure with the planned future improvements and privatization. The UACTF, BAX, and QTR2 would involve installing a new primary line to a transformer on the site and underground secondary power lines from the transformer to the buildings. The range control facility would obtain power from an existing line to the west of the project site. The motor pool would use approximately 1,248,100 kWh per year of additional electric power for air conditioning, lights, receptacles, water heaters, air compressors, and hoists. The estimated energy demand for the multiple deployment facility is approximately 4,794,919 kWh per year, which would be covered by the existing power distribution system. QTR1 would include connection to existing primary power lines and extension of secondary power lines from control towers to targets and range limit markers. The estimated annual energy consumption of the VFTF is 1,008,800 kWh, which would be supplied through the existing substation and distribution system. Installing energy-efficient lighting, appliances, and insulation would reduce the demand for electricity.

### *Reduced Land Acquisition*

*Less than Significant Impacts*

The public services and utilities impacts for Reduced Land Acquisition would be similar to those described under the Proposed Action. The additional population and the building space and facilities to be constructed, as well as any increases in training, would increase demand on utilities and service under Reduced Land Acquisition. Additional utilities would be provided for the projects that would require increased capacity; otherwise, existing systems would be expected to have adequate capacity to provide for these changes. Impacts on the utilities identified below would be slightly lower under Reduced Land Acquisition.

Approximately 1,300 acres (526 hectares) would not be subject to maneuver training by USARHAW under Reduced Land Acquisition, and as such, the demand on law enforcement, fire protection, and emergency medical services would be slightly less than under the Proposed Action. Less water would be trucked in; the sanitary wastewater volume to be collected in aerated vault latrines and removed by pumper truck would be lower; less telecommunications cabling would be required; and fewer new primary and secondary electrical lines would be required under Reduced Land Acquisition than under the Proposed Action, since QTR2 would not be constructed on SBMR.

### *No Action*

Existing conditions would continue under No Action. Under the status quo of No Action, utilities impacts would continue at their current levels.

# CHAPTER 6

# DILLINGHAM MILITARY RESERVATION

# CHAPTER 6
# DILLINGHAM MILITARY RESERVATION

## 6.1 INTRODUCTION

The proposed project at DMR would involve installing communication antennas at three locations and constructing a road from SBMR to DMR for transporting equipment and personnel. Changes in training activities and locations would occur on the installation and along the proposed road. The following text provides a description of these proposed activities; for detailed construction information, see Appendix D, Construction Details. Potential environmental impacts associated with these activities are discussed in detail throughout the remainder of this section.

### 6.1.1 Proposed Action

***Construction***

*Construction of Dillingham Trail*

The proposal is to acquire a perpetual easement of approximately 36 acres (14.5 hectares) and to construct a gravel road 15 feet (5 meters) wide with shoulders 3 feet (1 meter) wide. The road would run approximately 12.4 miles (20 kilometers) from SBMR to DMR and would be used by military vehicles. Work would include grading and paving the roadbed, improving drainage, and installing culverts at stream crossings and guardrails at drop-offs. Storm drainage structures and lines would be installed to prevent excessive amounts of stormwater runoff flowing over the road and endangering traffic. Underground telecommunication lines would be provided alongside the new road during road construction. Road grades steeper than 10 percent would be paved with asphalt or concrete, and the sides would be supported with shotcrete, guardrails, retaining walls, drainage structures (for example, concrete and grass swales), and signs. Until trail construction is complete, the Army would use public roads for travel from SBMR to DMR and KTA. If the proposed trail alignment changes, the Army will negotiate with the property owners on a new alignment and will conduct analysis and documentation, in accordance with NEPA, ESA and NHPA.

*Construction of Fixed Tactical Internet*

Two antennas strategically placed within the installation and one antenna on Dillingham Ridge would be constructed. As a result, radios within military vehicles would be able to receive communication signals to process both voice and data. Existing antenna support structure sites would be used when possible. Two antennas would be approximately 4 feet (1 meter) long and 2 inches (0.05 meter) in diameter, and two antennas would be approximately 10 feet (3 meters) long and 2 inches (0.05 meter) in diameter. They would be mounted on new antenna masts, or on existing utility poles, antenna support structures, or buildings. Each site area would be 20 feet (6 meters) by 25 feet (7.6 meters), including a 15-foot (4.6-meter) by 20-foot (6-meter) concrete pad for the support structure and shed. Sites would be accessed via existing roads in all cases. No security lighting would be installed at the sites. Equipment sheds would house radios and batteries. Of the 14 locations evaluated for construction of the FTI antennas on O'ahu, a maximum of eight will be selected from the locations represented in the EIS. Locations will be chosen based on the most suitable locations for communication logistics and avoidance of environmental concerns, such as cultural and biological resources.

### Training

*General SBCT Training*

Transformation activities would include military training on lands outside of developed areas (e.g., the cantonment area). Such training would include nonlive-fire, mounted maneuver training (using vehicles such as the Stryker and HMMWVs), and other nonlive-fire military training on foot. The mounted maneuver training would be limited to the areas shown on the maneuverability maps in Chapter 2 and existing roads. Most of the nonlive-fire training by SBCT forces would be similar to that conducted by Light Infantry Brigades.

Training would include establishing and using tactical and logistical operations and administrative centers, as well as smaller more dispersed activities, such as bivouacking (camping). As with current training, exercises would continue to be at the squad through company level, with some opportunities for battalion and above training. General SBCT training would likely occur 180 to 242 days per year.

Field training exercises could involve a variety of activities, such as vehicle movement, maneuvers, and convoys, foot maneuvers, bivouacking, limited aviation training, and staff training exercises. Field exercises can generally take place in the entire area. Areas available for mounted maneuver training are limited. UAVs would be used as part of the training at DMR.

### Proposed Action Impacts

Table 6-1 is a list of environmental impacts by specific SBCT project and resource category. This gives the public and reviewers a more detailed evaluation of impacts deriving from specific SBCT-related actions.

**Table 6-1**
**SBCT Project Impact Under Proposed Action at DMR**

| 1391 Project # | SBCT Project Title | Location | Land Use | Visual Resources | Airspace | Air Quality | Noise | Traffic | Water Resources | Geology and Soils | Biological Resources | Cultural Resources | Human Health & Safety Standards | Socioeconomics /EJ | Utilities |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 58161 | Land Easement/ Construct Road, SB/DMR | Dillingham | ⊙ | ⦸ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⊙ | ⊙+ | ⊙+ |
| N/A | Fixed Tactical Internet | Dillingham | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ○+ | ○+ |
| N/A | SBCT Training | Dillingham | ⊙ | ⊙ | ○ | ⦸ | ⊙ | ⊙ | ⊙+ | ⊗ | ⦸ | ⊗ | ⦸ | ⊙ | ⊙ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

<u>LEGEND:</u>

⊗ = Significant
⦸ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact
N/A= Not applicable

### 6.1.2 RLA Alternative

Activities under the RLA Alternative at DMR would be the same as those under the Proposed Action.

***Reduced Land Acquisition Impacts***

Table 6-2 is a list of environmental impacts by specific SBCT project and resource category. This gives the public and reviewers a more detailed evaluation of impacts deriving from specific SBCT-related actions.

### 6.1.3 Public Comments

Public scoping comments regarding SBCT project activities at DMR focused on potential impacts related to the following:

- Agricultural use;
- Traffic from SBMR to DMR; and
- The local farming and ranching economy and impact on other businesses.

During the DEIS public comment period, public comments on the SBCT project activities at DMR focused on the following:

- Impacts on endangered and threatened species and sensitive habitats, especially the albatross at Kaena Point;
- Impacts from invasive and nonnative species;
- Impacts from fire;
- Impacts on local agricultural operations;
- Increased erosion from training;
- Impacts from $PM_{10}$ and fugitive dust;
- Runoff effects on the marine environment;
- Revegetation and reclamation;
- Impacts on cultural resources;
- Closure cleanup plan;
- Ordnance cleanup;
- Sites of contamination;
- Conversion of agricultural land for trail development;
- Interference with agricultural activities;
- Hazardous materials and waste impacts, such as asbestos, depleted uranium, lead, and RDX;
- Noise impacts from increased training;

**Table 6-2**
**SBCT Project Impact Under RLA Alternative at DMR**

| 1391 Project # | SBCT Project Title | Location | Land Use | Visual Resources | Airspace | Air Quality | Noise | Traffic | Water Resources | Geology and Soils | Biological Resources | Cultural Resources | Human Health & Safety Standards | Socioeconomics /EJ | Utilities |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Dillingham** | | | | | | | | | | | | | |
| 58161 | Land Easement/ Construct Road, SB/DMR | Dillingham | ⊙ | ⊘ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊙ | ⊙+ | ⊙+ |
| N/A | Fixed Tactical Internet | Dillingham | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ○+ | ○+ |
| N/A | SBCT Training | Dillingham | ⊙ | ⊙ | ○ | ⊘ | ⊙ | ⊙ | ⊙+ | ⊗ | ⊘ | ⊗ | ⊘ | ⊙ | ⊙ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant

⊘ = Significant but mitigable to less than significant

⊙ = Less than significant

○ = No impact

\+ = Beneficial impact

N/A= Not applicable

- NPDES permit details;
- Easement acquisitions;
- Dillingham ranch impacts;
- Water supply impacts;
- Impacts on the locally unemployed;
- Funding for public roads;
- Traffic impacts;
- Impacts on visual resources on the Dillingham Trail;
- Impacts on the groundwater aquifer;
- Impacts on surface water; and
- Impacts from flooding.

## 6.2 LAND USE/RECREATION

The land uses and recreational resources for DMR were identified through review of the state Land Use District designations (State of Hawai'i 2002a), the state designations for Agricultural Lands of Importance to the State of Hawai'i (State of Hawai'i 2002a), the North Shore Sustainable Communities Plan (City and County of Honolulu 2000a), and the City and County of Honolulu Real Property Assessment Division data for tax map key identifications and property boundaries (City and County of Honolulu 2003).

### 6.2.1 Affected Environment

#### *Land Use*

*Dillingham Military Reservation*

DMR is on the northwestern tip of O'ahu (Figure 6-1). It consists of 664 acres (269 hectares) and supports units during field exercises (Nakata Planning Group, LLC 2002a). The 107-acre (43.3-hectare) cantonment area includes an airfield and associated roadways, bunkers, and earthen airplane hangars that were built along the coastal plain. Construction that extends into the foothills of the Wai'anae Mountain Range includes ammunition storage bunkers and gun emplacements (Nakata Planning Group, LLC 2002a).

Approximately 354 acres (143 hectares) of DMR are suitable for maneuver and field training, while the remaining land is on steep mountain slopes. DMR is used for small unit (up to platoon[1]) maneuvers and cannot support large-scale operations. No range facilities are available at DMR (Nakata Planning Group, LLC 2002b). Ammunition is restricted to blanks and is prohibited on the runway (Nakata Planning Group, LLC 2002a). There are no live-fire activities, designated ordnance impact areas, or associated surface danger zones on DMR.

The airfield is an active joint-use military/civilian airfield. The State of Hawai'i Department of Transportation has a lease from 1983 to 2008 for portions of DMR, including the runway and parking area (USARHAW and 25th ID[L] 2001a). The lease is for civilian light aircraft operations and support from sunrise to sunset. Night operations are reserved for the military. The Army also retains the right to close the airfield at any time for daytime military operations.

Most of DMR is within the state-designated Agricultural District (Figure 6-2; State of Hawai'i 2002a); however, the state ALISH map does not identify DMR as agricultural land of importance to the State of Hawai'i (Figure 6-3). A small portion at the western end of the airfield is within the Conservation District, with no designated subzone (State of Hawai'i 2002a). County zoning of DMR is Ag-2 General Agricultural District, except for a small portion at the airstrip, which is zoned as F-1 Military (City and County of Honolulu 2001). The Special Management Area includes the airfield portion of DMR (Figure 6-4; State of Hawai'i 2002a). Special Management Areas are discussed in Appendix N.

[1] A platoon consists of 16 to 44 Soldiers (USACE Mobile District 2001).

**Figure 6-1**
Land Use at Dillingham Military Reservation

**Figure 6-2**
State Land Use District Map Dillingham Military Reservation

**Figure 6-3**
Agricultural Lands of Importance to the State of Hawai'i Dillingham Military Reservation

**Figure 6-4**
Special Management Area Dillingham Military Reservation

Military land uses within DMR project areas are listed in Table 6-3. One of the antenna sites is outside DMR boundaries in a Conservation District Resource Subzone, a designation with the objective to develop areas to ensure sustained use of the area's natural resources.

**Table 6-3**
**Dillingham Military Reservation Project Areas and Land Uses**

| Project Title | Existing Land Use |
|---|---|
| SBCT Training | Training |
| FTI | |
| Dillingham Airport | Training |
| Dillingham P1 | Training |
| Dillingham Ridge | Conservation District Resource Subzone |

Public recreation/nonmilitary uses at DMR include glider plane operation, parachuting, sky diving, hang gliding, and hiking. Glider plane operation, parachuting, sky diving, and hang gliding are allowed in designated areas associated with the airfield. The military maintains priority use of the airfield at all times. The 2.3-mile (3.7-kilometer) Keālia Trail can be accessed through the western portion of DMR (Figure 6-5). This trail allows non-motorized biking and is open to the general public. If the trail is accessed from the south, through the Ka'ena Point Tracking Station, a DLNR permit is required (Nā Ala Hele 2003).

#### *Dillingham Trail*

The proposed land easement/road construction for Dillingham Trail would extend north from Main Post, would travel along the northeastern edge of Poamoho Gulch, and would turn west to continue to DMR. The trail alignment is along existing agricultural and undeveloped lands (USGS 1998c and 1999a). The state ALISH map shows Prime, Unique, and Other Agricultural Lands along the trail corridor (Figure 6-3). The trail passes near Thomson Corner, a residential subdivision. The trail also crosses the Mokulē'ia Forest Reserve Access, a 4.2-mile (6.8-kilometer) paved trail accessible on foot and by bicycle (Nā Ala Hele 2003).

The trail crosses the Special Management Area as it passes to the north and west of Thomson Corner (Figure 6-4).

### *Ownership*

#### *Dillingham Military Reservation*

The federal government owns DMR. Figure 6-6 shows land parcels within DMR, and Table 6-4 lists Tax Map Keys of the affected land parcels and the associated landowners and lessees.

**Figure 6-5**
Kuaokalā-Mokulē‘ia Area Trails (Hiking Trails at Dillingham Military Reservation)

**Figure 6-6**
Affected Parcels Map Dillingham Military Reservation

**Table 6-4**
**Dillingham Military Reservation Landowners and Lessees**

| Tax Map Key | Landowner (Lessee) |
|---|---|
| **DMR** | |
| 68014001 to 68014008 and 68014011 to 68014025 | United States of America (State Department of Transportation Airports Division) |
| 68002018 | United States of America |
| **FTI site outside of DMR** | |
| Dillingham Ridge | |
| 68001004 | State of Hawai'i |

Source: City and County of Honolulu 2003

*Dillingham Trail*

The proposed Dillingham Trail land is owned by various entities. Affected parcels are shown in Figure 6-6, and Table 6-5 lists Tax Map Keys of the affected land parcels and the associated landowners and lessees.

### *Surrounding Land Use*

*Dillingham Military Reservation*

The land surrounding DMR is generally undeveloped and includes Prime agricultural land to the east and beaches to the north, with some residences to the northeast. The Kawaihāpai reservoir and associated pumping station and aqueducts are located east of DMR (USGS 1983). Dillingham Ranch, a former cattle ranch, is approximately 1.6 miles (2.6 kilometers) west-southwest of DMR; its facilities include horse stables. Land south of DMR is mountainous and includes a state hunting area to the southwest (Figure 5-10). Conditions for hunting in this area, shown on Figure 5-10, are presented in Table 6-6. Land uses to the west include an inactive quarry immediately to the west and the YMCA's Camp Erdman and the military's Camp Ka'ena, approximately 0.7 mile (1 kilometer) west of DMR.

Mokulē'ia Beach extends along the shoreline north of DMR, across Farrington Highway. Mokulē'ia Beach Park, included north of the eastern side of DMR, is used for beachcombing, bodyboarding, fishing, snorkeling, surfing, swimming, and windsurfing (Clark 1999). Facilities include restrooms, showers, camping sites, and parking. A bikeway is proposed along Farrington Highway, but construction has not been planned (City and County of Honolulu 2000a; and Lloring 2002).

*Dillingham Trail*

The land surrounding Dillingham Trail is generally agricultural or undeveloped. The trail passes near the residential subdivision Thomson Corner (Figure 6-1).

**Table 6-5**
**Dillingham Trail Landowners and Lessees**

| Tax Map Key | Landowner (Lessee) |
|---|---|
| 64003001 | Dole Food Co., Inc. |
| 65001002 | Dole Food Co., Inc. (Waialua Sugar Co., Inc.) |
| 65002010 | George Gailbraith Trust Estate (PPI Del Monte Fresh Produce) |
| 65002011 | Dole Food Co., Inc. |
| 65002018 | Dole Food Co., Inc. |
| 65002019 | Dole Food Co., Inc. |
| 65002025 | George Gailbraith Trust Estate (PPI Del Monte Fresh Produce) |
| 66025001 | Dole Food Co., Inc. |
| 66027001 | Dole Food Co., Inc. (Haruo I. Ishida) |
| 66027007 | T. Otake & Sons, Ltd. |
| 67002004 | Dole Food Co., Inc. (Waialua Ranch Partners) |
| 67003019 | Dole Food Co., Inc. (Waialua Ranch Partners) |
| 68002005 | Dole Food Co., Inc. (Aloha Farms, Inc.) |
| 68003004 | Dole Food Co., Inc. |
| 68003006 | Metropolitan Mtg. and Securities Co., Inc. (Yusung Timber Co., Ltd.) |
| 68003009 | Dole Food Co., Inc. (Aloha Farms, Inc.) |
| 68003015 | Metropolitan Mtg. and Securities Co., Inc. (Yusung Timber Co., Ltd) Metropolitan Mtg. and Securities Co. Inc. |
| 68003030 | Metropolitan Mtg. and Securities Co., Inc. (Yusung Timber Co., Ltd.) Metropolitan Mtg. and Securities Co. Inc. |
| 68003031 | Metropolitan Mtg. and Securities Co., Inc. (Yusung Timber Co., Ltd.) Metropolitan Mtg. and Securities Co. Inc. |
| 68003040[1] | Metropolitan Mtg. and Securities Co. Inc. (Yusung Timber Co., Ltd.) Metropolitan Mtg. and Securities Co. Inc. |
| 68003041 | State of Hawaiʻi |
| 68007002 | Dole Food Co., Inc. (Waialua Sugar Co., Inc.) |
| 71001002 | George Gailbraith Trust Estate (PPI Del Monte Fresh Produce) |
| 71001003 | George Gailbraith Trust Estate (PPI Del Monte Fresh Produce) |
| 71001022 | George Gailbraith Trust Estate (Wahiawa Water Co., Inc.) |

Source: City and County of Honolulu 2003

[1]This parcel is adjacent to the Dillingham Trail alignment.

**Table 6-6**
**Hunting Near Dillingham Military Reservation**

| Conditions | Game Mammals | Game Birds |
|---|---|---|
| **Game to be taken** | Wild pigs and wild goats | Ring-neck pheasant, green pheasant; California valley quail, Japanese quail, Gambel's quail; Erckel's francolin, gray francolin, black francolin; chukar partridge; barred dove (small dove), spotted dove (large dove) |
| **Permitted hunting methods** | Rifles, shotguns, handguns, spears, bows and arrows. Dogs are permitted only from August through October. | Shotguns and bows and arrows |
| **Open hunting periods** | February through April, archery only; May through July, firearms; August through October, use of dogs allowed. | First Saturday in November through Martin Luther King Day or the third Sunday in January, whichever occurs later. There are additional special bird seasons for increased takes for the barred dove and spotted dove. |
| **Open hunting days** | Daily | Saturdays, Sundays, and state holidays |
| **Special conditions and restrictions** | Access through DMR (subject to military activities). | Public and private lands. Hunting on private lands requires permission of the landowner. The special dove seasons are limited to private lands. |
| **Hunters** | Persons who have the appropriate hunting license, tags, permits, or permit tags on their person and who have signed in at a hunter checking station. | |

Sources: DLNR 1999a, 1999b

### *Surrounding Land Ownership*

#### *Dillingham Military Reservation*

Landowners adjacent to DMR include Dole Food Co., Inc., to the east, the State of Hawai'i to the west and southeast, and Metropolitan Mtg. and Securities Co. Inc., to the south. Land ownership to the north, across Farrington Highway, includes the City and County of Honolulu, Metropolitan Mtg. and Securities Co., Inc., and the United States of America (Mokulē'ia Army Beach).

#### *Dillingham Trail*

Landowners of parcels adjacent to the proposed Dillingham Trail are the same as those listed in Table 6-5, plus the various landowners of parcels within Thomson Corner and the Metropolitan Mtg. and Securities Co., Inc.

### 6.2.2 Environmental Consequences

***Summary of Impacts***

A summary of impacts associated with land use and recreation at DMR is provided in Table 6-7. Under the Proposed Action and the Reduced Land Acquisition Alternative, less than significant impacts would occur from converting agricultural land to training land because Dillingham Trail would be constructed on agricultural roads and undeveloped land. Less than significant impacts on land use would also occur from construction of an FTI in a Conservation District, during the temporary construction of the projects, and from SBCT training on lands currently used for current force training. There would be no impacts on natural resources management or recreational land use. There would be no impacts under No Action.

**Table 6-7**
**Summary of Potential Land Use/Recreation Impacts at DMR**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Conversion of agricultural land to training land | ⊙ | ⊙ | ○ |
| Impacts on natural resources management and recreational land use | ○ | ○ | ○ |
| Construction of FTI in a Conservation District | ⊙ | ⊙ | ○ |
| Impacts on land use during construction activities | ⊙ | ⊙ | ○ |
| SBCT training on lands currently used for current force training | ⊙ | ⊙ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | | | |
|---|---|---|---|---|---|
| ⊗ | = | Significant | + | = | Beneficial impact |
| ⃠ | = | Significant but mitigable to less than significant | N/A | = | Not applicable |
| ⊙ | = | Less than significant | | | |
| ○ | = | No impact | | | |

***Proposed Action (Preferred Alternative)***

Environmental impacts discussed in this section are the result of the acquisition of an easement and construction of Dillingham Trail, the construction and operation of new communication antennas, and training associated with the SBCT transformation.

### Less Than Significant Impacts

*Conversion of agricultural land to training land.* An easement of approximately 55 acres (22.3 hectares) would be acquired and used for constructing Dillingham Trail. In general, the land use would be converted from agriculture (Prime, Unique, and Other) to training land. The trail alignment is generally through agricultural and undeveloped lands. According to the state land use law, roads can be constructed through agricultural fields (Hawai'i Revised Statutes Section 205-4.5[a][7]). Use of existing agricultural roads is preferred to minimize disruption of agricultural practices. Most of Dillingham Trail would be constructed along existing agricultural roads. The trail segment along Poamoho Gulch would be constructed along the gulch ridge to minimize impacts. Trail construction and use is not expected to significantly affect land use. The Army would consult with land owners so that, following construction of Dillingham Trail, joint use of the plantation roads would be coordinated to minimize impacts on agricultural land use.

*Construction of FTI in a Conservation District*. Construction of one antenna outside of DMR would affect a minimal area within the Conservation District. The new antenna facility would reuse an existing site, where possible, and when an existing facility is not available the new antenna would be constructed on a relatively small area (500 square feet [46 square meters]). The new facility would also be located, where possible, close to existing access roads or trails. It would be sited, painted, and landscaped to minimize their impacts on surrounding areas and users. As required in a Conservation District, endemic or indigenous plants would be used to renaturalize project areas where natural vegetation plant cover has been disturbed. Construction would be scheduled, where possible, to minimize conflicts with existing recreation activities. In addition, antenna sites are available for emergency efforts for aiding or rescuing stranded or lost hikers and hunters.

*Impacts on land use during construction activities.* During construction activities, land uses may be temporarily affected. To minimize impacts on agricultural practices, most of Dillingham Trail would be constructed along existing agricultural roads, and the trail segment along the Poamoho Gulch would be constructed along the gulch ridge.

*SBCT training on lands currently used for training.* Land use at DMR would not significantly change with the Proposed Action. Areas being used for maneuver training would continue to be used in the same manner. Vehicles used during maneuver exercises would be replaced by the Stryker vehicle. The land is expected to be used more frequently and intensively, with vehicle traffic between SBMR and DMR increasing in frequency (adding four brigade-level exercises per year), with vehicle density increasing to between 27 and 37 (an increase of 86 total vehicles on the road). However, maneuver areas would remain the same, therefore, introducing the Stryker is not considered a land use change. Public access to and use of the airfield at DMR would remain the same.

### No Impacts

*Impacts on natural resources management and recreational land use.* Projects associated with DMR and the Dillingham Trail would not affect natural resources management areas. The recreation uses of the DMR airfield and access to Keālia Trail and the hunting area southwest of DMR would not change with the Proposed Action.

***Reduced Land Acquisition Alternative***

The impacts associated with the RLA Alternative are identical to those described for the Proposed Action.

***No Action Alternative***

*No Impacts*

Under No Action, transformation would not occur, so no major changes to training areas would take place in Hawai'i. The Army would continue to operate and maintain its range, training areas, and support facilities to meet its current force training mission requirement. However, the level of training would change occasionally in response to this requirement, and, as a result, the land uses of these areas could change. If future changes could affect the environment, NEPA documentation would be prepared.

## 6.3 VISUAL RESOURCES

### 6.3.1 Affected Environment

The DMR discussion is divided into two areas, DMR and Dillingham Trail, which would extend from SBMR to DMR. The ROI includes all areas within the line of sight of activities or changes proposed at DMR or Dillingham Trail. The ROI therefore includes a wide corridor of land along the proposed route of Dillingham Trail, including views from adjacent roadways (Wilikina Drive, Kaukonahua Highway, and Farrington Highway), coastal and nearshore areas, and trails or adjacent forest preserve areas.

DMR and the northern half of Dillingham Trail are within the planning area of the North Shore Sustainable Communities Plan of the General Plan for the City and County of Honolulu. The North Shore Sustainable Communities Plan states that views of scenic resources, such as the Wai‘anae and Ko‘olau Mountain Ranges, coastal pali, the coastline, and the Pacific Ocean, from public places, including major roadways, should be preserved. New developments should seek to minimize impacts on these scenic resources, and interagency and private sector participation and cooperation in the creation, maintenance, and enhancement of views and visual resources on the North Shore should be encouraged (City and County of Honolulu 2000a, 3-17).

The southern half of Dillingham Trail is within the planning area of the Central O‘ahu Sustainable Communities Plan of the General Plan for the City and County of Honolulu. The Central O‘ahu Sustainable Communities Plan states that visual landmarks and significant vistas should be preserved (City and County of Honolulu 2002a, 3-20), but the plan does not offer any specific guidance for preserving scenic resources in the area.

#### *Landscape Character*

*Dillingham Military Reservation*

The visual landscape of DMR is largely characterized by developed features, including the airfield and associated structures, fencing, antenna support structures, and roads. The developed area is within a gently sloping coastal plain between steeply sloping irregular ridges and valleys of the Wai‘anae Mountain Range and the Pacific Ocean. Views to the south from DMR are less expansive because they are partially obscured by the ridgeline. Vegetation limits many views from within or onto DMR, except from the adjacent ridges. The Pacific Ocean is a dominant visual feature of the area near DMR, but it is largely screened from views on DMR by vegetation, fencing, or structures. The overall visual quality of DMR is low due largely to extensive modification that results in a lack of vividness, intactness, or unity.

Modifications in the surrounding area include residential uses immediately north of DMR and agricultural uses in the coastal plain areas east of DMR. These modifications give the landscape a highly ordered appearance, with strong regular lines. The area west of DMR is undeveloped and consists of grasses, low shrubs, and some mature trees that have variable densities and random ordering, resulting in a more unified and balanced visual space.

*Dillingham Trail*

The proposed Dillingham Trail would depart the proposed Helemanō Trail (see Section 5.3) near the Poamoho stream, continuing northwest along the stream channel and east of Kaukonahua Road. This portion of the route is characterized by a broad, rolling valley floor with pineapple plantations that give the landscape a fine uniform texture. Roads through this area expose the dark red soil and create visually distinct lines that tend to draw the eye across the valley and up toward the sky or surrounding mountains. Although this area offers panoramic views of the Koʻolau and Waiʻanae Mountain Ranges and is unified in some cases by the consistency of the agricultural land use, the landscape where the trail would be constructed has been extensively modified, and, based on the criteria outlined in Section 4.3.1, the overall visual quality is considered to be moderate.

As the proposed Dillingham Trail approaches Thomson Corner and Waialua, urban development begins to dominate the visual field, but agricultural uses continue. Panoramic views of the Waiʻanae Mountain Range continue throughout this area, with the Pacific Ocean as an intermittent background feature. Based on the criteria outlined in Section 4.3.1, the overall visual quality is considered to be low along this portion of the route due to the high degree of human modification to the landscape.

Between Thomson Corner and Waialua, the trail would cross Farrington Highway toward the Waiʻanae Mountain Range and enter into a broad alluvial plain at the base of the mountains. This area is predominantly in agricultural use. Agricultural fields and features dominate the foreground and middle ground, while the irregular form of the Waiʻanae Mountain Range continues to be the dominant background feature. As the route continues west, the Pacific Ocean becomes an increasingly dominant middleground to foreground feature in views to the north. Although the high degree of modification in this area diminishes the visual quality of the area, the outstanding panoramic views of the Waiʻanae Mountain Range and Pacific Ocean result in an overall moderate visual quality along this portion of the route.

### *Sensitive Views*

DMR and the northern end of Dillingham Trail are within the planning area of the North Shore Sustainable Communities Plan, which designates a number of intermittent and continuous sensitive views, including the following:

- Views of the Waiʻanae and Koʻolau Mountains, the Pacific Ocean and shoreline, and Waialua and Haleʻiwa towns, from Kamehameha Highway and Kaukonahua Road as one enters into the North Shore;
- Views of the Waiʻanae Mountains from Farrington Highway, Kaukonahua Road, and Kamehameha Highway;
- Stationary views from the shoreline, between Kaʻena Point and Makaleha Beach;
- Views of the Waiʻanae Mountain Range and agricultural fields from Crozier Drive; and
- Views from nearshore waters (City and County of Honolulu 2000a, 3-15).

Additional sensitive views in this area are associated with recreational areas along the north shore, especially Ka'ena Point State Park and Mokulē'ia Beach Park.

The Central O'ahu Sustainable Communities Plan designates a number of intermittent and continuous sensitive views in the viewshed of the Dillingham Trail, including the following:

- Northerly views from Kamananui Road between Kaukonahua Highway and Wilikina Drive; and
- Westerly views from Kaukonahua Highway from the intersection with Wilikina Drive to Thomson Corner (City and County of Honolulu 2000b, 3-21).

The North Shore Sustainable Communities Plan designates continuous scenic views along the Kamehameha Highway between Hale'iwa and Waiale'e and intermittent views on both sides of the Kamehameha Highway between the Poamoho Stream channel and Hale'iwa (City and County of Honolulu 2000a, 3-15).

As discussed in Section 6.2, DMR Land Use, public recreation/nonmilitary uses at DMR include flying glider planes, sky diving, and hang gliding. The Keālia Trail can be accessed through the western portion of DMR and is open to the general public on weekends and state holidays, except when military maneuvers are scheduled (USARHAW and 25th ID [L] 2001a). A publicly accessible Army wild pig hunting area is designated inland of the airfield on DMR.

### 6.3.2 Environmental Consequences

This section addresses the environmental consequences of the Proposed Action, Reduced Land Acquisition, and No Action alternatives on visual resources.

#### *Summary of Impacts*

Construction of two FTI antenna support structures (Dillingham ARPT and Dillingham P1, Figure 2-7) approximately half a mile (0.8 kilometer) east of DMR would have a <u>less than</u> significant impact on views. Limited training would be conducted at DMR under the Proposed Action but would generally be screened from view by higher vegetative cover around the post and would not significantly affect visual resources. The proposed Dillingham Trail would not substantially alter the landscape due to previous disturbance and active agricultural use, but it would result in significant but mitigable impacts on views along the route. Potential impacts on visual resources are summarized in Table 6-8.

#### *Proposed Action (Preferred Alternative)*

##### <u>*Significant Impacts Mitigable to Less than Significant*</u>

<u>*Impact 1: Modification of the existing views—construction of Dillingham Trail.*</u> Although the proposed Dillingham Trail would be within an area disturbed by agricultural practices and containing a number of agricultural roads, the trail would be visible from a number of major roadways and from portions of these roadways that are designated as scenic.

**Table 6-8**
**Summary of Potential Visual Resources Impacts at DMR**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Impairment of view during the construction phase | ⊙ | ⊙ | ○ |
| Modification of existing view | ⦸ | ⦸ | ○ |
| Alteration of the landscape character | ⊙ | ⊙ | ○ |
| Consistency with visual resource policies | ⊙ | ⊙ | ○ |
| Impairment of views from visible fugitive dust | ⊙ | ⊙ | ○ |
| Alteration of nighttime light and glare | ⊙ | ⊙ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | | |
|---|---|---|---|---|
| ⊗ | = Significant | + | = | Beneficial impact |
| ⦸ | = Significant but mitigable to less than significant | N/A | = | Not applicable |
| ⊙ | = Less than significant | | | |
| ○ | = No impact | | | |

Segment one of the trail from the Helemanō Trail to Thomson Corner would be east of Kaukonahua Road, a designated continuous panoramic view, and west of Kamehameha Highway, an intermittent panoramic view; however, the trail would not be visible from either of these views due to intervening topography and vegetation (Photo 6-1). <u>Dillingham Trail is not readily visible from Kaukonahua Road, but Stryker and other vehicles traveling along the trail can be seen from Kaukonahua Road along a few points for short distances. The Army vehicles may be seen as they cross under Kaukonahua Road.</u> The impact on views along this segment of the trail would be minor.

Segment two of the trail in the vicinity of Thomson Corner would be within a highly modified area and not within any views designated as sensitive (Photo 6-2). The impact on views along this segment of the trail would be minor.

Segment three of Dillingham Trail from the highway crossing near Thomson Corner to DMR would be south of Farrington Highway and within a designated continuous panoramic view. Although the foreground and middle ground views from these locations have been altered by agricultural practices, this area is considered to be of medium sensitivity due to the expansive views and the scenic view designations. The proposed trail alignment would be within disturbed agricultural areas. Because of the low viewing angle of the trail from Farrington Highway, vegetation and topography would obstruct views of the trail alignment (Photo 6-3). The impact on views along this segment of the trail would therefore be low to moderate.

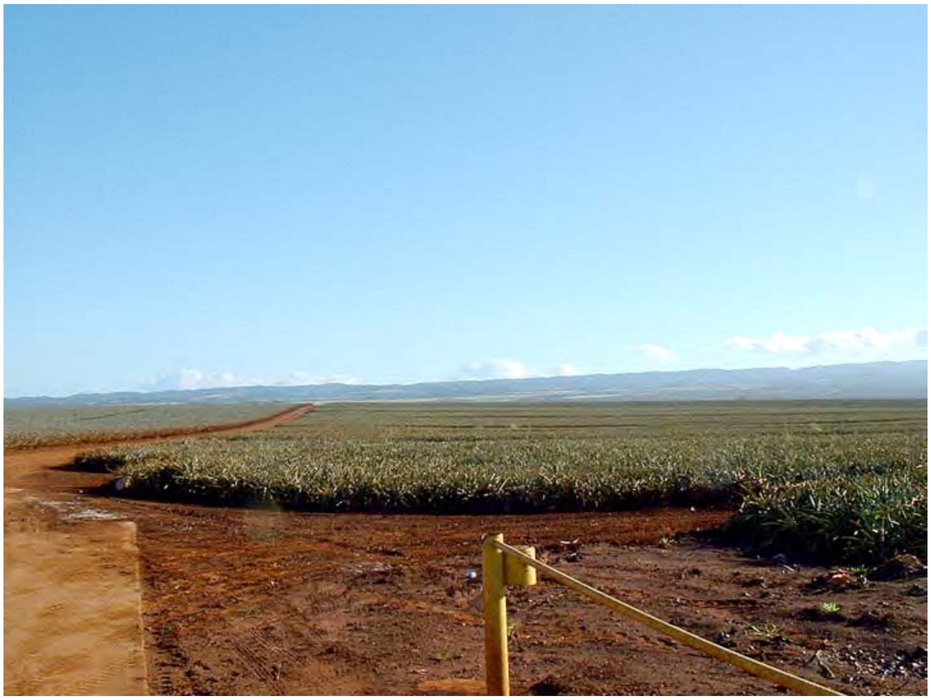


Photo 6-1. View from Kaukonahua Road looking east.

Photo 6-2. View from Farrington Highway looking north at proposed trail crossing location.

Photo 6-3. View from Farrington Highway looking south.

*Regulatory and Administrative Mitigation 1.* None proposed.

*Additional Mitigation 1.* The Army proposes to construct military vehicle trails to conserve existing natural features, including terrain and vegetative cover, to the extent practicable. Use of roadbed materials that contrast sharply with existing conditions will be avoided to the extent practicable. To avoid creating a discordant linear feature, the road alignment would, where possible, follow the natural contours of the land. Cut slopes would be minimized or avoided, where practicable, and would be blended into the landscape by rounding the edges of the slope and by differentially orienting the slope and the road bed alignments where practicable. Use of these techniques would be varied, based on the specific conditions, including depth of the cut, orientation of the slope, and type of material (e.g., dirt slope and rock slope).

### *Less than Significant Impacts*

*Modification of the existing views—installing FTI.* Two FTI antenna support structures would be constructed at DMR and one approximately 1.5 mile (2 kilometers) south of DMR on the ridge. These towers would be in areas visible from designated scenic areas along Farrington Highway and the coastline, as well as from Keālia Trail (photos 6-4 and 6-5). These views would be partially screened by existing vegetation. This area has been altered by development and agriculture. The height of the towers on DMR would be 42 feet (13 meters), and the height of the tower on the ridge would be 30 feet (nine meters). Given the height of the towers and the level of modification to the natural environment around DMR, potential impacts from the towers on views would be less than significant.

Photo 6-4. View of DMR from Farrington Highway looking southeast.

Photo 6-5. View of DMR from Keālia Trail looking northeast.

*Modification of the existing view—training activities*. Under the Proposed Action, training exercises would continue at DMR. The Army would continue to operate and maintain its training assets there to meet its mission requirement. The level of use of these training assets is expected to remain approximately the same under the Proposed Action. Taking into consideration the limited changes occurring at DMR from the Proposed Action, the potential impact on views from changed training activities would be less than significant.

SBCT-related vehicles on the Dillingham Trail would be visible from potentially sensitive viewpoints, but these impacts would be intermittent and temporary and would be similar in character to large-scale agricultural activities (e.g., farm equipment and trucks) in the area. UAV use at DMR would also be an intermittent and temporary use that would be similar in character to existing uses at the airfield and would not significantly affect existing views.

*Alteration of landscape character.* Construction of Dillingham Trail would occur in an area that is heavily disturbed and contains a large number of features associated with agricultural use of the area (e.g., row crops patterns, roads, buildings). Construction of the trail in this area would not substantially alter the landscape character.

*Impairment of view during the construction phase.* Dillingham Trail would be constructed within the viewshed of several sensitive view corridors, but because these areas are intensively farmed, road construction would not be substantially inconsistent with current agricultural practices in the area.

*Consistency with visual resource policies.* SBCT training activities at DMR would not alter views from public roadways or sensitive view areas and would be substantially consistent with the visual preservation objectives stated in the Central O'ahu and North Shore Sustainable Communities Plan. Measures described above would ensure consistency of the road construction with visual resource preservation policies.

*Impairment of views from visible fugitive dust.* As discussed in Section 6.5, training at DMR would increase fugitive dust. $PM_{10}$ emissions from military vehicle use on unpaved roadways and off-road areas would increase. (Section 6.9 includes a discussion of soil erosion.) Coastal winds would help dissipate the clouds so that the dust would not stay suspended in the air for an extended duration. It is assumed the fugitive dust and soil mitigation measures identified in Sections 6.5 and 6.9 would be implemented to keep soil erosion and compaction to a minimum. As a result, visual impacts would be less than significant with respect to visible fugitive dust.

*Alteration of nighttime light and glare.* Under the Proposed Action, the use of nighttime lighting devices, such as flares, during training might increase slightly. The use of these devices is not expected to increase dramatically because training in the use of night vision goggles would be conducted at night. Visual impacts would be less than significant with respect to altering nighttime light and glare.

### *Reduced Land Acquisition Alternative*

The impacts associated with Reduced Land Acquisition would be identical to those described for the Proposed Action.

### *No Action Alternative*

*No Impacts*

Under No Action, training exercises would continue at DMR. The Army would continue to operate and maintain its training area facilities in order to meet its training mission requirement. Invariably, the level of training would change occasionally in response to this requirement and consequently, the visual impact of these changes may alter as well. The level of use of the installation's training assets is not anticipated to alter the physical character of the landscape itself.

## 6.4 AIRSPACE

### 6.4.1 Affected Environment

The affected airspace environment is described below in terms of its principal attributes, namely controlled and uncontrolled airspace, special use airspace, military training routes, en route airways, airports and airfields, and air traffic control. Jet routes, all above 18,000 feet (5,486.4 meters), are well above the activities proposed and thus are not considered as part of the ROI. The maximum height of each FTI antenna will be 100 feet (33 meters) or the FAA-approved height, whichever is lower. Prior to final design, the Army will coordinate with FAA to ensure that each antenna does not obstruct air navigation, including approach and departure clearance near any runway or airfield.

#### *Controlled and Uncontrolled Airspace*

The airspace in the DMR ROI is composed of Class G (uncontrolled) airspace from the surface to a ceiling of 1,200 feet (365.8 meters) and Class E (controlled) airspace above 1,200 feet (365.8), with the exception of the special use airspace discussed below. Appendix F provides a full definition of the different classes of airspace and an explanatory diagram.

#### *Special Use Airspace*

The R-3110 B & C restricted area lies to the south of Dillingham Airfield. Just north of the airfield, three nautical miles off the north shore of O‘ahu, is the W-189 warning area. (The effective altitudes, time of use, and controlling agencies for these special use airspace areas are given in Table 6-9). During the published hours of use, the agency using the airspace is responsible for controlling all military activity within a restricted area and determining that its perimeters are not violated. When the airspace is inactive, the using agency releases it back to the controlling agency or center, and, in effect, the airspace is no longer restricted.

#### *Military Training Routes*

There are no formal, published military training routes in the DMR airspace ROI.

**Table 6-9**
**Special Use Airspace in the Dillingham Military Reservation Region of Influence**

| Number/Name | Effective Altitude (in feet) | Time of Use | Controlling Agency |
|---|---|---|---|
| R-3110B | 9,000 to 19,000[1] (2,743 to 5,791 meters) | Intermittent[2] | Honolulu ARTCC |
| R-3110C | To 9,000[1] ( To 2,743 meters) | Intermittent[2] | Honolulu ARTCC |
| W-189 | To Unlimited | 0700-2200 Monday-Friday<br>0800-1600 Saturday-Sunday | Honolulu CERAP |

Source: NACO 2002
Notes:
ARTCC = Air traffic control center

[1]To but not including the indicated altitude
[2]By notice to airmen (NOTAM)

#### *En Route Airways*

No low altitude en route airways enter or transect the ROI, but general aviation aircraft use the airspace in the ROI. This includes all civil aviations operations, other than scheduled air services and unscheduled air transport for hire.

#### *Airports and Airfields*

Dillingham Airfield is the only airport in the airspace ROI. The area around Dillingham Airfield on the north shore of Oʻahu is indicated on aeronautical charts as a glider operating area (NACO 2002). In addition, Dillingham Airfield is a center for skydiving and for vintage airplane and aerobatic flights. The airfield has an average of 167 takeoffs and landings per day, 97 percent local general aviation and 3 percent military (AirNav.Com 2002).

Dillingham Airfield is a joint-use military/civil airfield, portions of which have been leased to the State of Hawaiʻi Department of Transportation. The lease only allows civil operations during daylight hours; night operation is reserved for military operations. The Army can close the airfield for daytime military operations with prior notification to the State of Hawaiʻi Department of Transportation.

#### *Air Traffic Control*

Air traffic in the ROI is managed by the Honolulu Control Facility. Dillingham Airfield does not have a control tower.

### 6.4.2 Environmental Consequences

This section addresses the environmental consequences of the Proposed Action and No Action on airspace.

#### *Summary of Impacts*

The Proposed Action, Reduced Land Acquisition, and No Action alternatives would have no impacts on DMR airspace ROI. Table 6-10 summarizes the airspace impact issues at DMR.

#### *Proposed Action (Preferred Alternative)*

No Impacts

*Reduction in Navigable Airspace*. There would be no requirement for new or modified special use airspace to accommodate the Proposed Action nor any requirement for the imposition of any flight restrictions, thus no reduction in the ROI's navigable airspace.

*New or Modified Special Use Airspace.* The proposed UAV flights would normally be conducted within the R-3109 and R-3110 restricted area complex south of DMR or within the W-189 warning area off the northern coast of Oʻahu; thus, the UAV flights would use existing special use airspace. Although the nature and intensity of utilization varies over time and by individual special use airspace area, the proposed UAV flights represent precisely the kinds of activities that the special use airspace was created for. Restricted areas contain airspace within which the flight of aircraft, while not wholly prohibited, is subject to restrictions. Activities within these areas must be confined because of their nature or limitations imposed on aircraft operations that are

**Table 6-10**
**Summary of Potential Airspace Impacts at DMR**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Reduction in navigable airspace | ○ | ○ | ○ |
| New-modified special use airspace | ○ | ○ | ○ |
| Change to a military training route | ○ | ○ | ○ |
| Change in en route airways or IFR procedure | ○ | ○ | ○ |
| Restriction of access to airport/airfield | ○ | ○ | ○ |
| Obstruction to air navigation | ○ | ○ | ○ |
| Aviation safety | ○ | ○ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | |
|---|---|---|---|
| ⊗ = | Significant | + | = Beneficial impact |
| ⃠ = | Significant but mitigable to less than significant | N/A | = Not applicable |
| ⊙ = | Less than significant | | |
| ○ = | No impact | | |

not part of these activities, or both. Warning areas contain activity that may be hazardous to nonparticipating aircraft, and pilots are warned of the potential danger and must abide by the operating rules of Federal Aviation Regulations, Part 91. As such, the UAV flights would not represent an adverse impact on special use airspace and would not conflict with any airspace plans, policies, or controls. UAV flights are also addressed under aviation safety.

*Change to a Military Training Route.* There are no published military training routes in the ROI, and no new aircraft activity is proposed at DMR. Consequently, no changes to military training routes would result.

*Change in En Route Airways, or IFR Procedures.* There are no low altitude en route airways in the DMR airspace ROI, and no new aircraft activity is proposed at DMR. Consequently, no changes to existing or planned IFR minimum flight altitude, published or special instrument procedure, or IFR departure procedures would be required, and VFR operations would not be required to change from a regular flight course or altitude.

*Restriction of Access to Airports/Airfields.* With no new aircraft activity associated with the Proposed Action, access to, or the use of, airports/airfields available for public use, would not be affected, and commercial or private airport/airfield arrival and departure traffic flows would not be affected.

*Obstruction to Air Navigation*. Construction of two 42-foot (12.8-meter) FTI antenna support structures (Dillingham ARPT and Dillingham P1, Figure 2-7) along the road to DMR would be well below the 500-foot (152.4 meter) above ground level threshold for an obstruction to air navigation specified by the FAA (FAA 2001). The antenna support structures would also be at sufficient distance from the Dillingham Airfield runway to be well below the civilian and military airport imaginary surface thresholds (FAA 2001) and thus would not constitute an obstruction to air navigation. Construction and operation of Dillingham Trail would have no impacts on airspace.

*Aviation Safety.* With no new aircraft activity proposed, no new aviation safety issues, and no adverse impacts on public health and safety are anticipated. The strict procedures and rules in place governing flight operations in both controlled/uncontrolled navigable airspace and special use airspace, coupled with the Army's excellent aviation safety record in Hawai'i make future adverse impacts on public health and safety extremely unlikely.

For those UAV flights that could not be contained wholly within restricted area or warning areas, their operations would be conducted in accordance with well-defined FAA procedures for remotely operated aircraft. At least 60 days before UAV operations, the FAA regional office in Honolulu would have to approve the UAV flights, which would be contingent on the Army demonstrating that the flights would be as safe as those for manned aircraft. Methods include radar observation, forward or side-looking cameras, electronic detection systems, observation from one or more ground sites, or a combination thereof (FAA 2001). In addition, coordination, communications, route and altitude procedures, and lost link/mission abort procedures would all have to be identified. Authorized UAV flights and the other proposed training activities at DMR would have no adverse impact on aviation safety and thus public health and safety.

### Reduced Land Acquisition Alternative

The impacts associated with RLA would be identical to those described for the Proposed Action.

### No Action Alternative

#### No Impacts

Continued support for current force training at DMR would have no impacts on controlled and uncontrolled navigable airspace, special use airspace, military training routes, en route airways, or airports/airfields and would not create obstructions to air navigation in the airspace ROI. Existing conditions would continue under No Action. Under the status quo of No Action, there would be no impacts because none of the factors considered in determining impacts apply.

## 6.5 AIR QUALITY

### 6.5.1 Affected Environment

There are no air quality monitoring stations close to DMR. The closest air quality monitoring stations are on the south side of O'ahu. Vehicle traffic and aircraft flight operations represent the major Army emission sources that are present intermittently at DMR. Live-fire training exercises are not conducted at DMR, but blank ammunition and ground-based smoke devices are used in other types of training exercises. Army use of the airfield at DMR is rather limited, accounting for about three percent of total annual flight operations. DMR sometimes is used as a refueling and re-arming location for Army OH-58D helicopters during training operations at other installations (Fanscher 2003). Private aircraft are the dominant users of Dillingham Airfield.

There are no meteorological stations at DMR, but the Army has a remote weather station on the ridge between DMR and MMR. The Mākua Ridge monitoring station is probably more representative of conditions at DMR than is the Army's monitoring station at KTA. Wind speeds recorded on the northeast shore of O'ahu tend to be stronger than those that would occur at DMR. Maximum wind speeds exceed the 15 mph (24 kph) threshold commonly associated with wind erosion processes about nine percent of the time.

### 6.5.2 Environmental Consequences

#### *Summary of Impacts*

One significant air quality impact has been identified at DMR under the Proposed Action or the RLA Alternative. Fugitive dust $PM_{10}$ emissions from military vehicle use on unpaved roadways and off-road areas would increase by 211 tons (191 metric tons) per year compared to No Action conditions. Visible dust is a clear indication of airborne $PM_{10}$ concentrations that are typically in the range of several thousand micrograms per cubic meter. It takes only a few hours of such concentrations to produce a 24-hour average that exceeds the state and federal 24-hour average $PM_{10}$ standard of 150 micrograms per cubic meter. Dispersion modeling analyses indicate that fugitive dust emissions from vehicle travel on the DMR military vehicle trail have the potential for violating the federal 24-hour $PM_{10}$ standard at moderate distances beyond the trail right-of-way. $PM_{10}$ represents the size fractions of suspended particulate matter that are likely to penetrate into the lower respiratory tract, creating potential adverse health effects. The substantial increase in fugitive $PM_{10}$ emissions from military vehicle use at DMR, the potential for exceeding the federal 24-hour $PM_{10}$ standard, and the potential impacts on quality of life to surrounding communities result in a significant air quality impact at DMR under the Proposed Action. The impact from fugitive dust emissions would be reduced to a less than significant level through mitigation programs that include using washed gravel on military vehicle trails, periodically applying dust control chemicals, and developing an adaptive management program to manage training area lands and to modify training procedures as necessary to ensure compliance with federal air quality standards.

Construction activities associated with DMR under the Proposed Action or Reduced Land Acquisition would include three FTI antennas and Dillingham Trail. Maximum annual emissions from construction activities would be 56 tons (51 metric tons) of nitrogen oxide emissions in 2006. Nitrogen oxide emissions are of concern primarily as an ozone precursor. Emissions of ozone precursors from construction activities associated with the Proposed Action or the RLA Alternative would be too small to have a measurable effect on ozone levels, and would not change the attainment status of the area. Compared to No Action, ordnance use quantities at DMR would decrease by about 25 percent under the Proposed Action or the RLA Alternative. Because emission quantities from ordnance use are very small and include only trace quantities of hazardous components, no significant air quality impacts would occur and there would be no change in the attainment status of the area.

SBCT Transformation would add the Stryker armored vehicle to the tactical and support vehicle inventory used at DMR. As a result, vehicle use and resulting vehicle engine emissions would increase at DMR under the Proposed Action or the RLA Alternative. The net increase in military vehicle engine emissions would be 0.45 tons (0.4 metric tons) per year for reactive organic compounds, 4.3 tons (3.9 metric tons) per year for nitrogen oxides, 1.3 tons (1.2 metric tons) per year for carbon monoxide, 0.05 ton (0.05 metric ton) per year for sulfur oxides, and 0.39 ton (0.35 metric tons) per year for $PM_{10}$. The net increase in military vehicle engine emissions would be too small to have meaningful effects on ambient air quality conditions or to affect the attainment status of the project area. Consequently, the increase in military vehicle engine emissions would have a less than significant impact on air quality.

Increased off-road vehicle use under the Proposed Action or RLA Alternative would increase the extent of land disturbance by vehicle use, leading to an increase in wind erosion at DMR. The net increase of 30 tons (27 metric tons) per year of emissions would be too small to have a meaningful effect on ambient air quality conditions. Consequently, increased wind erosion would have a less than significant air quality impact at DMR. The addition of UAV flight operations at DMR under the Proposed Action or the RLA Alternative would result in a less than significant increase in overall aircraft emissions associated with DMR.

There would be no change in the risk of wildfires at DMR under the Proposed Action or RLA. Emissions associated with wildfires at DMR would remain a less than significant impact. No personnel are based at DMR, so there would be no air quality impact at DMR from changes in personnel numbers under the Proposed Action or RLA.

Table 6-11 summarizes the significance of air quality impacts at DMR under the Proposed Action, RLA, and No Action.

### *Proposed Action (Preferred Alternative)*

#### *Significant Impacts Mitigable to Less Than Significant*

*Impact 1: Fugitive dust from military vehicle use.* $PM_{10}$ emissions would be approximately 537 tons (487metric tons) per year, an increase of about 211 tons (191 metric tons) per year compared to No Action conditions. Approximately 32 percent of the net increase in fugitive $PM_{10}$ emissions would be associated with vehicle travel on unpaved roads, while the remaining 68 percent represents potential emissions from off-road vehicle maneuver activity.

Fugitive dust generated by off road military vehicle maneuver traffic inside DMR poses a limited potential for creating either nuisance conditions at nearby off-post locations or localized violations of the state or federal 24-hour average $PM_{10}$ standards. $PM_{10}$ represents the size fractions of suspended particulate matter that are likely to penetrate into the lower respiratory tract, creating potential adverse health effects. DMR is used primarily for logistics training activities, much of which occurs in the portion of DMR near the airfield. Tactical vehicle maneuver training would be limited at DMR. Soils in the level areas near the airfield

**Table 6-11**
**Summary of Potential Air Quality Impacts at Dillingham Military Reservation**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Emissions from construction activities | ⊙ | ⊙ | ○ |
| Emissions from ordnance use | ⊙ | ⊙ | ⊙ |
| Engine emissions from military vehicle use | ⊙ | ⊙ | ⊙ |
| Fugitive dust from military vehicle use | ⊘ | ⊘ | ⊙ |
| Wind erosion from areas disturbed by military vehicle use | ⊙ | ⊙ | ⊙ |
| Emissions from increased aircraft operations | ⊙ | ⊙ | ⊙ |
| Emissions from wildfires | ⊙ | ⊙ | ⊙ |
| Other emissions from personnel increases | ○ | ○ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
+ = Beneficial impact
N/A = Not applicable

have a high sand content, resulting in rapid settling of dust generated by off-road vehicle activity. The nature of the training activities and the rapid settling of dust particles minimize the potential for significant $PM_{10}$ impacts beyond the installation boundaries.

As discussed in Section 4.5, dispersion modeling analyses have been performed to better evaluate the potential for violations of the federal $PM_{10}$ standard due to fugitive dust emissions from military vehicle trails. Vehicle convoys on the DMR Trail would vary in size, ranging from just a few vehicles to as many as 120 for a major exercise at DMR. However, most convoys would not travel to DMR or return to SBMR on the same day. Thus, total traffic volumes on the DMR Trail might be as high as 112 vehicles per day. If road surfaces are dry and winds are light, even relatively modest numbers of vehicles can create sufficient dust to cause downwind $PM_{10}$ concentrations of more than 150 micrograms per cubic meter. In the absence of any dust control measures, daily traffic volumes of about 100 vehicles per day have the potential for causing $PM_{10}$ problems at locations within 2,000 feet (610 meters) of the roadway. Lower daily traffic volumes could cause $PM_{10}$ problems over shorter distances.

Potential $PM_{10}$ problems from vehicle traffic on the DMR Trail can be reduced to a less than significant level by a combination of feasible mitigation measures, including the use of washed gravel for surfacing military vehicle trails and/or implementing a dust management program that may include periodic application of chemical dust suppressants. Alternative dust control compounds include environmentally friendly hygroscopic salts (such as calcium chloride or magnesium chloride solutions) or synthetic polymer compounds (such as polyvinyl acetate and vinyl acrylic). If properly applied, dust control measures for unpaved roads would be expected to achieve at least 90 percent control of fugitive dust under the weather conditions and roadway use levels prevalent at USARHAW installations.

Expected $PM_{10}$ concentrations downwind of the DMR Trail on a maximum use day are illustrated in Figure 6-7, where the modeling results assume implementation of the proposed dust management program. The assumed daily traffic volume of 112 vehicles per day would occur infrequently. Most days would have significantly less vehicle traffic and thus would have lower fugitive dust impacts than indicated in Figure 6-7.

The Dillingham Trail already is planned as a gravel road, with paved sections where necessary to control erosion problems. The gravel surface has been taken into account in the fugitive dust emission estimates. Dust generation could be further reduced by washing gravel after it is produced by rock crushing operations. Asphalt or concrete paving of the entire trail would further reduce dust generation from vehicle travel but might involve unacceptable costs. Water evaporates too rapidly to provide effective dust control for any extended period of time. The necessity for frequent repeat treatments often makes water application for on-going dust control an impractical option in warm climates. Thus, simple water sprays are not recommended for dust control on unpaved roads at USARHAW installations.

The substantial increase in fugitive $PM_{10}$ emissions from military vehicle use at DMR, the potential for exceeding the federal 24-hour $PM_{10}$ standard, and the potential impacts on quality of life to surrounding areas result in a significant air quality impact at DMR under the Proposed Action. The impact from fugitive dust emissions would be reduced to a less than significant level through mitigation programs that include using washed gravel on military vehicle trails, periodically applying dust control chemicals, and developing an adaptive management program to manage training area lands and modify training procedures as necessary to ensure compliance with federal air quality standards. Given the anticipated effectiveness of feasible mitigation measures, fugitive dust from vehicle travel on unpaved areas at DMR is considered a significant but mitigable to less than significant impact.

*Regulatory and Administrative Mitigation 1*. The Army will develop and implement a DuSMMoP for the training area. The plan will address measures such as, but not limited to, restrictions on the timing or type of training during high risk conditions, vegetation monitoring, dust monitoring, soil monitoring, and buffer zones to minimize dust emissions in populated areas. The Army will use the plan to determine how training will occur in order to keep fugitive dust emissions below CAA standards for $PM_{10}$ and soil erosion and compaction to a minimum. The Army will monitor the impacts of training activities to ensure that emissions stay within the acceptable ranges as predicted and that environmental problems do not result from excessive soil erosion or compaction. The plan will also define contingency measures to mitigate the impacts of training activities that exceed the acceptable ranges for dust emissions or soil compaction.

The Army will continue to implement land restoration measures identified in the INRMP. Mitigation measures include, but are not limited to, implementing the ITAM program to

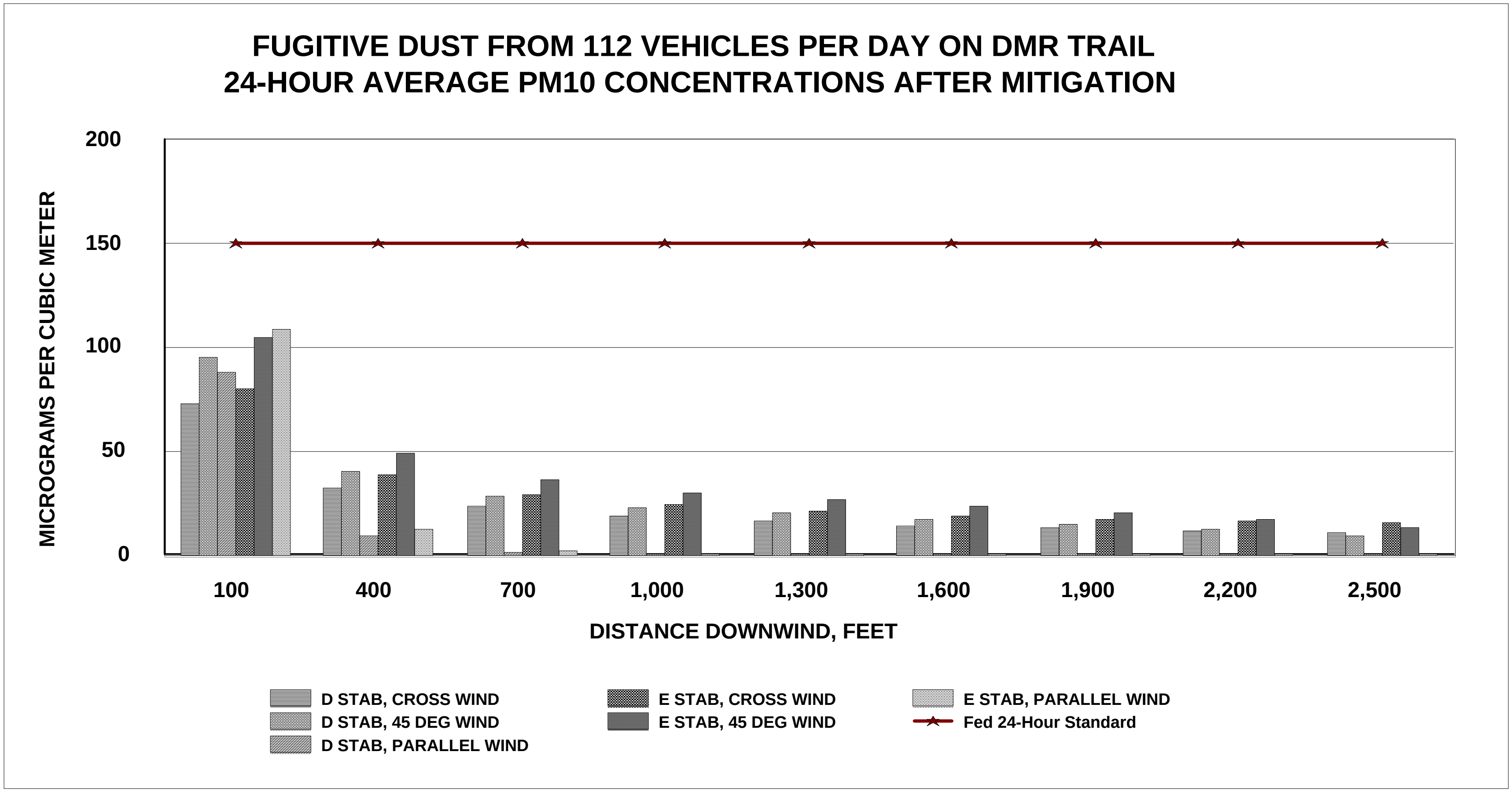



Chart shows potential $PM_{10}$ concentrations under varied weather conditions: three wind directions relative to the local trail alignment and two atmospheric stability conditions (neutral D stability and mild inversion E stability).

Figure 6-7. Potential $PM_{10}$ Concentrations Along DMR Trail With Proposed Dust Control Mitigation Program identify and inventory land condition using a GIS database; coordinating between training planners and natural resource managers; implementing land rehabilitation measures identified in the INRMP; monitoring the effectiveness of the land rehabilitation measures; evaluating erosion modeling data to identify areas in need of improved management; and implementing education and outreach programs to increase user awareness of the value of good land stewardship.

To reduce fugitive dust associated with the use of military vehicle trails, the Army will implement dust control measures, such as applying dust control chemicals, using washed gravel for surfacing, spraying water, or paving sections of trails. The extent of gravel washing would have to balance dust reduction goals with engineering requirements for achieving a stable roadway surface. Selecting the appropriate dust control products would be based on testing alternative products on dirt and gravel road segments. Based on general characteristics and performance elsewhere, environmentally friendly synthetic polymers (such as polyvinyl acetate and vinyl acrylic) and hygroscopic salt solutions (such as calcium chloride or magnesium chloride) appear to be the most promising groups of dust control agents. The Army will monitor road surface conditions and will apply palliatives as necessary. If moisture levels are adequate to suppress dust, then applying dust palliatives would not be necessary. To the extent possible, the Army would plan dust suppressant applications to be scheduled to immediately precede periods of significant convoy traffic.

### *Less than Significant Impacts*

*Emissions from construction activities.* The Proposed Action would include two construction projects at DMR, with construction activities occurring from 2005 into 2007. Construction projects would include a military vehicle trail between SBMR and DRM and three FTI antennas. Most construction activity would be completed in 2006. Figure 6-8 summarizes estimated emissions from the construction projects according to current construction schedules. Maximum annual emissions from construction equipment would be 56 tons (51 metric tons) per year of nitrogen oxide emissions in 2006. Nitrogen oxide emissions are of concern primarily as an ozone precursor. Emissions of ozone precursors from construction activities associated with the Proposed Action would be too small to have a measurable effect on ozone levels, and would not change the attainment status of the area. Consequently, construction activities at DMR would have a less than significant air quality impact under the Proposed Action.

Construction contractors will comply with the provisions of Hawaii Administrative Rules, Sec. 11-60.1-33 on Fugitive Dust as part of the requirements of construction contracts.

*Emissions from ordnance use.* Live ordnance is not used at DMR, but blank ammunition and ground-based smoke devices are used for some training exercises. The total estimated ordnance use by the 2nd Brigade at all USARHAW installations would decrease by about 25 percent under the Proposed Action. Smoke, flare, and simulator items would remain the predominant munitions used at DMR. Emissions from ordnance use have not been quantified. However, as discussed in Chapter 5, Section 5.5.2, pollutant emission quantities from ordnance use are small. Based on the general nature of detonation processes and the very low emission rates that have been published in studies of munitions firing and open detonations, emissions associated with ordnance use at DMR pose very little risk of creating adverse air quality impacts. Consequently, air quality impacts from munitions use under the Proposed Action are considered less than significant.

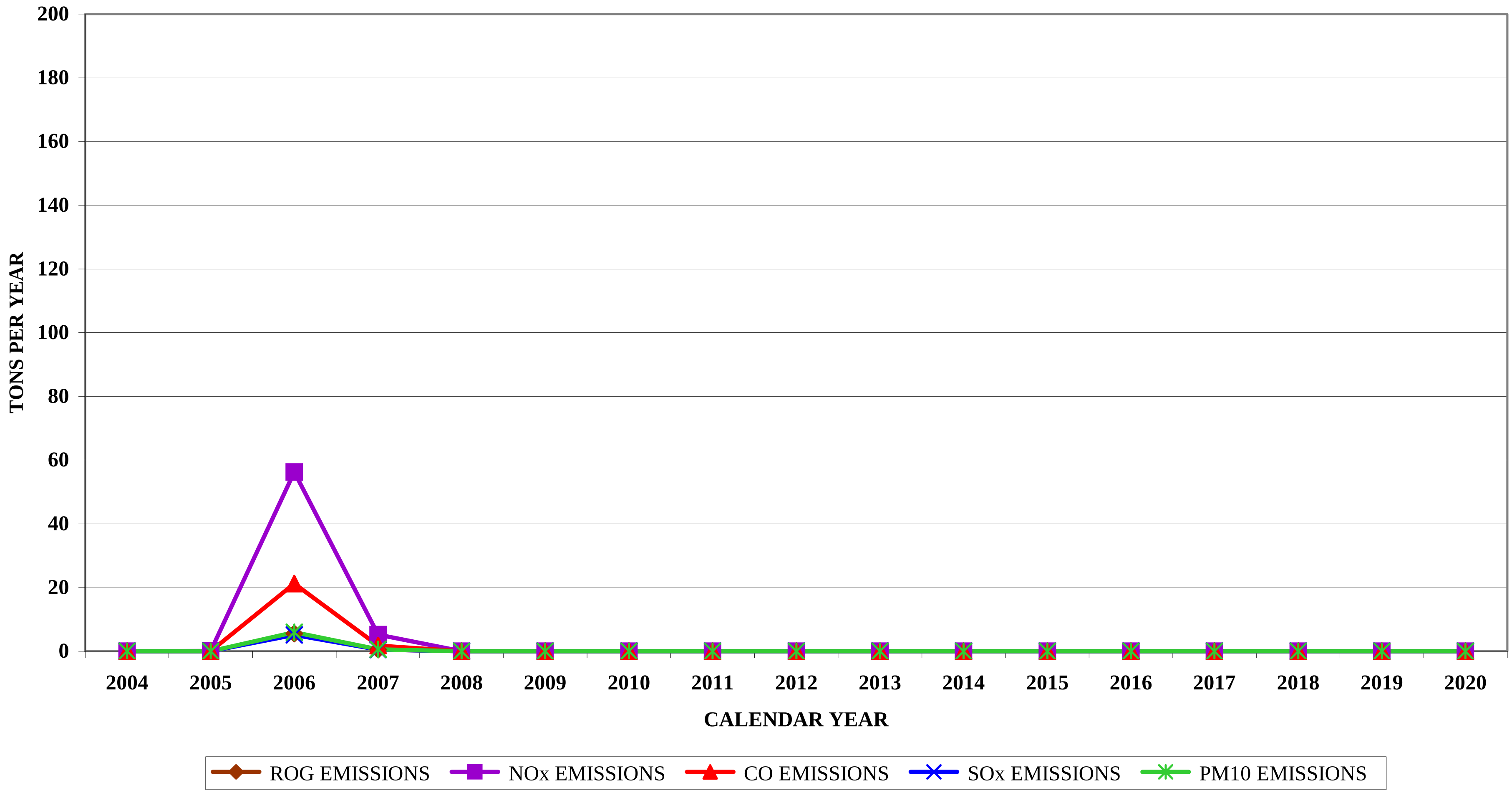



Figure 6-8 Estimated Emissions from Construction Projects at Dillingham Military Reservation

_Engine emissions from military vehicle use._ Estimated annual use of military vehicles at DMR would result in a 32 percent increase in annual military vehicle emissions, compared to No Action. Figure 6-9 summarizes an estimated net increase in annual engine emissions from military vehicle use at DMR under the Proposed Action. The net increase in military vehicle engine emissions would be 0.45 tons (0.4 metric tons) per year for reactive organic compounds, 4.3 tons (3.9 metric tons) per year for nitrogen oxides, 1.3 tons (1.2 metric tons) per year for carbon monoxide, 0.05 ton (0.05 metric ton) per year for sulfur oxides, and 0.39 ton (0.35 metric tons) per year for $PM_{10}$. The net increase in military vehicle engine emissions would be too small to have meaningful effects on ambient air quality conditions or to affect the attainment status of the project area. Consequently, emissions from military vehicle use at DMR would be a less than significant impact under the Proposed Action.

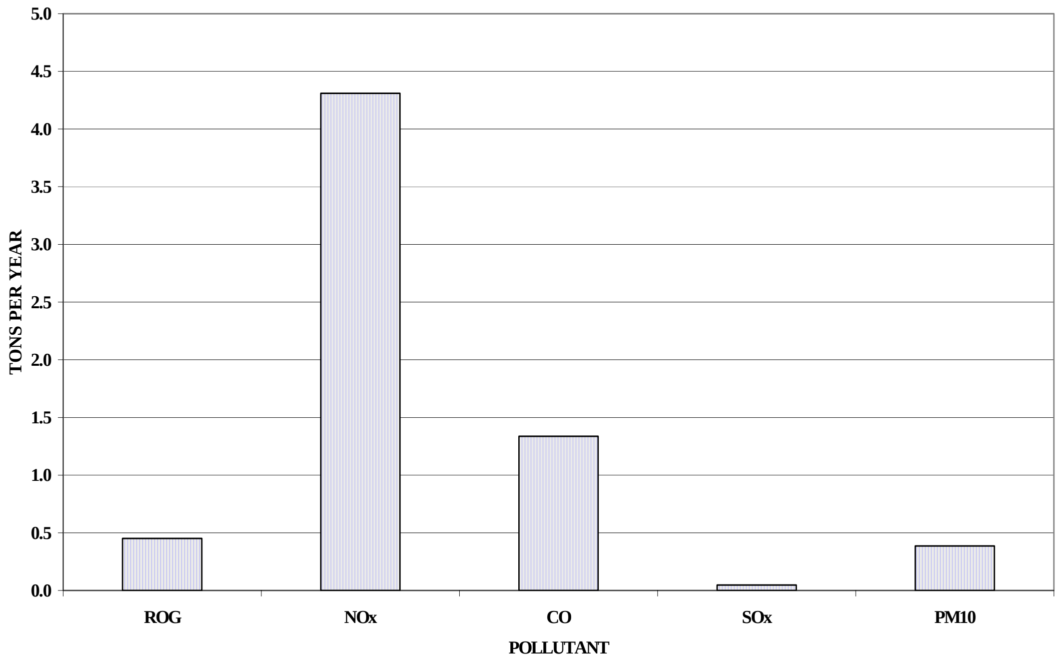



Figure 6-9. Net Change in Military Vehicle Emissions for the Proposed Action: Dillingham Military Reservation

_Engine emissions from military vehicle use._ Estimated annual use of military vehicles at DMR would result in a 32 percent increase in annual military vehicle emissions, compared to No Action. Figure 6-9 summarizes an estimated net increase in annual engine emissions from military vehicle use at DMR under the Proposed Action. The net increase in military vehicle engine emissions would be 0.45 tons (0.4 metric tons) per year for reactive organic compounds, 4.3 tons (3.9 metric tons) per year for nitrogen oxides, 1.3 tons (1.2 metric tons) per year for carbon monoxide, 0.05 ton (0.05 metric ton) per year for sulfur oxides, and 0.39 ton (0.35 metric tons) per year for $PM_{10}$. The net increase in military vehicle engine emissions would be too small to have meaningful effects on ambient air quality conditions or to affect the attainment status of the project area. Consequently, emissions from military vehicle use at DMR would be a less than significant impact under the Proposed Action.

*Wind erosion from areas disturbed by military vehicle use.* Off-road vehicle activity can reduce or eliminate vegetation cover in affected areas, resulting in increased susceptibility to wind erosion. The amount of off-road vehicle activity at DMR would increase by 28 percent under the Proposed Action. This increase in off-road vehicle activity would reduce vegetation cover in the maneuver areas. An estimated 90.5 tons (82 metric tons) per year of $PM_{10}$ would be generated by wind erosion from the affected areas, a net increase of about 30 tons (27 metric tons) per year compared to No Action. The net increase in emissions would be too small to have a meaningful effect on ambient air quality conditions. Consequently, wind erosion from disturbed areas would be a less than significant impact under the Proposed Action.

*Emissions from increased aircraft operations.* The Proposed Action would not result in any major change to existing Army helicopter flight operations in Hawai'i. Some UAV flight activity could be based at DMR, but the total flight time would be relatively low. The net increase in emissions resulting from UAV flight activity would be too small to have a meaningful effect on ambient air quality conditions. Consequently, the increase in aircraft emissions at DMR under the Proposed Action would be a less than significant impact.

*Emissions from wildfires*. Because there are no live-fire exercises at DMR and overall munitions use would decrease by 25 percent under the Proposed Action, there is little chance that the Proposed Action would increase the risk of wildfires at DMR. Because the frequency and size of wildfires at DMR is not expected to change, emissions from wildfires would be a less than significant impact under the Proposed Action.

*No Impact*

*Other emissions from personnel increases.* No Army personnel are based at DMR, and the installation does not have any stationary emission sources; consequently, the Proposed Action would not result in any emissions from personal vehicle use or any increase in emissions from fixed facilities.

### Reduced Land Acquisition

Air quality impacts and mitigations under the RLA Alternative would be the same as under the Proposed Action.

### No Action

*Less than Significant Impacts*

*Emissions from ordnance use.* Overall ordnance use under No Action would be about 34 percent greater under No Action than under the Proposed Action or the RLA Alternative. Based on the general nature of detonation processes and the very low emission rates that have been published in studies of munitions firing and open detonations, emissions associated with ordnance use at DMR pose very little risk of creating adverse air quality impacts. Consequently, air quality impacts from munitions use under No Action are considered less than significant.

*Engine emissions from military vehicle use.* Vehicle use associated with DMR would remain at present levels under No Action. Estimated annual emissions from vehicle engine operations would be approximately the following:

- 1.4 tons (1.3 metric tons) of reactive organic compounds;
- 13.4 tons (12 metric tons) of nitrogen oxides;
- 4.1 tons (3.8 metric tons) of carbon monoxide;
- 0.15 ton (0.14 metric ton) of sulfur oxides; and
- 1.2 tons (1.1 metric tons) of $PM_{10}$.

The amount of military vehicle engine emissions would be too small to have meaningful effects on ambient air quality conditions. Consequently, military vehicle engine emissions would have a less than significant impact under No Action.

*Fugitive dust from military vehicle use.* Vehicle numbers and estimated annual use levels would remain at current conditions under No Action. Fugitive dust $PM_{10}$ emissions from military vehicle use at DMR would remain at the current level of about 326 tons (296 metric tons) per year. Because existing conditions at DMR have not led to any known violations of state or federal ambient air quality standards, the fugitive dust from military vehicle use at DMR would have a less than significant impact under No Action.

*Wind erosion from areas disturbed by tactical vehicle use.* Vehicle maneuver activity at DMR would remain the same as current conditions under No Action. An estimated 60.5 tons (55 metric tons) per year of $PM_{10}$ would be generated by wind erosion from the affected areas. Wind erosion from disturbed areas would be too small to have a meaningful effect on ambient air quality conditions, and therefore would be a less than significant impact under No Action.

*Emissions from increased aircraft operations.* There would be no change in aircraft operations and no increase in aircraft emissions at DMR under No Action. Because there would be no change from current conditions and because current conditions have not created any known violations of state or federal ambient air quality standards, emissions from aircraft operations under No Action would have a less than significant impact on air quality.

*Emissions from wildfires.* The risk of wildfires at DMR would remain the same as for current conditions under No Action. Because the frequency and size of wildfires at DMR is not expected to change, emissions from wildfires would be a less than significant impact under No Action.

#### No Impact

*Emissions from Construction.* No construction projects are associated with No Action, so there would be no air quality impact from construction under No Action.

*Other emissions from personnel increases.* No Army personnel are based at DMR, and the installation does not have any stationary emission sources; consequently, No Action would not result in any emissions from personal vehicle use or any increase in emissions from fixed facilities.

## 6.6 NOISE

### 6.6.1 Affected Environment

No noise monitoring data are available for DMR. The dominant noise sources include general aviation aircraft, vehicle traffic, limited military aircraft traffic, military vehicle traffic, and limited use of blank ammunition during Army exercises. No live-fire training occurs at DMR.

### 6.6.2 Environmental Consequences

***Summary of Impacts***

Noise sources associated with project alternatives at DMR include construction activity, ordnance use, military vehicle traffic, and military aircraft operations. Noise impacts from these sources would be less than significant under all project alternatives.

Construction projects at DMR would be far enough from noise-sensitive areas to avoid significant noise impacts under both the Proposed Action and the RLA Alternative. There would be no construction noise impacts under No Action. The use of blank ammunition would continue at DMR under all alternatives. The quantity of blank ammunition used at DMR would probably increase somewhat under the Proposed Action or the RLA Alternative. Noise-sensitive land uses are far enough from DMR so that noise from blank ammunition would be a less than significant impact under all alternatives. Training activities at DMR are expected to employ fewer than 75 vehicles at a time under any of the alternatives. Resulting hourly average traffic noise levels along the Dillingham Trail and vehicle noise from activity at DMR would be a less than significant impact under all alternatives. Limited aircraft and helicopter flight operations would continue at DMR under all alternatives. UAV flights would not be launched from or recovered at DMR under the Proposed Action and the RLA Alternative, but some UAV flight activity may occur in the R-3110B and R-3110C restricted airspace areas south of DMR or in the offshore W-189 Warning Area north of DMR. Noise generated by the UAV flight activity near DMR would be a less than significant impact.

Table 6-12 summarizes the significance of noise impacts at DMR under the Proposed Action, RLA, and No Action.

***Proposed Action***

*Less than Significant Impacts*

*Noise from construction activities.* The construction projects associated with DMR are three FTI antennas and Dillingham Trail. Construction activities would occur from 2005 through early 2007. Individual items of construction equipment typically generate noise levels of 80 to 90 dBA at a distance of 50 feet (15 meters). With multiple items of equipment operating concurrently, noise levels can be relatively high during daytime, at locations within several hundred feet of active construction sites. The zone of relatively high construction noise levels typically extends to distances of 400 to 800 feet (122 to 244 meters) from the site of major equipment operations. Locations more than 1,000 feet (305 meters) from construction sites seldom experience significant levels of construction noise.

**Table 6-12**
**Summary of Potential Noise Impacts at DMR**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Noise from construction activities | ⨀ | ⨀ | ○ |
| Noise from ordnance use | ⨀ | ⨀ | ⨀ |
| Noise from military vehicle use | ⨀ | ⨀ | ⨀ |
| Noise from aircraft operations | ⨀ | ⨀ | ⨀ |
| Noise from added personnel vehicle traffic | ○ | ○ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⃠ = Significant but mitigable to less than significant
⨀ = Less than significant
○ = No impact
+ = Beneficial impact
N/A = Not applicable

Table 6-13 summarizes the estimated minimum distance between the sites for proposed construction projects and the nearest noise-sensitive land uses.

**Table 6-13**
**Estimated Minimum Distance Between Construction Sites and Noise-Sensitive Land Uses**

| Proposed Project | Distance to Closest Noise-Sensitive Receptor | Noise-Sensitive Land Use Type |
|---|---|---|
| S7. Fixed Tactical Internet | Not evaluated | Construction activities too limited to create noise issues |
| D1. Dillingham Trail | 3,900 feet | Residential (Waialua Beach) |
| | 6,300 feet | Waialua High and Intermediate Schools |
| | 1,500 feet | Residential (Kamoʻoloa area) |

Source: Tetra Tech staff analyses

Construction of the FTI antennas would require minimal equipment and minimal site preparation activities, so there would be minimal associated noise. Most construction noise would be associated with construction of Dillingham Trail. These construction activities would generate average daytime noise levels of about 90 dBA at a distance of 50 feet (15 meters) from the construction activity, and about 70 dBA at a distance of 500 feet (152 meters). Average daytime noise levels would be less than 65 dBA at distances of 700 feet (213 meters) or more. The Ldn increment generated by construction activities would drop below 65 dBA at distances of 550 feet (168 meters) or more. No nighttime construction activity is expected. Because incremental Ldn contributions from construction activities would be less than 65 dBA at the nearest noise-sensitive areas, construction noise would be a less than significant impact.

*Noise from ordnance use.* Blank ammunition and ground-based smoke generating items are the only types of ordnance that would be used at DMR. Small arms firing with blank ammunition can produce relatively high peak noise levels at distances of up to 3,000 feet (915 meters) and might remain audible at distances of up to 1.5 miles (2.4 kilometers). The 1/8 second Lmax noise level from blank ammunition is typically about 71 to 78 dBA at 2,000 feet (610 meters) and 50 to 57 dBA at 1 mile (1.6 kilometers). Noise levels from firing blank small arms ammunition typically drop below levels that cause significant annoyance at distances of 2,500 to 3,000 feet (760 to 915 meters). The closest residential areas are more than 2 miles (3 kilometers) from the areas where blank ammunition would be used at DMR. Consequently, noise impacts from ordnance use at DMR would be less than significant under the Proposed Action.

*Noise from military vehicle use.* Most military vehicle travel to and from DMR would occur on Dillingham Trail. In addition, vehicle maneuver training would occur at DMR. Estimated peak pass-by noise levels and average traffic noise levels for military vehicles were discussed in Chapter 5, Section 5.6.2. During an individual training activity at DMR, fewer than 75 vehicles are operating at any one time. Generally, fewer than 60 vehicles would travel in a convoy to DMR on the Dillingham Trail per hour. Resulting hourly average traffic noise levels along Dillingham Trail would be about 65 dBA at a distance of 100 feet (30 meters) from the vehicle trail. Vehicle activity within DMR would produce comparably low noise levels. Consequently, noise from military vehicle use at DMR would be a less than significant impact under the Proposed Action.

*Noise from aircraft operations.* The Proposed Action would not result in any meaningful changes in helicopter or fixed-wing aircraft flight operations at DMR. The only added military flight activity would involve UAV flight operations in nearby restricted airspace. UAV flights would not be launched from or recovered at DMR under the Proposed Action and the RLA Alternative, but some UAV flight activity may occur in the R-3110B and R-3110C restricted airspace areas south of DMR or in the offshore W-189 Warning Area north of DMR. The Shadow 200 UAV produces a noise level of 85 dBA at a distance of about 70 feet when the engine is at an idle power setting, and a noise level of 85 dBA at a distance of about 342 feet when the engine is at a high power setting (US Army 2001a). In most cases, the UAV is expected to operate at relatively high altitudes to avoid conflict with other helicopter and aircraft flight activity. As noted in Chapter 5, Section 5.6.2, the addition of UAV flight activity to current patterns of aircraft and helicopter flight activity would not result in any noticeable change in noise levels from aircraft flight operations. Consequently, noise from aircraft operations at DMR would be a less than significant impact under the Proposed Action.

#### *No Impact*

*Noise from added personal vehicle traffic.* No Army personnel are based at DMR, and none of the personnel added under the Proposed Action would be based at DMR; consequently, there would be no noise from added personal vehicle traffic at DMR under the Proposed Action.

### ***Reduced Land Acquisition***

Noise-related impacts at DRM under the RLA Alternative would be the same as under the Proposed Action.

### *No Action*

*Less than Significant Impacts*

*Noise from ordnance use.* Existing training exercises using blank ammunition would continue at DMR under No Action. Annual ordnance use at DMR probably would be slightly less than that under the Proposed Action or the RLA Alternative. As discussed for the Proposed Action, use of blank training ammunition would have a less than significant noise impact under No Action.

*Noise from military vehicle use.* Military vehicle use associated with DMR would be less under No Action than under the Proposed Action or the RLA Alternative. No Stryker vehicles would be used under No Action. Noise levels produced by a continuation of existing vehicle use patterns at DMR would have a less than significant noise impact under No Action.

*Noise from aircraft operations.* Existing patterns of aircraft and helicopter use of DMR would continue under No Action. No UAV activity would be added at DMR. Noise levels produced by a continuation of existing aircraft operations at DMR would have a less than significant noise impact under No Action.

*No Impact*

*Noise from construction activities.* No specific construction projects are proposed under No Action. Consequently, there would be no construction noise impacts under No Action.

*Noise from added personal vehicle traffic.* There would be no change in personnel numbers at DMR under No Action. Consequently, there would be no noise impact from added personal vehicle traffic.

# 6.7 TRAFFIC

## 6.7.1 Affected Environment

### *Regional Transportation System*

The regional transportation system is discussed in Chapter 5, Section 5.7.

### *Local Transportation System*

The proposed Dillingham Trail between SBMR and DMR would generally follow the existing travel corridor (See Figure 6-10).

Going north, the travel corridor follows Wilikina Drive from SBMR to Kaukonahua Road, Kaukonahua Road from Wilikina Drive to Farrington Highway, and Farrington Highway to DMR. The connection between Farrington Road and DMR is partially via a sugar cane haul road and other local unnamed roads. These roadways are discussed separately.

#### *Kunia Road*

Kunia Road (SR 750) between SBMR (Trimble Road or Foote Gate) and Wilikina Drive is a four-lane divided state roadway. The posted speed limit is 35 miles (56 kilometers) per hour. There are signals at the intersections of Kunia Road with Trimble Road and Kunia Road with Wilikina Drive.

The average daily traffic (ADT) is approximately 25,000 VPD. The morning peak-hour traffic volumes are 1,000 vph northbound and 880 vph southbound. The afternoon peak-hour volumes are 1,210 vph northbound and 840 vph southbound.

#### *Wilikina Drive*

Wilikina Drive (SR 803) is a four-lane divided roadway between Kunia Road and Funston Gate and a two-lane undivided roadway from Funston Gate to Kaukonahua Road. The posted speed limit is 35 mph from Kunia Road to McNair Gate, 25 mph from McNair Gate to Kamananui Road, and 45 mph from Kamananui Road to Kaukonahua Road. There are traffic signals at the intersections with Macomb Gate and Kamananui Road.

Between Kunia Road and McNair Gate, the ADT is approximately 27,400 vehicles. The northbound and southbound morning peak-hour volumes are 1,080 vph and 1,040 vph, respectively. During the afternoon peak hour, the northbound and southbound volumes are 1,200 vph and 1,100 vph, respectively.

Between McNair Gate and Kamananui Road, the ADT is 16,000 vehicles. The northbound and southbound morning peak hour volumes are 380 vph and 650 vph, respectively. During the afternoon peak hour, the northbound and southbound volumes are 950 vph and 550 vph, respectively.

**Figure 6-10**
Peak Hour Volumes Worst Case Scenario on Dillingham Trail

Between Kamananui Road and Kaukonahua Road, the ADT is 7,780 vehicles. The northbound and southbound morning peak-hour volumes are 70 vph and 490 vph, respectively. During the afternoon peak hour, the northbound and southbound volumes are 430 vph and 250 vph, respectively.

*Kaukonahua Road*

Kaukonahua Road is a two-lane undivided state roadway between Wahiawā and Waialua. For approximately one mile (1.6 kilometers) north of Kaukonahua Road, the posted speed limit is 45 mph. North of this point, the speed limit is 35 mph because the terrain constrains the roadway alignment.

Between Kaukonahua Road and Farrington Highway, the ADT is 10,000 vehicles. The northbound and southbound morning peak-hour volumes are 130 vph and 500 vph, respectively. During the afternoon peak hour, the northbound and southbound volumes are 545 vph and 330 vph, respectively.

*Farrington Highway*

From Kaukonahua Road to DMR, Farrington Highway (SR 930) is a two-lane, undivided state highway. The posted speed limit is 35 mph, except for a short section posted for 45 mph and a section adjacent to Waialua Intermediate School and Waialua High School, where the speed limit is reduced to 25 mph.

Along Farrington Highway in Waialua, the ADT is approximately 8,800 vehicles. The eastbound and westbound morning peak hour volumes are 305 vph and 240 vph, respectively. During the afternoon peak hour, the eastbound and westbound volumes are 300 vph and 390 vph, respectively.

In the vicinity of DMR, the ADT is less than 1,000 vehicles. The morning and afternoon peak hour volumes are less than 100 vph.

### 6.7.2 Environmental Consequences

This section addresses the environmental consequences of the Proposed Action and No Action on traffic.

#### *Summary of Impacts*

A summary of traffic impacts at DMR is shown in Table 6-14. Intersection operations, roadway segment operations, construction traffic, and parking impacts would be less than significant with the Proposed Action and Reduced Land Acquisition Alternative. There would be no traffic impacts under No Action.

**Table 6-14**
**Summary of Potential Traffic Impacts at DMR**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Intersection operations | ⊙ | ⊙ | ○ |
| Roadway segment operations | ⊙ | ⊙ | ○ |
| Construction traffic | ⊙ | ⊙ | ○ |
| Parking | ○ | ○ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:
⊗ = Significant
⃠ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
+ = Beneficial impact
N/A = Not applicable

***Proposed Action (Preferred Alternative)***

Strykers would be used, up to one company level, for off-road training. Troops would be transported by Strykers and trucks up to one company level plus support trucks.

A perpetual easement of 55 acres (22.3 hectares) would be acquired for Dillingham Trail. The road would be constructed on private plantation roads owned by Dole Food Co., Inc., and other private landowners. Dillingham Trail is proposed to be a one-lane gravel road, 15 feet (5 meters) wide and approximately 11 miles (18 kilometers) long, connecting SBMR to DMR. The proposed Dillingham Trail would not be open to the public. Until the trail is constructed all military vehicles would continue to use public roads. The estimated military vehicle traffic between SBMR and DMR is shown in Table 6-15.

*Less than Significant Impacts*

*Intersection operations.* Dillingham Trail would cross state highways at two locations. The first crossing would be at Kaukonahua Road north of Farrington Highway. The peak-hour traffic volumes along this section of Kaukonahua Road are 412 vph during the morning peak hour and 489 vph during the afternoon peak hour (HDOT 2001).

The second crossing would be at Farrington Highway, west of Kaukonahua Road. The morning and afternoon peak hourly traffic volumes along Farrington Road at this location are 547 and 690 vph, respectively.

A LOS analysis was performed for the highways and crossings using the following assumptions:

- The maximum number of vehicles was used for calculations (four convoys of 24 vehicles each, sequenced at 15-minute intervals);

- The convoys would stop for traffic along the state highways, so an intersection would be two-way stop sign-controlled; and
- The convoys would approach the state highways during the peak hour of traffic. As noted above, convoys would be scheduled for non-peak hours, but, by assuming peak-hour conditions, a worst-case condition was analyzed.

**Table 6-15**
**Estimated Military Vehicle Traffic Between SBMR and DMR**

| | Vehicle Density (vehicles per convoy) | Number of Convoys | Trail-Roadway Split | Annual Frequency |
|---|---|---|---|---|
| Company Level Exercise, Current Force | | | | |
| Trucks | 15 | 1 | All road | 1 |
| Company Level Exercise, Proposed Action | | | | |
| Trucks | 6 | 1 | 60/40 | 1[1] |
| Strykers | 11 | 1 | 90/10 | 1[1] |
| Battalion Level Exercise, Current Force | | | | |
| Trucks | 0[2] | 0 | 0 | 0 |
| Battalion Level Exercise, Proposed Action | | | | |
| Trucks | 6 | 1 | 60/40 | 4 |
| Strykers | 11 | 1 | 90/10 | 4 |
| Brigade Level Exercise, Current Force | | | | |
| Trucks | 24[2] | 8 | All road | 2 |
| Brigade Level Exercise, Proposed Action | | | | |
| Trucks | 24 | 8 | 60/40 | 1 |
| Strykers | 6 | 1 | 90/10 | 1 |

Source: John Gallup & Associates 2002

Notes: [1]Brigade Headquarters and Headquarters Company (HHC) performs exercises four times per year.
[2]Current forces would not conduct multi-location exercises.

According to the LOS analysis, both state highway crossings would operate at LOS C under worst-case conditions. Convoy traffic would experience delays because they would yield to traffic along the state highways. Because the convoys would yield to through traffic, there would be no impact on LOS on public highways. The identified impact would be less than significant.

While no mitigation is required for project impacts on traffic congestion, the Army will operate a public Internet Web site that lists a schedule of upcoming USARHAW activities, including training and public involvement projects. Subject to force protection measures and other security measures, the site would contain USARHAW training and convoy schedules, community projects the USARHAW is involved in, any USARHAW activity or function that the public could attend, any general USARHAW news that might be of interest to the public, and USARHAW services available to the public.

*Roadway segment operations.* The number of military vehicles using the proposed Dillingham Trail would be minimal. The maximum number of vehicles per convoy would be 24. Convoys would be sequenced at 15- to 30-minute intervals, so the maximum hourly volume would be 96 vehicles per hour. Convoys would be scheduled during non-peak traffic hours, thus reducing potential impacts on peak-hour traffic conditions. Because the increase of military traffic on public roadways would be minimal, the LOS would not change. The identified impact would be less than significant, and no mitigation would be necessary.

Before the DMR trail is constructed, all SBCT military vehicles would use public roadways to access DMR. Because convoys would still operate with a maximum hourly volume of 96 vehicles, as described above, the short-term elevated use of the roadways would operate at LOS C under worst-case conditions. While there would be noticeable delays, the impacts would be less than significant.

*Construction traffic.* Construction associated with the Proposed Action would generate additional traffic from worker vehicles and trucks. However, construction traffic would be temporary and minimal in relation to overall traffic levels.

To minimize traffic impacts to the surrounding community during construction, a construction traffic management program would be implemented. The program would include staggered work hours to reduce impacts from construction workers during peak hours, identified truck routes to limit truck traffic to major streets, and designated parking for construction workers. Since project traffic does not significantly affect operations at the intersections and street segments in the project vicinity and traffic is generally free flowing, the interim construction worker traffic impacts would not be significant. The identified impact would be less than significant, and no mitigation would be necessary.

#### *No Impacts*
*Parking.* No parking impacts are expected from the proposed change.

### ***Reduced Land Acquisition Alternative***
The impacts associated with Reduced Land Acquisition would be identical to those described for the Proposed Action.

### ***No Action Alternative***

#### *Less than Significant Impacts*
*Roadway segment operations.* Under No Action, existing conditions from roadway segment operations would continue. Under the status quo of No Action, impacts to traffic would continue at their current levels. Current forces would continue to travel on public roads to DMR, possibly contributing to roadway congestion. BMPs would be followed. Convoy and transport would only occur at non-peak hours. Advance notice of military transport would be provided to the public in the event of a large-scale convoy activity.

### *No Impacts*

*Intersection operations.* Under No Action, existing conditions from intersection operations would continue. Under the status quo of No Action, impacts to traffic would continue at their current levels. Use of the facility and operations would remain the same.

*Construction traffic.* Under No Action, existing conditions from construction traffic would continue. Under the status quo of No Action, impacts to traffic would continue at their current levels.

*Parking.* Under No Action, existing conditions from parking would continue. Under the status quo of No Action, impacts to traffic would continue at their current levels.

# 6.8 WATER RESOURCES

## 6.8.1 Affected Environment

### *Surface Water*

*Precipitation and Surface Water Drainage*

DMR is on the windward (north) coast of the Waiʻanae Range. Prevailing winds are east or northeasterly trade winds from 4 to 24 mph (6 to 39 kph) in the summer and light south to southwesterly winds in the winter.

The average annual precipitation at DMR ranges from 20 to 30 inches (51 to 76 cm) but varies with elevation and time of year (USARHAW and 25th ID[L] 2001a). For example, at the summit of Mount Kaʻala, south of the installation, the average annual rainfall is greater than 70 inches. The variation with elevation affects surface water runoff and groundwater recharge.

Most of the rainfall occurs from November through April (Stearns and Vaksvik 1935). At DMR monthly average rainfall ranges from less than 1 inch (less than 2.5 cm) in summer to 5 inches (12.7 cm) in winter (USARHAW and 25th ID[L] 2001a).

Average annual rainfall along the approximate site of the proposed Dillingham Trail route from DMR to Kaukonahua Stream is less than 40 inches (102 cm), while the average annual rainfall along the route from Kaukonahua Stream to SBMR is between 40 and 60 inches (102 and 154 cm) (Oki 1998). DMR is in the Kawaihāpai watershed (see Figure 3-3 and Figure 6-11). There are several unnamed intermittent streams and no perennial streams on DMR. The State of Hawaiʻi DOH classifies the waters as Class 2.

DMR and most of the proposed Dillingham Trail are on the north slope or at the foot of Kaʻala Mountain and the northwest-trending ridge of the Waiʻanae Range. Streams are incised in steep narrow valleys containing thin soil cover. Most of the streams carry intermittent flows and are subject to short duration flash flows following rainfall events. However, the lower reaches of some of the streams, where they encounter the alluvial deposits overlying caprock on the coastal plain, flow year round. The water supply for the farmland west of Waialua is supplemented by water conveyed by the Ito and Wilson ditches from surface storage in the Kaukonahua watershed to the east.

Stearns and Vaksvik (1935) noted that springs occur in many places along the northeast coast, including at Waialua, near sea level. They concluded that the springs discharge water mainly from the basal water table within the Koʻolau basalts. DMR and Dillingham Trail are underlain by Waiʻanae volcanics or, on the coastal plain, by sedimentary caprock.

**Figure 6-11**
Watershed Boundaries and Drainage Features Dillingham Military Reservation

### *Wetlands*

There is a wetland in DMR adjacent to proposed training activities. However, based on an evaluation by the Corps of Engineers, Honolulu District, Regulatory Branch, dated September 4, 2002, this wetland area is nonjurisdictional, and is not regulated under Section 404 of the Clean Water Act (see letter in Appendix E). Another jurisdictional wetland at DMR is not adjacent to proposed training activities and it will not be affected by the Proposed Action. A more detailed discussion of the wetland is included in the biological resources section.

### *Flooding*

A review of FEMA FIRMS indicates that the northeastern corner of DMR is mapped as a 100-year flood zone (FEMA 2000). The FEMA study area did not extend over the entire reservation. However, by comparing elevations on the unmapped portion of the reservation to the areas that were mapped, it appears that the 100-year flood zone extends inland from the shoreline to about the 15 to 20 foot elevation contour. Thus, much of the flat-lying area of DMR may be effectively within an area subject to a 100-year return period for flooding. At least part of the flood potential is likely the result of calculations of tsunami runup.

The probability of flooding from a tsunami (a series of large ocean waves generated by events such as earthquakes or undersea landslides) exists in low-lying coastal areas of Hawai'i. Tsunamis may be generated by events that occur within the Hawaiian Islands or at distant points around the Pacific Rim. Most locally-generated tsunamis result from earthquake activity associated with the active volcanoes of the island of Hawai'i. Tsunamis generated by large earthquakes or undersea landslides distant from the Hawaiian Islands have a greater likelihood of causing large runups on O'ahu than do locally-generated tsunamis. From 1946 to present, six tsunamis recorded in the Hawaiian Islands had wave run-ups of 2 meters (6.6 feet) or more (NOAA 2003). Wave runup can vary radically from location to location due to local bathymetry, differences in coastal configuration, direction of approach of the waves, and tide levels and other antecedent conditions. The maximum observed run-ups in each of the six events recorded since 1946 ranged from 15.7 feet to 55.8 feet (4.79 meters to 17.0 meters). The largest runup, 55.8 feet on April 1, 1946, was observed on the northeast coast of the island of Hawai'i. The largest runup reported from this event on O'ahu was 33.8 feet (10.3 meters). At Ka'ena Point the runup from this event was reported to be 33.2 feet (10.1 meters), while the runup at Wai'anae was only 13.1 feet (3.99 meters) (NOAA 2003). Five of the six tsunamis reported since 1946 were Pacific-wide tsunamis, from distant sources. The sixth and most recent Hawaiian tsunami, which occurred on November 29, 1975, was generated by a magnitude 7.2 earthquake centered south of the island of Hawai'i. The earthquake produced a tsunami with a runup of nearly 26 feet (7.92 meters) at Halapē on the south shore of the island of Hawai'i. However, this event did not produce a significant runup in O'ahu (NOAA 2003).

The State of Hawai'i is preparing revised tsunami inundation maps for the Hawaiian Islands, but these are not yet available. Tsunami evacuation maps prepared by the US Pacific Disaster Center provide an indication of the wave runup zone. Evacuation Map 13 indicates that the flightline at DMR is within the area to be evacuated, roughly 500 feet (152.4 meters) inland from Farrington Highway (PDC 2001). This area is generally within the 20-foot (6.1-meter) msl elevation contour.

#### Surface Water Quality

No surface water quality sampling has been performed at DMR.

### Groundwater

#### Groundwater Occurrence and Flow

DMR is in the Mokulēʻia hydrologic unit of the North hydrologic sector. The State of Hawaiʻi Water Commission estimates the sustainable yield of the Mokulēʻia hydrologic unit to be 12 MGD.

Deposits of the coastal plain include clay, silt, sand, gravel, calcareous reef, and beach and dune deposits, with some post-Koʻolau volcanic deposits. Stearns and Vaksvik (1935) note that the permeability of deeply weathered, cemented, and poorly sorted sediments is low. However, limestone, lava, volcanic cinders, and beach and dune sands are highly permeable. The coastal plain is the area where the basal groundwater lens beneath the islands meets the sea and is found at shallow depths. It is also the area where surface water and shallow groundwater in intermittent drainages discharges to the sea. Due to its proximity to the coast, the basal groundwater is vulnerable to salt water intrusion. In the coastal area, tidal fluctuations and variations in groundwater discharge create a mixing zone in which the groundwater tends to be brackish. Stearns and Vaksvik (1935) mapped the coastal area from Waialua to near Kaʻena Point as an area of artesian groundwater (basal groundwater under confining pressure beneath a cap of less permeable rock that rises above the elevation of the ground surface in wells). Further inland, the basal groundwater is not artesian. DMR appears to overlie both regions. Stearns and Vaksvik attributed the artesian conditions to the presence of a cap of Koʻolau basalt over permeable beds in the Waiʻanae volcanic series.

Several wells have been installed on DMR, and a large number of wells are present on the ranchlands to the east of DMR (HDLNR 2002b). Existing water allocation permits in the Mokulēʻia aquifer system total 6.3 MGD, or about 52 percent of the sustainable yield of the aquifer system.

The water supply for DMR and several nearby residences is a well located about 700 feet (213 meters) south of the control tower. The well reportedly yields about 55,000 gallons (208.2 liters) per day (USARHAW and 25th ID[L] 1997). The well is reportedly completed at a depth of 180 feet (54.9 meters).

#### Groundwater Quality

No specific information about groundwater quality at DMR is available. The installation is located over an area underlain by caprock, with surficial deposits of dune and beach sands and soils derived from erosion of the nearby Waiʻanae Range. It is expected that basal groundwater beneath the caprock is of good quality, since there are no obvious sources of pollutants in the Waiʻanae Range inland of the installation. Shallow groundwater may be affected by local sources of pollutants, including agricultural runoff and surface spill;

however, no data are available to suggest that there has been any historical impact on groundwater quality.

### 6.8.2 Environmental Consequences

This section addresses the environmental consequences of the Proposed Action and No Action on water resources.

#### *Summary of Impacts*

Less than significant impacts on stormwater runoff, suspended sediment, and chemical spills are expected from the Proposed Action. No impacts are expected from No Action. A summary of impacts is provided in Table 6-16.

**Table 6-16**
**Summary of Potential Water Resources Impacts at DMR**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Impacts on surface water quality | ⊙ | ⊙ | ○ |
| Impacts on groundwater quality | ○ | ○ | ○ |
| Increased flood potential | ⊙ | ⊙ | ⊙ |
| Groundwater supply | ○ | ○ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⃠ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
+ = Beneficial impact
N/A = Not applicable

#### *Proposed Action (Preferred Alternative)*

*Less than Significant Impacts*

*Increased flood potential.* A portion of DMR lies within a designated 100-year flood zone, and it is likely that a portion of the unmapped part of DMR is also subject to a 100-year flood. The Proposed Action would not increase the potential for flooding, but it may increase the exposure of personnel or property to flooding. Also, storage of hazardous chemicals within a flood prone area can lead to the potential for chemical releases in the event of a flood. This is considered a less than significant impact.

The primary hazard from flooding at DMR is likely to be loss of property and the potential for chemical releases. The extent of the risk of flooding is not well established because flood zone determination has not been made for DMR. After determination of flood prone areas, it may be possible to reduce the hazards of flooding to less than significant levels through a combination of engineering controls, training, and planning. Engineering controls include modifying structures to withstand flooding; for example, through the construction of berms or elevated storage areas. Training and planning include preparing a flood evacuation plan that addresses the potential hazard, and training personnel to respond appropriately in a flood emergency. For example, vulnerable equipment and supplies could be stored in a way that would make them relatively easy to move to higher ground in the event of heavy runoff or a tsunami.

*Impacts on surface water quality from nonpoint source pollution by suspended sediment.* During construction of Dillingham Trail, grading and widening the trail, making cuts and fills, trenching to install fiber optic cable, and installing box culverts and other drainage controls would increase the short-term potential for stormwater runoff to come into contact with disturbed soils. This may result in increased sediment loading of stormwater runoff and could degrade water quality in receiving streams. These impacts would be reduced to less than significant levels by implementing standard construction BMPs for runoff control. These would be specified in the construction stormwater pollution prevention plan for the project, as required by the Clean Water Act for construction sites of one acre or more under new federal and state regulations beginning in March 2003. The identified impact would be less than significant.

*Impacts on surface water quality from chemical spills or nonpoint source discharges.* Vehicles would transport equipment and supplies along Dillingham Trail. Operating vehicles at safe speeds would minimize the potential for spills or releases along Dillingham Trail. Since accidents cannot be ruled out, there is a small potential for spills of petroleum products or other substances that may be transported along Dillingham Trail. The impact on surface water quality would be less than significant compared to existing conditions because in addition to the lower risk of not traveling on public roads, appropriate spill response equipment would be carried with any vehicles transporting chemical or petroleum products, and trained response personnel would be immediately dispatched to the spill site to begin cleanup, according to standard spill response procedures.

No live-fire training would be conducted at DMR, so no explosive residue is expected to be released. Maneuver training could involve the possibility of accidental spills of petroleum products (from fuel or hydraulic lines) or other chemicals. Any spills would be reported, contained, and cleaned up as soon as possible according to procedures described in the SPCC Plan.

*Impacts on surface water quality from use of dust control palliatives.* Controlling dust using calcium or magnesium chloride,calcium lignosulfonates, or other environmentally friendly materials or measures could affect surface water quality, either by increasing the biological oxygen demand or by increasing total dissolved solids concentrations. These impacts are expected to be less than significant because the chemicals would be applied according to industry standards (Parametrix, undated).

*Impacts on groundwater quality*. Perched groundwater occurs at shallow depth beneath DMR, and groundwater occurs at various depths along Dillingham Trail. Accidental spills or releases could occur during routine operations as described above and instead of affecting surface water quality could infiltrate the subsurface and affect groundwater quality. The impacts are expected to be less than significant because, as described for surface water, spills would be quickly contained and then cleaned up, using standard procedures described in the SPCC Plan. Furthermore, although there would be more mounted maneuver training at DMR under the Proposed Action, the increase would not result in significantly higher risk of spills.

*Groundwater supply*. Current groundwater use is small compared to available water supplies. The Proposed Action would not result in a significant increase in groundwater use, and would have a negligible impact on local groundwater supply.

*Impacts on surface water quality from the dredge and fill of jurisdictional wetlands.* In accordance with Section 404 of the CWA, any dredge or fill activities that may occur in a jurisdictional wetland must be reviewed by the Corps prior to construction to determine if a Department of the Army permit is required. If a Department of the Army permit is required, then a CWA Section 401 Water Quality Certification issued by the State of Hawai'i may also be required. Based on an evaluation by the Corps of Engineers, Honolulu District, Regulatory Branch, dated September 4, 2002, there are no jurisdictional wetlands that would be affected by or adjacent to proposed training activities (Appendix E).

*Impacts on surface water quality from stream crossings.* Construction of Dillingham Trail could potentially affect waters of the US via stream crossings at Poamoho Stream near SBMR or at smaller, unnamed streams that might require new crossings, such as on the unnamed streams that emanate from the foot of the Wai'anae Range between DMR and Waialua. All stream crossings would be reviewed by the Corps prior to construction to determine if the activity is regulated under Section 404 of the CWA. In accordance with Section 404 of the CWA, any dredge or fill activities in these streams associated with the crossings may require a Department of the Army permit. If a Department of the Army permit is required, then a CWA Section 401 Water Quality Certification issued by the State of Hawai'i may also be required. The Army would design the stream crossing to minimize any dredge or fill impacts on the stream to the fullest extent practicable in compliance with Section 404 of the CWA. If the Corps determines that a Department of the Army permit is required, the Army would abide by all appropriate CWA regulations and permit processes administered by the Corps and the State of Hawai'i.

### *Reduced Land Acquisition Alternative*

The impacts associated with Reduced Land Acquisition would be identical to those described for the Proposed Action.

### *No Action Alternative*

#### *Less than Significant Impacts*

*Increased flood potential*. The impacts of flooding are similar to those described for the Proposed Action, but they would be somewhat lower in magnitude because staffing and training intensity would be at approximately current levels.

*Impacts on surface water quality from chemical spills on public roadways.* One of the reasons for proposing construction and use of Dillingham Trail under the Proposed Action is to avoid the potential for traffic accidents on public roads. Army vehicles may drive at a slower speed than other traffic, and convoys or wide loads can cause impatient drivers to attempt to pass unsafely. Traffic accidents can result in releases of chemicals, including petroleum products and any chemicals that are being transported in the vehicles, whether civilian or military. Spills can result in significant impacts on surface water or groundwater. The potential for accidents would be kept at less than significant levels by implementing standard Army procedures when operating vehicles on public roads, such as driving at a safe speed, transporting hazardous materials in secure containers according to Army and state and federal regulations, and using appropriate signs and placards.

# 6.9 GEOLOGY, SOILS, AND SEISMICITY

## 6.9.1 Affected Environment

### *Physiography*

DMR is on the Waialua Plain and extends inland to the foot of the Wai'anae Range. Elevation ranges from near sea level on the northern boundary to 200 feet (61 meters) near the southern boundary.

The proposed Dillingham Trail would connect DMR and SBMR. From DMR to Ranch Camp at Waialua, the proposed trail would use established paved roads on the coastal plain inland of the Farrington Highway. The proposed route would cross several small streams, the largest of which is Makaleha Stream, near Dillingham Ranch. At Ranch Camp, the trail would head south up to an elevation of about 250 feet (15.2 meters), where it would cross a tributary of Kaukonahua Stream. Here it would head east, below the Ito Ditch, which runs approximately along the contour of the hillslope for about one-quarter mile (402 meters). Then the trail would turn upslope and follow a ridge up to an elevation of about 1,800 feet (549 meters). The proposed trail would turn east again and descend gradually along the contour of the mountain to an elevation of about 1,500 feet (457 meters), where it would round the shoulder of a prominence called Māʻili. The trail would continue south along the contour of the mountain at an elevation of about 1,200 feet (366 meters) and then descend steeply to SBMR, crossing both Haleanau Gulch and Mohiākea Gulch.

### *Geology*

DMR is on the north slope of the Waiʻanae Range and is underlain by volcanic rocks of the Waiʻanae volcanic series (Figure 6-12). The Waiʻanae flows ended in the late Tertiary period and were overlain by erosional sediments, followed by volcanic rocks of the Koʻolau series that were erupted during the building of the Koʻolau volcanic dome. These also have been eroded. The exposed rocks on the north slope of the Waiʻanae Range, south of DMR, are remnants of the dike complex belonging to the northwest-trending rift zone of the Waiʻanae dome. Along the coast, the volcanic rocks alternately have been submerged below and have emerged above sea level over recent geologic time. The coastline is underlain by an ancient coral reef, which subsequently has been overlain by dune sand deposits.

### *Soils*

Soils at DMR are developed on beach sand deposits, with various mixtures of finer and coarser sediments. Figure 6-13 shows the distribution of soil types. Most of the area is underlain by Jaucas sand, which has subsequently been disturbed or filled to construct the airstrip, roads, and building sites. The boggy seasonal wetlands are underlain by Lualualei Clay, while the marginal sloping uplands are primarily Kaena very stony clay or other stony or rocky soils. The Jaucas sand is very susceptible to wind erosion (and probably also to liquefaction). The Kaena very stony clay is subject to moderate or severe erosion by water runoff (Foot et. al 1972).

**Figure 6-12**
Geologic Map of Dillingham Military Reservation

**Figure 6-13**
Soils Map of Dillingham Military Reservation

Dillingham Trail would use unpaved farm roads over most of the proposed alignment. Some modification to roads would likely be required, such as hardening the roads or improving drainage to prevent damage to the road surface. A fiber optic telecommunications line would be installed underground in a trench alongside the trail. In some areas, such as in the segment that passes near the rim of the channel of Poamoho Stream, east of Waialua, the trail would follow the edge of cultivated farmlands, where the road may be minimally used or non-existent. The trail would use existing stream crossings where suitable, but improvements or modifications to these crossings may be required, to ensure that the trail would be passable, to prevent environmental damage, or both. Because the trail follows existing roads, the characteristics of the soils underlying the trail in these areas are of less relevance to the later discussion of impacts than in areas where the trail requires new construction. The following narrative describes the soils over which the proposed trail passes. The soils along the trail alignment are shown on Figure 6-13.

From the east edge of DMR to just east of Waialua, Dillingham Trail crosses relatively flat lands of the coastal plain, underlain by soils of the Kaena-Waialua association, which includes deep, poorly drained to excessively drained soils with a fine- to coarse-textured subsoil on coastal plains and talus slopes. Initially, the trail follows the 20 to 50 foot (6 to 15 meter) elevation contour near the toe of the alluvium at the base of the Wai‘anae Range, where it is underlain by Pulehu very stony clay loam on 0 to 12 percent slopes (PuB), Pearl Harbor clay (Ph), Kawaihapai stony clay loam on 0 to 12 percent slopes (KlaA), Kaena stony clay on 2 to 6 percent slopes (KaeB), Puleu clay loam on 0 to 3 percent slopes (PsA), Waialua stony silty clay on 3 to 18 percent slopes (WlB), and Waialua silty clay on 0 to 3 percent slopes (Wka). Except for the clay soils, most of the soils make good road fill. The Pearl Harbor clay, Kaena stony clay, and Waialua clays have a moderate to high shrink-swell potential, poor workability, and high water table.

The trail starts upslope along an existing paved road east of Mokule‘ia and continues further upslope to an elevation of about 180 to 200 feet (55 to 61 meters) msl before continuing along the toe of the slope within this elevation range to a point above Ranch Camp at Waialua. This traverse is underlain by Ewa silty clay loam on 6 to 12 percent slopes (EaC), Ewa stony silty clay on 6 to 12 percent slopes (EwC), and Ewa stony silty clay on 2 to 6 percent slopes (EaB). The Ewa soils make good road fill.

The trail rises to the edge of the cultivated farmlands and then starts downslope, picking up a heavier duty farm road, which becomes a paved road near Ranch Camp. The paved road crosses a bridge over a tributary of Ki‘iki‘i Stream east of Ranch Camp and continues along paved roads through Thomson Corner and eastward to a point upstream of the Kaheaka Reservoir. From this point, the trail crosses soils belonging to the Helemano-Wahiawa association. These are deep, well-drained soils on uplands. The trail then continues south, leaving the paved road, and skirts the southern edge of the cultivated farmlands along the north rim of Poamoho Stream. Poamoho Stream is in a deeply-incised channel in a gulch where the stream channel is more than 200 feet (61 meters) below the rim of the gulch. The sideslopes of the downstream portion of the gulch are identified as rock land (rRK), transitioning to Helemano soils (HLMG) further upstream. Rock land is made up of areas where exposed rock covers 25 to 90 percent of the surface. The soil between the rock outcrops tends to be clayey, has a high shrink-swell potential, and is susceptible to sliding. Helemano soils, on steep slopes, have rapid runoff and a severe erosion hazard.

At the rim of the gulch the trail traverses soils of the Wahiawa silty clay (WaB and WaC), then continues gradually upslope across Manana silty clay (MpD and MpC) and Kolekole silty clay loam (KuC and KuD), skirting the Wahiawa silty clay soils that underlie the adjacent farmlands. All three of these soils are suitable for road fill.

Near Poamoho Camp, the trail crosses Poamoho Stream just downstream of the point of convergence of two tributaries of the stream. There is no bridge crossing here. The crossing area is in Helemano soils with 30 to 90 degree slopes (HLMG). The trail then runs along the south bank of the stream, along the margin of the cultivated farmland underlain by Wahiawa silty clay (WaB), then picks up a farm road that traverses the flat ridge between Poamoho Stream and Kaukonahua Stream, across soils of the WaA and WaB series. The trail then follows along the rim of the gulch of Kaukonahua Stream, until it picks up the paved highway (Wilikina Drive) to the gate at SBMR.

### *Geologic Hazards*

Although the installation lies at the foot of the steep slopes of the northern extension of the Wai‘anae Range, steep slopes (greater than 30 percent) within DMR are limited to the southern margin of the installation (Figure 6-14). The typical mode of failure in this geologic context is rock falls, since the slopes contain relatively little soil cover.

The northwest part of O‘ahu is within an area that has about a 10 percent probability of experiencing ground accelerations of more than 10 percent of gravity during the next 50 years because of an earthquake (Klein et al. 2001).

The combination of loose beach and dune sands and a shallow water table present at DMR make liquefaction a potential hazard. Liquefaction is the sudden loss of strength of saturated soil or sediment that results from increased pore pressure caused by vibration or seismic shaking. Loose sandy sediments with a high water table are particularly susceptible to liquefaction.

## 6.9.2 Environmental Consequences

This section addresses the environmental consequences of the Proposed Action and No Action on geology.

### *Summary of Impacts*

The Proposed Action and RLA Alternative would result in significant and unmitigable impacts on soil loss from mounted training activities. Significant impacts mitigable to less than significant are expected from soil erosion resulting from wildfires. Less than significant impacts on soil erosion and slope failure are expected from the Proposed Action within DMR and along Dillingham Trail, and less than significant impacts relating to seismicity and liquefaction may result at DMR because of the high water table and sandy sediments. No impacts on soil erosion and slope failure are expected from No Action. A summary of impacts is provided in Table 6-17.

**Figure 6-14**
Steep Slopes at Dillingham Military Reservation

**Table 6-17**
**Summary of Potential Geologic Resources Impacts at DMR**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Soil loss from training activities | ⊗ | ⊗ | ○ |
| Soil erosion and loss from wildland fires | ⊘ | ⊘ | ⊙ |
| Soil compaction | ○ | ○ | ○ |
| Exposure to soil contaminants | ○ | ○ | ○ |
| Slope failure | ⊘ | ⊘ | ○ |
| Volcanic and seismic hazards | ⊙ | ⊙ | ⊙ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact
N/A = Not applicable

### *Proposed Action (Preferred Alternative)*

*Significant Impacts*

*Impact 1: Soil loss from training ranges.* Training activities under the Proposed Action are expected to result in a significant increase in soil erosion and soils loss compared to existing conditions in the DMR. The soil loss may be partially but not fully mitigated. Therefore, this is considered to be a significant but not mitigable impact.

The Army developed the ATTACC model, as described in Appendix M and summarized in chapter 5.9, to assess the impacts of mounted maneuver training on land. A land condition curve was developed for DMR.

In DMR, the ATTACC model results indicate that land condition will decline. Maneuver training would be unrestricted over the entire accessible area where slopes are less than 30 percent. Under this assumption, the land condition was determined to decline to a severely degraded condition. However, if the Stryker is restricted to existing training roads, the land damage would be limited to the existing roads instead of distributed over the entire DMR, but the restriction to the roads would mean that damage to the road areas would be increased because the vehicle use would be focused onto a smaller area. The existing roads do not contain vegetation, but intense vehicle use could disturb the soils underlying the roads and cause ruts and gullies to form, which in turn could lead to enhanced soil erosion. These opposing effects do not necessarily cancel each other out, but it is difficult to know what the differences would be. Within the uncertainties of the model, it is expected that, without mitigation, the effects of soil loss from soil erosion caused by the mounted maneuver training would be significant over time.

Land condition is projected by the ATTACC model to decline from acceptable under existing conditions to "severe" under the Proposed Action because mounted maneuver training with the Stryker vehicle would be focused in the relatively small portion of the range having less than 30 percent slopes and because the effect of the Stryker vehicle on vegetation and soils is relatively greater than from existing vehicles. Therefore, without mitigation, the effects on soil loss in DMR are considered to be significant over time. The mitigation measures detailed below could be implemented. Their success cannot be adequately assessed, and because of the expected severity of the effects, the effects likely would not be fully successful in preventing the eventual loss of fertility and sustainability of the soils on the DMR. The mitigation measures below will substantially reduce the impact but not to less than significant levels.

*Regulatory and Administrative Mitigation 1.* The Army will develop and implement a DuSMMoP for the training area. The plan will address measures such as, but not limited to, restrictions on the timing or type of training during high risk conditions, vegetation monitoring, soil monitoring, and buffer zones to minimize dust emissions in populated areas. The plan will determine how training will occur in order to keep fugitive dust emissions below CAA standards for $PM_{10}$ and soil erosion and compaction to a minimum. The Army will monitor the impacts of training activities to ensure that emissions stay within the acceptable ranges as predicted and environmental problems do not result from excessive soil erosion or compaction. The plan will also define contingency measures to mitigate the impacts of training activities which exceed the acceptable ranges for dust emissions or soil compaction.

The Army will implement land management practices and procedures described in the ITAM annual work plan to reduce erosion impacts (US Army Hawai'i 2001a). Currently these measures include implementing a TRI program; implementing an ITAM program; implementing an SRA program; developing and enforcing range regulations; implementing an Erosion and Sediment Control Management Plan; coordinating with other participants in the KMWP; and continuing to implement land rehabilitation projects, as needed, within the LRAM program. Examples of current LRAM activities at KTA include revegetation projects involving site preparation, liming, fertilization, seeding or hydroseeding, tree planting, irrigation, and mulching; a CTP; coordination through the TCCC on road maintenance projects; and development mapping and GIS tools for identifying and tracking progress of mitigation measures.

### *Significant but Mitigable to Less Than Significant*

*Impact 2: Soil erosion and loss from wildland fires.* At each of the installations, wildland fires have the potential for removing vegetation that protects soil from erosion. Fire also could affect the adjacent uplands and the lands bordering Dillingham Trail. Wildland fires can affect large areas of land, removing grasses and larger trees and shrubs that hold the soil. The magnitude of this impact is directly related to the size of the fire. Fires may be initiated by detonation of munitions, or potentially even by vehicle engines, smoking, use of welding torches, by downed power lines, and many other causes. Land management practices can increase or reduce the potential damage caused by fires, through management of the fuel supply (wood, brush, grasses). Although naturally-caused fires are not common in Hawai'i, fires may also be started naturally, by electrical storms. Wildland fires are considered to be a potentially significant impact of all alternatives because of the potential for increased soil erosion.

The potential for fires initiated as a result of Army activities at DMR is expected to be no greater than the potential outside of DMR because activities at DMR would involve mainly transport of personnel and supplies. The potential for a fire to spread, if initiated, is probably somewhat lower than in the surrounding community because the Army maintains fire response equipment and trained personnel at DMR and carries fire suppression equipment during transport and training and thus could respond quickly to a fire. If necessary, Army personnel and civilian fire departments would cooperative to suppress any fires in the vicinity of DMR and to ensure that the response was adequate to address the threat. The mitigation described below will reduce the impact to a less than significant level.

*Regulatory and Administrative Mitigation 2.* The IWFMP for Pōhakuloa and Oʻahu Training Areas was updated in October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts associated with wildland fires. The plan is available upon request.

*Impact 3: Slope failure - Dillingham Trail alignment.* Most of Dillingham Trail would follow existing roads and would be on relatively gentle stable slopes. Parts of the proposed route would be near the rim of the gulches of Poamoho Stream and Kaukonahua Stream. The route could cross areas of unstable slopes, or construction of new roadways or modification of the existing roads could reduce slope stability through creation of new cuts and fills or drainage problems. Some of the clay soils on the coastal plain near DMR are not considered highly suitable for road fills and are subject to shrinking and swelling or soil creep (slow downslope movement in soils with low strength). The mitigation described below will reduce the impact to a less than significant level.

*Regulatory and Administrative Mitigation 3.* None proposed.

*Additional Mitigation 3.* The Army proposes to minimize and avoid cut slopes, where practicable. Cut slopes would be blended into the landscape by rounding the edges of the slope and by differentially orienting the slope and the roadbed alignments where practicable. Use of these techniques would be varied based on the specific conditions, including depth of the cut, orientation of the slope, and type of material (e.g., dirt slope and rock slope). In accordance with Army design standards, potential mitigation measures for this impact also include, where practicable, selecting the least failure-prone route, geotechnically testing soils where necessary along the route to identify problems, designing the roadbed, slope, and surface to avoid slope failure, properly sizing drainage systems, designing storm drainage outfalls for efficient performance, and properly monitoring and maintaining the road.

### *Less than Significant Impacts*

*Slope failure within DMR.* ATTACC model results indicate that existing levels of maneuver training activities have relatively little impact on land condition. A total of 1,710 MIMs were attributed to mounted maneuver training at DMR in the ATTACC modeling assumptions for existing conditions. Current land condition is considered mildly impacted. However, under the Proposed Action, it is expected that annual MIMs would increase to 4,335. Moderate impacts on land condition (for example, reduction in vegetation and exposure of soils) are expected to occur for a range of about 3,000 to 4,000 MIMs, and land condition is expected to decline more rapidly when MIMs exceed 4,000. DMR itself is mainly on level or gently-sloping terrain. Slopes greater than 30 percent are limited to the southern margin of the installation. Therefore, although vegetation may be affected by training activities (discussed further in the biology section), the threat of erosion within the boundaries of DMR because of damage to vegetative cover would be slight.

*Soil loss from training activities - use of Dillingham Trail.* Over the long term, use of Dillingham Trail by heavy vehicles may lead to compaction of the road surface and formation of ruts that interfere with proper drainage and may destabilize slopes in areas underlain by soft saturated soils. In addition, vibrations caused by heavy vehicle use may induce failure of unstable slopes, or loading on unstable steep slopes may induce failure of the roadway. Repair of failed slopes could require additional cutting, filling, or shoring, with the potential to further alter natural land contours and drainage patterns. Landslides themselves may become the locus of future slides since the failed soil may be poorly drained. These potential impacts would be avoided or reduced to less than significant levels through monitoring and early maintenance of the roadway and adjacent slopes.

*Volcanic and seismic hazards.* Liquefaction potential at DMR has not been characterized, and the potential for injury or property loss in the event that liquefaction occurs is probably small, due to the low potential for significant ground shaking. However, in a strong earthquake DMR may be impacted by liquefaction, because of the high water table and sandy sediments underlying the facility. Liquefaction could cause damage to structures or to the runway, for example. The Proposed Action is not expected to result in any significant new hazards associated with earthquakes or liquefaction relative to existing conditions, and no new structures would be constructed at DMR under the Proposed Action. Therefore, the impact is considered less than significant.

### Reduced Land Acquisition Alternative

The impacts associated with RLA are identical to those described for the Proposed Action.

### No Action Alternative

#### Less than Significant/No Impacts

The impacts under the No Action Alternative would generally be the same as described for the Proposed Action. Flood hazards may be qualitatively slightly less, since the installation would be less intensively used.

No impact of slope failure along the Dillingham Trail would occur under the No Action Alternative, because the trail would not be constructed.

## 6.10 BIOLOGICAL RESOURCES

### 6.10.1 Affected Environment

This section is divided into discussions of general wildlife and vegetation and habitat types common to DMR, including sensitive species and habitats known to occur or with the potential to occur in this area. The DMR ROI was based largely on the potential for damage from fires during SBCT training. Fire has been evaluated to be the most far-reaching impact of SBCT on DMR, with the exception of Dillingham Trail, because of its ability to affect a large area. Fire is a lesser concern for Dillingham Trail, where trampling/crushing, introduction of exotic species, and noise are the major concerns. The ROI at DMR has been determined, based on the above factors, to correspond with the installation boundary. The DMR ROI also includes a 164-foot (50-meter) buffer on either side of Dillingham Trail as well as a portion of the coastline and adjacent Pacific waters over which aircraft maneuvers may occur.

The waters that surround the islands in the Hawaiian chain host an array of marine wildlife (NMFS 2000a to 2000bb) and extensive coral reef ecosystems that support a variety of industries and resource uses (HCRI 2002). The location and sensitivity of these ecosystems were taken into account when determining the ROI for the SBCT project areas. Marine organisms and wildlife are evaluated when they occur adjacent to or in the vicinity of the terrestrial ROI. The DMR Marine ROI is represented in Figures 6-15 and 3-13.

Biological data were collected from numerous sources, including the USFWS, NOAA Fisheries, DLNR, HBS, HINHP, and various biological surveys and environmental documents pertinent to the species and habitats of DMR. For details on pertinent regulations see Definition and Regulatory Considerations in Appendix N.

This DEIS was developed concurrently with ESA Section 7 consultation with USFWS. The biological resource section has been updated to reflect additional information resulting from these consultations.

#### *Recovery Plan*

Two animal species with recovery plans are known to or have the potential to occur within the DMR ROI. These species are listed in Appendix I-1a.

#### *Vegetation*

The area surrounding DMR is sparsely populated, and neighboring land is either owned privately or by the State of Hawai'i. Botanical surveys to identify rare plants, communities, and potential threats to these resources have been conducted intermittently since 1977. HINHP surveyed the area in 1995, but the visit was brief due to the small size and rugged terrain of the training area. During this site visit, HINHP staff documented the only known example in Hawai'i of extremely dry closed canopy forest. These natural resource surveys have been used for the resource assessments in the *Endangered Species Management Plan Report, O'ahu Training Areas* (R. M. Towill Corp. 1997b), as well as the more recent *O'ahu Training*

**Figure 6-15**
Dillingham Military Reservation Biological Region of Influence

*Areas Natural Resource Management Report* (PCSU 2001) and *O'ahu Training Areas INRMP* (USARHAW and 25th ID[L] 2001a). Figure 6-16 shows the locations of vegetation communities described below that occur within the DMR ROI. The low-lying areas of DMR are populated mostly by nonnative vegetation, some species posing serious threats to the native natural communities that exist in more remote locations of this small training area. Guinea grass *(Panicum maximum)* is becoming more widespread in DMR. It regenerates quickly after fire and can inhibit the growth of other plants by its dense matting and by producing chemicals that discourage other plants from taking root.

There are only two types of native lowland dry communities on DMR. Lonomea *(Sapindus oahuensis)* forest is the only known occurrence in Hawai'i of a closed canopy, extremely dry forest type. Little information is available about this type of forest due to its rarity. On DMR it is found on the cliff slopes at the southern end of the training area. It is considered to be globally imperiled. The other forest type is wiliwili *(Erythrina sandwicensis)*. This is also found in the sloping cliff areas of DMR but grows in patches with the Lonomea Forest. These areas are surrounded by heavily degraded weedy shrubland.

A jurisdictional wetland was identified in the DMR ROI and is described further under Biologically Significant Areas (Figure 6-17). This wetland is perched and is outside of the area that would be used for maneuver training. An additional wetland area was investigated and determined to be non-jurisdictional and, therefore, not regulated under Section 404 of the Clean Water Act based on an evaluation by the Corps of Engineers, Honolulu District, Regulatory Branch dated September 4, 2002. No training or construction is proposed to occur in this area.

### *Disturbed Habitat*

Invasive and noxious weeds targeted for eradication in DMR include padang cassia *(Cinnamomum burmannii)*, Chinese banyan *(Ficus macrocarpa)*, and fountain grass *(Pennisetum setaceum)* (USARHAW and 25th ID[L] 2001a). Widespread weed species would be controlled where they threaten native plants and communities.

Populations of feral pigs *(Sus scrofa scrofa)* directly affect native plants and contribute to numerous ecological problems (Atlas 1998). The effects of these wild pigs include trampled and grazed native plants, erosion, and landslides (USARHAW and 25th ID [L] 2001a; PCSU 1999, 2000, 2001). Browsing and otherwise destroying the native vegetation encourages nonnative plants to become established, which can severely affect the habitat. What native habitat remains at DMR is accessible to pigs, and signs of pig activity have been observed.

Habitat disturbance by humans on DMR includes possible disturbance by military training activities. Trampling associated with training activities could affect populations of rare plants (R. M. Towill Corp. 1997b). Nonmilitary impacts on the area include those from hiking and occasional hunting and poaching.

Fire threat is moderate in DMR and is a threat to native plants and ecological communities. Nonmilitary fire impacts could come from vehicles, campfires, arsonists, cigarettes, and

**Figure 6-16**
Vegetation Communities in the Dillingham Military Reservation Region of Influence

**Figure 6-17**
Dillingham Military Reservation USACE Jurisdictional Wetland And Biologically Significant Areas

civilian use of the airfield (R. M. Towill Corp. 1997b). Civilian use might also contribute to pollution and introduction of exotic species into the area. Additionally, the rugged terrain of the training area limits access for fire suppression and control. DMR is a small parcel of land and the training that takes place there is relatively low impact, so there are few ITAM requirements for this range. The ITAM program at DMR provides for collection of plant specimens to document species and supports Range Division through the use of GIS and GPS. The IWFMP includes provisions for this range.

### *Wildlife*

Zoological field surveys on DMR have been limited due to the rugged terrain and small size. Surveys have focused on special status invertebrates, mammals, and birds. No specific reptile surveys have been conducted on DMR due to the absence of native terrestrial reptiles and amphibians on the Hawaiian Islands. Surveys of DMR were made by the Environmental Impact Study Corp. in 1977, the HINHP in 1995, and PCSU natural resource staff in 2000 and 2001. The following sections describe the general presence of species within the invertebrate, mammal, bird, and fish species. There are two wildlife species with a recovery plan in the ROI (Appendix I-1).

#### *Invertebrates*

The native invertebrates on DMR could include dragonflies *(Nesogonia blackburni)* and damselflies *(Megalagnion hawaiiense)* (USARHAW and 25$^{th}$ ID[L] 2001a). In surveys of DMR conducted in 1995, staff from the HINHP detected three nonnative invertebrates: cannibal snail *(Euglandina rosea),* two-spotted leafhopper *(Sophonia rufofascia),* and Louisiana crayfish *(Procambarus clarki).* The black twig borer is suspected to occur on DMR, based on the presence of host species, but has not yet been observed.

Humans have purposely or accidentally introduced these nonnative species to O'ahu. They now threaten the native snail species through competition for resources and predation, as well as by the spread of disease.

#### *Amphibians*

There are no native terrestrial amphibians on the Hawaiian Islands. Nonnative amphibians with the potential to occur at DMR include the green and black dart-poison frog, bullfrog, wrinkled frog, giant toad, coqui frog, and Cuban tree frog (USARHAW and 25$^{th}$ ID[L] 2001a). These species were introduced into O'ahu from other countries and have inhabited areas where adequate aquatic habitat and surrounding vegetation exists.

#### *Reptiles*

The Hawaiian Islands have no native terrestrial reptiles. Nonnative reptiles with the potential to occur at DMR include the green anole, mourning gecko, stump-toed gecko, tree gecko, Indo-Pacific gecko, house gecko, metallic skink, and gold dust day gecko (USARHAW and 25th ID[L] 2001a).

#### *Terrestrial Mammals*

The Hawaiian hoary bat has the potential to occur on DMR (PCSU 2001). It is the only native terrestrial mammal on the Hawaiian Islands. The following nonnative species may occur on DMR: feral pig, feral cat, feral dog, Norway rat, black rat, Polynesian rat, and house mouse.

### Birds

The following indigenous forest bird species have been recorded on DMR: Hawaiian duck *(Anas wyvilliana),* Hawaiian coot *(Fulica alai),* Hawaiian goose *(Branta sandwicensis),* and Hawaiian moorhen *(Gallinula chloropus sandvicensis).* The pueo *(Asio flammeus sandwichensis)* is believed to occur on DMR, based on the presence of adequate habitat and prey.

Nonnative bird species believed to occur in DMR include the red-billed leiothrix, white-rumped shama, Japanese bush warbler, rock dove, spotted dove, zebra dove, common myna, red-vented bulbul, and Japanese white-eye. The nutmeg manikin, red-crested cardinal, barn owl, Erchel's francolin, ring-necked pheasant, and northern cardinal are also species that have been introduced by humans on O'ahu. This list of nonnative species is based on those species present on the nearby Mālwa Military Reservation which has areas of corresponding habitat (R. M. Towill Corp. 1997b).

### Fish

There are no documented studies of fish in DMR streams (USARHAW and 25th ID[L] 2001a).

### Marine Biological Resources

Since DMR is adjacent to a small segment of beachfront, a portion of the DMR ROI is extended to include this portion of the coast and the nearshore waters adjacent to the coast in order to address potential impacts on marine biological resources. This area is outside the Hawaiian Islands Humpback Whale National Marine Sanctuary waters (see Figure 3-13). The sanctuary does encompass marine waters in north O'ahu near, but not adjacent to, the Dillingham ROI.

There are no coral reef "hot spots" in the DMR ROI, that is, no specific coral reef areas of management concern (CRAMP 2003). There are, however, coral reefs in the coastal waters of the DMR ROI within a half a mile of the shoreline.

Marine wildlife does occur in the coastal and marine portion of the DMR ROI. The adjacent beachfront/coastline area of DMR may provide shore habitat for some marine wildlife, such as sea turtles or monk seals.

Distribution and abundance of marine mammals and sea turtles in Pacific waters vary seasonally and spatially; that is, the numbers and types of animals may vary in the nearshore versus the offshore regions, as well as by the time of year (Calambokidis et al. 1997; Leatherwood et al. 1982; Mobley et al. 1999, 2000; NMFS 2000a to 2000bb). All marine mammal species are protected under the MMPA, regardless of their status under the ESA. Informal consultation with NOAA Fisheries has been initiated for marine mammals in the DMR ROI. Both MMPA and ESA protected marine wildlife species that may occur in the DMR ROI seasonally, permanently, or as transients, are listed in Table 6-18.

**Table 6-18**
**Sensitive Marine Wildlife Occurring or Potentially Occurring in Hawaiian Waters near Dillingham Military Reservation Region of Influence**

| Scientific Name | Common Name | [1]Federal Status | [2]State Status | Habitat | Date Last Observed | Likelihood of Occurrence | Notes |
|---|---|---|---|---|---|---|---|
| ***Cetaceans and Pinnipeds*** | | | | | | | |
| *Balaenoptera acutorostrata* | Minke whale | * | - | May occur in nearshore or offshore waters | Known Currently | U | Most common northwest of the main seven-island chain or on leeward side of islands. May be incidentally sighted in waters adjacent to DMR. |
| *B. Borealis* | Sei Whale | E* | - | Most likely in deeper offshore waters | Known currently | U | Rarely sighted in Hawaiian waters. |
| *B. edeni* | Bryde's whale | * | - | May occur in nearshore or offshore waters | Known Currently | U | Most common northwest of the main seven-island chain. May be incidentally sighted in waters adjacent to DMR. |
| *B. musculus* | Blue whale | E* | - | Most likely in deeper offshore waters | Known currently | U | Heard in Hawaiian waters. |
| *B. physalus* | Fin whale | E* | - | Most likely in deeper offshore waters | Known currently | U | Heard but rarely sighted in Hawaiian waters. |
| *Berardius bairdii* | Baird's beaked whale | * | - | Most likely in deeper offshore waters | Known Currently | P | May be incidentally sighted in waters adjacent to DMR. |
| *Delphinus Delphis* | Common dolphin | * | - | Most likely in deeper offshore waters | Known Currently | U | May be incidentally sighted in waters adjacent to DMR. |
| *Eubalaena glacialis* | Pacific right whale | E* | - | Unknown if depth is a criteria | Known currently | U | Most likely stray individuals from more northern population. |
| *Feresa attenuate* | Pygmy killer whales | * | - | May occur in nearshore or offshore waters | Known Currently | C | Occasionally seen in the channels between the main islands. Has been documented off the coast of O'ahu. |
| *Globicephala macrorhynchus* | Short-finned pilot whale | * | - | May occur in nearshore or offshore waters | Known Currently | C | Occasionally seen in the channels between the main islands. Common in nearshore or offshore areas in waters adjacent to DMR. |
| *Grampus griseus* | Risso's dolphin | * | - | Most likely in deeper offshore waters | Known Currently | U | More common sighted offshore. May be seen in offshore areas in waters adjacent to DMR |
| *Kogia breviceps* | Pygmy sperm whale | * | - | Most likely in deeper offshore waters | Known Currently | P | Prefers deeper waters but occasionally seen in the channels between the main islands. May be incidentally sighted in waters adjacent to DMR. |
| *K. simus* | Dwarf sperm whale | * | - | Most likely in deeper offshore waters | Known Currently | P | Prefers deeper waters but occasionally seen in the channels between the main islands. May be incidentally sighted in waters adjacent to DMR. |

**Table 6-18**
**Sensitive Marine Wildlife Occurring or Potentially Occurring in Hawaiian Waters near Dillingham Military Reservation Region of Influence** *(continued)*

| Scientific Name | Common Name | [1]Federal Status | [2]State Status | Habitat | Date Last Observed | Likelihood of Occurrence | Notes |
|---|---|---|---|---|---|---|---|
| *Monachus schauinslandi* | Monk seal | E*, CH, D | - | More common in nearshore waters or hauled out on the coast. | Known currently | C | Most common northwest of the main seven-island chain. Incidental individuals may haul out along the coast of the islands' north shores. Anecdotal sighting on DMR beach. |
| *Megaptera novaeangliae* | Humpback whale | E* | - | May occur in nearshore or offshore waters | Known currently | C | Occurs throughout the main seven-island chain January through April. Occurs in waters adjacent to the islands' north shores. |
| *Mesoplodon densirostris* | Blainsville's whale | * | - | Most likely in deeper offshore waters | Known Currently | C** | Prefers deeper offshore waters but has been sighted off coast of O'ahu. |
| *Orcinus orca* | Killer whale | * | - | May occur in nearshore or offshore waters | Known Currently | C** | Occasionally seen, especially in the channels between the main islands and at the northwest island chain. May be incidentally sighted in nearshore or offshore waters adjacent to DMR. |
| *Peponocephala electra* | Melon-headed whale | * | - | May occur in nearshore or offshore waters | Known Currently | C** | Occurs especially in the channels between the main islands and at the northwest island chain. May also occur in nearshore or offshore areas adjacent to DMR. |
| *Physeter macrocephalus* | Sperm whale | E* | - | Most likely in deeper offshore waters | Known currently | U | Most common off the north and eastern shores of the main seven islands. May be sighted in waters adjacent to the islands' north shores. |
| *Pseudorca crassidens* | False killer whale | * | - | May occur in nearshore or offshore waters | Known Currently | C** | Occasionally seen in the channels between the main islands. May be sighted in nearshore or offshore waters adjacent to DMR. |
| *Stennella attenuata* | Spotted dolphin | * | - | Most likely in nearshore, leeward coastal waters | Known Currently | C | Common along the coastline, especially on the leeward sides of the island. Occurs in nearshore or offshore areas in waters adjacent to DMR. |
| *S. coeruleoalba* | Striped dolphin | * | - | May occur in nearshore or offshore waters | Known Currently | P | More strandings sighted than live individuals. |
| *S. longirostris* | Spinner dolphin | * | - | Most likely in nearshore, leeward coastal waters | Known Currently | C | Common along the coastline. Occurs in nearshore or offshore areas in waters adjacent to DMR. |
| *Steno bredanensis* | Rough toothed dolphin | * | - | Most likely in deeper offshore waters | Known Currently | C** | Prefers deeper offshore waters but has been sighted off coast of O'ahu. |

**Table 6-18**
**Sensitive Marine Wildlife Occurring or Potentially Occurring in Hawaiian Waters near Dillingham Military Reservation Region of Influence** *(continued)*

| Scientific Name | Common Name | [1]Federal Status | [2]State Status | Habitat | Date Last Observed | Likelihood of Occurrence | Notes |
|---|---|---|---|---|---|---|---|
| *Tursiops truncatus* | Bottlenose dolphin | * | - | May occur in nearshore or offshore waters | Known Currently | C | Common along the coastline. Occurs in nearshore or offshore areas in waters adjacent to DMR. Also common offshore in project area waters. |
| *Ziphius cavirostris* | Cuvier's beaked whale | * | - | Most likely in deeper offshore waters | Known Currently | C** | Most common of the beaked whales in project area waters. Prefers deeper offshore waters but can be common in nearshore or offshore areas in waters adjacent to DMR. |
| ***Sea Turtles*** | | | | | | | |
| *Caretta caretta* | Loggerhead turtle | T | - | In project area; prefers nearshore waters | Known currently | U | Considered uncommon in DMR waters. |
| *Chelonia mydas* | Green turtle | T | - | In project area; prefers nearshore waters | Known currently | C | Nests annually on Hawaiian beaches; common in nearshore areas of any of the main seven islands. Most abundant sea turtle in DMR waters. |
| *Dermochelys coriacea* | Leatherback turtle | E | - | In project area; prefers offshore waters | Known currently | C | Primarily occurs over deep oceanic waters; sighted equally as frequently off any of the main seven islands. |
| *Eretmochelys imbricata* | Hawksbill turtle | E | - | In project area; prefers nearshore waters | Known currently | U | Considered uncommon; a small number nest on the island of Hawai'i. |
| *Lepidochelys olivacea* | Olive ridley turtle | T | - | In project area; prefers offshore waters | Known currently | U | Infrequently seen in Hawaiian offshore waters. |

Sources: NMFS 2000a-bb; ONR 2000.

**Status:**
**[1]Federal:**
E = Endangered
* = Protected under MMPA
D = Depleted under the MMPA
CH = Critical habitat designated or proposed for designation
** = presence confirmed from aerial surveys but found at a distance offshore from the DMR coastline, so discussed in Appendix rather than text.

**[2]State**
/-/ = No Status

**Likelihood of occurrence in the project site**
C = Confirmed
P = Potentially may occur
U = Unlikely to occur

*Whales and Dolphins Potentially Occurring in Hawaiian Waters of the Dillingham Military Reservation Region of Influence*

Non-ESA listed but MMPA protected marine mammals considered to have the potential to be found in Hawaiian waters, or in waters off the DMR ROI, include the following:

- Bryde's whales *(Balaenoptera edeni);*
- Minke whales *(B. acutorostrata);*
- Pygmy sperm whales *(Kogia breviceps);*
- Dwarf sperm whales *(K. simus);*
- Killer whales *(Orcinus orcina);*
- False killer whales *(Pseudorca crassidens);*
- Pygmy killer whales *(Feresa attenuate);*
- Pilot whales *(Globicephala macrorhynchus);*
- Beaked whale species *(Mesoplodon* and *Ziphius* spp.*);*
- Baird's beaked whale *(Berardius bairdii);*
- Melon-headed whales *(Peponocephala electra);*
- Bottlenose dolphins *(Tursiops truncatus);*
- Spinner dolphins *(Stenella longirostris);*
- Rough-toothed dolphins *(Steno bredanenis);*
- Risso's dolphin *(Grampus griseus);*
- Striped dolphin *(Stenella coeruleoalba);*
- Common dolphin *(Delphinus delphis);* and
- Several species of spotted dolphins, the most common of which is *Stenella attenuata.*

The natural history of these species, as well as specific documented locations either in or near the DMR ROI (if known), are described in Appendix I-1. (Note: As marine mammals are mobile and rapid movers, if they have been documented near the DMR ROI [within 2 to 5 nautical miles], they are assumed to occur in the ROI).

Most of the species listed above are not expected to occur in the DMR ROI, with the exception of the humpback whale and several of the dolphin species.

### *Sensitive Species*

Sensitive species include special status, or regulated, species such as USFWS or State of Hawai'i listed endangered, threatened, candidate, or proposed species; MMPA species; federal and state species of special concern; and locally regulated species. Also considered sensitive are rare species that have had rapid population decline or whose habitat has markedly decreased in recent years. Potential sensitive species on DMR were identified by the State of Hawai'i DLNR (HDLNR 2002a), USARHAW biologists and surveys, and the Hawai'i Natural Heritage Program (HINHP 1994).

A list of all sensitive vegetation and wildlife and any critical habitat found in the region, according to USFWS and DLNR records, is found in Tables 6-19 and 6-20. An assessment of the likelihood of a species occurring on DMR was made, where possible, based on the habitat requirements and geographic distribution of the species, on-site habitat quality, and the results of biological surveys of DMR. Natural history descriptions of sensitive species with the potential to occur in the ROI, and specific locations if known, can be found in Appendix I-1 (Recovery Plans 1-1a; Plants I-1b; Wildlife I-1c).

### *Sensitive Plant Species*

The rare plants found on DMR outside of the ROI include federal species of concern, candidates for federal listing, and state-ranked rare plants. *Bobea sandwicensis, Hibiscus brackenridgei* ssp. *mokuleianus, H. kokio* spp. *kokio,* and *Schiedea kealiae* are all sensitive species with the potential to occur within the ROI. The remaining native ecosystems near or adjacent to the ROI have low densities of native species and are fragmented and disturbed. A 1977 survey found unique populations of Lonomea and *Reynoldsia sandwicensis* near the base of the cliffs. Though not endangered, these species are rare and represent the only example of closed canopy *Sapindus oahuensis* forest known in the world.

Sensitive plants and their likelihood of occurrence in the DMR ROI are shown in Table 6-19.

### *Sensitive Wildlife Species*

The following discussion includes a profile of sensitive wildlife species considered likely to be found in the project area. This information is primarily based on information from the O'ahu INRMP (USARHAW and 25th ID[L] 2001a), the ESMPR (R. M. Towill Corp 1997b), and the Biological Inventory of DMR (HINHP 1994). The first extensive zoological surveys of DMR were conducted in 1976 and 1977 (Shallenberger and Vaughn 1978). More recent studies were conducted in 1995 by HINHP, in search of rare and sensitive species on DMR, and by PCSU natural resource staff in 2000 and 2001. The latest USFWS and HINHP survey information on species and habitat in the SBCT ROI has been incorporated into this evaluation of biological resources. Table 6-20 lists sensitive terrestrial wildlife and their potential to occur in the DMR ROI. Figure 6-18 shows the documented locations of sensitive terrestrial wildlife recorded in the DMR ROI.

### *Marine Wildlife*

Six species of endangered whales occur in the Pacific tropical waters of Hawai'i. only one of these is considered likely to occur in the waters adjacent to DMR (in the DMR ROI), the humpback whale *(Megaptera novaeangliae)*. The other listed species are the fin *(Balaenoptera physalus),* blue *(Balaenoptera musculus),* sei *(Balaenoptera borealis),* and pacific right *(Eubalaena glacialis),* and sperm whale *(Physeter macrocephalus)*.

There is one federally listed endangered seal, the monk seal *(Monachus schauinslandi),* which is considered to have the potential to occur. The monk seal has critical habitat in the northwestern portion of the Hawaiian Island chain, which is outside of the ROI.

**Table 6-19**
**Sensitive Plant Species Occurring or Potentially Occurring at DMR ROI**

| Scientific Name | Hawaiian Name/Common Name | Federal[1] Status | State[2]/Global[3] Status | Habitat | Date Last Observed | Likelihood of Occurrence |
|---|---|---|---|---|---|---|
| *Bobea sandwicensis* | ʻahakea/- | - | -/G2 | Ridges and gulch slopes of dry to moist lowland forests | Unknown | P |
| *Cyperus trachysanthos* | puʻukaʻa/- | E, CH | -/G1 | Wet slopes and pond margins in lowland areas | Unknown | P |
| *Hibiscus brackenridgei* ssp. *mokuleianus* | Kokiʻo keʻokeʻo, maʻo hau helemaʻo hau hele, maʻo hau helemaʻo hau hele/- | E, CH | -/G1 | Lowland dry forests | Unknown | P |
| *H. kokio* spp. *kokio* | kokiʻo ʻulaʻula/- | SOC | -/ G2 | Wet or dry forests adjacent to DMR | 2000 | P |
| *Lepidium bidentatum* var. *o-waihiense* | ʻānaunau, naunau, kūnānā/- | SOC | -/- | Steep dry coastal slopes in low elevations | Unknown | P |
| *Lipochaeta remyi* | nehe/- | SOC | -/G1 | Wet sites in dry forests | Unknown | P |
| *Nototrichium humile* | kuluʻī/- | E, CH | -/G2 | Dry forest understory and cliff faces | Unknown | P |
| *Schiedea kealiae* | NCN | E, CH | -/G1 | Dry cliff faces and steep slopes | 2000 | P |

Sources: USFWS 2002a; USARHAW and 25th ID [L] 2001a; PCSU 2000

Notes:

NCN = No Common Name

Status:

**[1]Federal:**
E = Endangered
SOC = Species of concern
CH = Critical habitat designated or proposed for designation

**[2]State**
/-/ = No Status

**[3]Heritage Global Rank:**
G1 = Species critically imperiled globally (typically 1-5 current occurrences)
G2 = Species imperiled globally (typically 6-10 current occurrences)

**Likelihood of occurrence on the project site**
C = Confirmed
P = Potentially may occur

**Table 6-20**
**Sensitive Terrestrial Wildlife Species Occurring or Potentially Occurring at Dillingham Military Reservation Region of Influence**

| Scientific Name | Hawaiian Name/ Common Name | Federal[1] Status | State[2]/Global[3] Status | Habitat | Date last observed | Likelihood of Occurrence |
|---|---|---|---|---|---|---|
| **Invertebrates** | | | | | | |
| *Megalagrion xanthomelas* | -/orange-black damselfly | C | -/G2 | Breeds in coastal wetlands, perennial streams, reservoirs, ponds. | 2000 | U* |
| **Birds** | | | | | | |
| *Anas wyvilliana* | koloa maoli/Hawaiian duck | E | E/G1 | Lowland marshes, reservoirs, taro patches, pastures, drainage ditches, agricultural lands below 1,000 feet (305 meters), stream and river valleys in densely wooded areas at higher elevations, mountain pools, mountain bogs, forest swamps, natural and human-made ponds, wetlands. Nests on ground near water in well-concealed site, primarily on small islets. | 1995 | C^ |
| *Asio flammeus sandwichensis* | pueo/Hawaiian short-eared owl | SOC, + | E**/G5T3 | Pastures, grasslands, dry and wet forests that are dominated by either native or nonnative vegetation, sea level to 7,900 feet (2,408 meters). | Unknown | P |
| *Chasiempis sandwichensis ibidis* | Oʻahu ʻelepaio/- | E, CH | E/G4T1 | Native Hawaiian forest. | Unknown | P |
| *Fulica alai* | ʻalae keʻokeʻo/Hawaiian coot | E | E/G2 | Herbaceous wetland, lagoon, river mouth/tidal river, low gradient, pool, shallow water, herbaceous wetland. | 1995 | C^ |
| *Gallinula chloropus sandvicensis* | ʻalaeʻula/Hawaiian common moorhen | E | -/- | Freshwater marshes, taro patches, reedy margins of water courses, reservoirs, wet pastures. | Unknown | C^ |
| *Himantopus mexicanus knudseni* | aeʻo/black-necked stilt | E | -/G5T2 | Shallow salt or freshwater with soft muddy bottom; grassy marshes, wet savanna, mudflats, shallow ponds, flooded fields, borders of salt ponds and mangrove swamps. Nests along shallow water of ponds, lakes, swamps, or lagoons. May nest on the ground or in shallow water on a plant tussock. | Unknown | C^ |
| *Paroreomyza maculata* | ʻalauahio/Oʻahu creeper | E | E/G1 | Native Hawaiian shrublands, forests, bogs. | Unknown | U |
| *Vestiaria coccinea* | ʻiʻiwi/Hawaiian honeycreeper | + | E/G4 | Native forests, especially ʻōhiʻa *(Metrosideros)* forest. | Unknown | U |

**Table 6-20**
**Sensitive Terrestrial Wildlife Species Occurring or Potentially Occurring at Dillingham Military Reservation Region of Influence** *(continued)*

| Scientific Name | Hawaiian Name/ Common Name | Federal[1] Status | State[2]/Global[3] Status | Habitat | Date last observed | Likelihood of Occurrence |
|---|---|---|---|---|---|---|
| **Mammals** | | | | | Unknown | |
| *Lasiurus cinereus semotus* | -/Hawaiian hoary bat | E | E/G5T2 | Bare rock, cliff, hardwood forest, grassland/herbaceous, hardwood woodland, riparian habitats. | Unknown | P |

Sources: USARHAW and 25th ID(L) 2001a; HDLNR 2002a; HINHP 1994; R. M. Towill Corp. 1997b; NatureServe 2001; Virginia Tech 1998; PCSU 2001
Notes::
NCN = No Common Name
*The species record is based on an attempted reintroduction, which subsequently failed. This species has not been identified in this location since.
**The state endangered listing refers only to the populations on O'ahu, Lana'i, and Moloka'i.

^These four waterbirds have been documented at DMR, however, there have been extensive surveys for them and it has been determined that they are not resident species.

**[1]Status:**

**[1]Federal:**
E = Endangered
SOC = Species of concern
C = Candidate
/-/ = No Status
\+ = Birds of Conservation Concern

**[3]Heritage Global Rank:**
G1 = Species critically imperiled globally (typically 1-5 current occurrences.
G2 = Species imperiled globally (typically 6-10 current occurrences).
G4 = Species apparently globally secure.
G5 = Species demonstrably globally secure.
T1 = Subspecies critically imperiled globally (typically 1-5 current occurrences).
T2 = Subspecies imperiled globally (typically 6-10 occurrences).
T3 = Subspecies either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range, or because of other factors making it vulnerable to extinction throughout its range (21-100 occurrences).

**[2]State**
E= Endangered
/-/ = No Status

**Likelihood of occurrence on the project site**
C = Confirmed
P = Potentially may occur
U = Unlikely to occur

**Figure 6-18**
Sensitive Wildlife Species in the Dillingham Military Reservation Region of Influence

There are five listed sea turtles that could occur in the Pacific tropical waters of Hawai‘i, two of which are more common and could occur in the DMR ROI. These are the green sea turtle *(Chelonia mydas),* which is federally threatened, and the leatherback sea turtle *(Dermochelys coriacea),* which is federally endangered. The green sea turtle is expected to occur in the ROI. The leatherback turtle could occur but most likely would not because it prefers offshore waters. Adult leatherbacks are commonly sighted in the waters off the outer Hawaiian Islands (NOAA Fisheries 2000z). The loggerhead *(Caretta caretta gigas),* hawksbill *(Eretmochelys imbricata),* and olive ridley *(Lepidochelys olivacea)* are not expected to occur. Hawksbills and green sea turtles nest annually on Hawaiian beaches (ONR 2000), though no nests for either species have been documented in the ROI, and no hawksbills are expected to occur there. This species is considered uncommon in Hawaiian waters, but does have nesting sites on Hawai‘i and Moloka‘i (NOAA Fisheries 2000y), which are distant from the ROI. Loggerheads and olive ridleys are known to occur in Hawaiian waters as they occur as bycatch in the longline fishery, but they are pelagic (open sea) species and as such are not expected in the DMR ROI. Loggerheads are known to spend 40 percent of their time at the surface, and olive ridleys are only at the surface 20 percent of the time and tend to be found in shallower waters than loggerheads (Polovina et al. 2000). Olive ridleys are the most abundant sea turtles in the world (Polovina et al. 2000), though they are less common in Hawaiian waters. Most records of olive ridley are from entanglements and strandings (NOAA Fisheries 2000aa).

### *Humpback Whale (FE/MMPA)*

The waters off the coasts of the Hawaiian Islands are known for their seasonal population of humpback whales, which are also the most abundant marine mammal throughout the Hawaiian waters (Mobley et al. 2001). The Hawaiian Islands are an important breeding ground for this species (Calambokidis et al. 1998). The humpback whale is the only one of the five endangered baleen whales potentially occurring in Hawaiian waters that is known to be present in reasonably large numbers. The International Whaling Commission and NOAA Fisheries consider the Hawaiian population of humpbacks to be a separate stock (NOAA Fisheries 2000a). Humpback whales are found throughout the island chain and are most abundant in coastal waters of the main Hawaiian Islands, including Hawai‘i and O‘ahu, from November through April, with peak abundance from late February through mid-March (Baker and Herman 1981). Approximately two-thirds of the entire North Pacific humpback whale population (approximately 4,000 to 5,000) migrate to Hawaiian waters to breed, calve, and nurse (NOAA Fisheries 2000a). These whales are generally found in shallow waters shoreward of the 600-foot (183-meter) depth contour (ONR 2000).

Humpback whale mothers and calves prefer the calmer shallower waters often found on the leeward sides of the islands (Smultea 1992), and they prefer very shallow water less than 60 feet (18 meters) (ONR 2000; Smultea 1992). Some research suggest that habitat use patterns of females and calves in nearshore areas may decrease as a result of increasing vessel traffic and human activities (ONR 2000). Humpback whales are vulnerable to human disturbance in Hawaiian waters and possibly to vessel strikes. Hawai‘i regulations prohibit boats from approaching within 100 yards (91 meters) of adult whales and within 300 yards (274 meters) of mother/calf pairs. Humpback whales (of varying pod sizes and types, including mother and calf pods) are commonly sighted off the O‘ahu coast and are confirmed in project area waters, though with unknown frequency, from January through April (Pickering 2003; Clark and Tyack 1998).

### *Monk Seal (E/MMPA,D)*

The monk seal is the only pinniped (seal species) known to occur in the Hawaiian archipelago, where it is endemic. This species may occasionally occur in the waters or shore of the ROI, but it is more common in the northwest island chain. Incidental transients are known at all of the main seven islands and there is a small uncounted population on the island of Ni'ihau (NOAA Fisheries 2000w). The species was designated as depleted under the MMPA in 1976, following a large decline in animal counts from the late 1950s and mid 1970s. The monk seal was also listed as endangered under the ESA in 1976. In 1988, NOAA Fisheries designated critical habitat for the Hawaiian monk seal, but this habitat is quite distant from the ROI, in the northwestern Hawaiian Islands, extending from shore to a distance offshore that is 20 fathoms (180 feet, or 55 meters) deep. The species is managed as one stock, though each island may in fact have its own subpopulations (NOAA Fisheries 2000w). Virtually nothing is known about its distribution and movement patterns when it is at sea. Current estimates indicate that the monk seal population is declining and is believed to include approximately a thousand animals. Hawaiian monk seals breed primarily at Laysan Island, Lisianski Island, and Pearl and Hermes Reefs but also are known to use the Midway Islands, among other northwest Hawaiian Islands (NOAA Fisheries 2000w).

### *Green sea turtle (FT)*

The green sea turtle is considered the most abundant turtle in Hawaiian waters (Zug et al. 2002; ONR 2000; NOAA Fisheries 2000x-z, 2000aa, 2000bb). The Hawaiian population of nesting green sea turtle makes up a distinct genetic unit (Zug et al. 2002). Except during their post-hatching pelagic phase, this species spends most of its time in coastal waters, shallow bays, and nearshore areas where foraging is optimal (Brill et al. 1994; Zug et al. 2002). Juveniles and subadult green turtles are especially abundant in the nearshore areas. These turtles have nested on all of the seven main islands (Dollar 1999). The most accurate abundance estimates for adult female green turtles, which nest annually on Hawaiian beaches, are from 450 to 475 animals, with reproduction taking place mostly at the French Frigate Shoals (Balazs 1980; NOAA Fisheries 2000x, 2000y). Submergence intervals vary by behavior. When the animals are resting, they have regular, long submergence intervals. When feeding, submergence intervals are short and irregular (Brill et al. 1994). In Hawaii, 40 to 60 percent of immature green sea turtles suffer from fibropapillomatosis, a disease that causes tumor growth (Work et al. 2003). Studies are ongoing to assess the impacts of these tumors on the animals' behavior.

Green sea turtles are expected to occur in the ROI, in waters off DMR or on the beach. This species is known to feed on marine plants that occur in the ROI and in the nearshore areas at DMR. The DMR ROI could serve as sea turtle foraging and resting areas. Green sea turtles have been shown from some Hawaiian areas to remain within a small portion of a habitat area, if foraging and rest habitat is optimal there, and to have short submergence intervals (Brill et al. 1994). During the breeding season, adult green sea turtles undertake long-distance oceanic migrations from feeding areas throughout the Hawaiian archipelago to nesting beaches at French Frigate Shoals, Laysan Island, Lisianski Island, Pearl Reef and

Hermes Reef, Cure Atoll, and Midway Island. Ninety percent of green turtle nesting in the Hawaiian Islands occurs far from the ROI at the French Frigate Shoals, the portion of the islands that is 800 miles (1,482 kilometers) northwest of the main Hawaiian Islands and consisting of a string of 11 small island regions.

### *Leatherback sea turtle (FE)*

Leatherbacks do not nest regularly or in great numbers in the Hawaiian Islands (NOAA Fisheries 2000x, 2000aa). Adult leatherbacks are commonly sighted in the Pacific Ocean near the Hawaiian archipelago, primarily over deep oceanic waters. Leatherbacks could occur equally as frequently off any of the main seven islands, but they are often sighted off the north shores of both O‘ahu and the island of Hawai‘i (NOAA Fisheries 2000z; ONR 2000). They are considered unlikely in ROI waters, as they are more typically sighted along the north shore or in offshore waters (NOAA Fisheries 2000z). However, transients could occur in the waters off DMR and, rarely, on the coastline.

Of these marine mammals, the only likely occurrence in the ROI would be the humpback whale, the monk seal, and the green sea turtle. Table 6-18 lists the likelihood of occurrence of these species within the project area and associated habitat and regulatory information. The natural history of these species, as well as specific documented locations either in or near the DMR ROI (if known), are described in Appendix I-1. (Note: As marine mammals are mobile and rapid movers, if they have been documented near the DMR ROI [within 2 to 5 nautical miles], they are assumed to occur in the ROI.)

## ***Sensitive Habitats***

### *Critical Habitat*

Army lands were excluded from the latest critical habitat designations for plants based on the essential contribution that Army-led natural resource conservation actions play in the stabilization of threatened and endangered species. ~~Small portions of~~ There is no USFWS critical habitat ~~may occur~~ within the DMR ROI.

### *Hawaiian Islands Humpback Whale National Marine Sanctuary*

The Hawaiian Islands Humpback Whale National Marine Sanctuary was designated under the National Marine Sanctuaries Act (16 U.S.C. 1431 et seq., P.L. 106-513). This act was passed to designate and manage areas of the marine environment with special national significance as National Marine Sanctuaries. The primary objective of this law is to protect marine resources. The act also directs the Secretary of Commerce to facilitate all public and private uses of those resources that are compatible with the primary objective of resource protection. Sanctuaries are managed according to site-specific management plans prepared by the NOAA Fisheries. The sanctuary waters are composed of five separate areas abutting six of the major islands. Designated sanctuary waters encompass marine waters in north O‘ahu near, but not adjacent to, the Dillingham ROI. Designated sanctuary waters also occur outside of O‘ahu at Penguin Banks (see Figure 3-13).

### *Biologically Significant Areas*

Classifications of BSAs are defined in Section 5.10-1.

- BSA1: On DMR, Lonomea lowland dry forest is classified as a BSA1 rare natural community, with Global Heritage Ranking G2.
- BSA2: There is one BSA2 area on DMR, adjacent to the BSA1 area and in the southern portion of DMR in an area of sloping cliffs.
- BSA3: There are no BSA3 areas in DMR.

A wetland delineation of DMR was conducted in the spring and summer of 2002 following procedures outlined in the ACOE 1987 wetland delineation manual; results were published in a report dated August 2002 (USACE 2002d). Those conducting the survey identified one jurisdictional wetland on DMR (USACE 2002d). The wetland is spring fed, is dominated by primrose willow, and is approximately 287 square yards (240 square meters) (USACE 2002d). This perched wetland is within the ROI but outside of the area that will be used for maneuver training.

An additional wetland area was investigated at DMR. Based on an evaluation by the Corps of Engineers, Honolulu District, Regulatory Branch, dated September 4, 2002, the wetland area was determined to be non-jurisdictional and, therefore, not regulated under Section 404 of the Clean Water Act. (See Appendix E).

### 6.10.2 Environmental Consequences

In response to the agency and public comments received during the Draft EIS comment period we reevaluated our analysis of the biological resources. As a result of considering these comments and a reanalysis of the available information, we recognize that the impact to biological resources from fire could not be mitigated to the less than significant level. However, these impacts will be substantially reduced as a result of mitigation.

This section identifies potential biological impacts that may result from the Proposed Action, Reduced Land Acquisition, and No Action. The methodology and significance criteria used to determine the level of impact on biological resources are described in Section 4.10.1.

The Army and USFWS have not yet agreed on a final ROI. Changes to the present ROI, depicted in Figure 6-15, could alter the qualitative and quantitative analyses within this environmental consequences section.

#### *Summary of Impacts*

Impacts on biological resources would occur as a result of fire if it occurs, construction, the elevated use of areas by Soldiers and the intensification of training including off-road mounted maneuvers, and the increase in nonlive-fire training. All biological resources have been assessed for potential impacts from project activities. For a full description of the impact methodology used to determine impact on a resource please refer to chapter 4.10. Only the resources potentially affected are included in this chapter. If a resource was determined not to be impacted, it has not been included for discussion. A summary of impacts is provided in Table 6-21.

Significant impacts mitigable to less than significant are fire effects on sensitive species and sensitive habitat; impacts from construction and training activities on sensitive species and habitat; and impacts on sensitive species and habitat from the spread of nonnative species., Less than significant impacts involve impacts from training activities and construction on general habitat and wildlife at DMR and along Dillingham Trail, threats to migratory birds from FTI construction, and noise and visual impacts on wildlife.

**Table 6-21**
**Summary of Potential Biological Impacts at DMR**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Impacts from fire on sensitive species and sensitive habitat. | ⊘ | ⊘ | ⊘ |
| Impacts from construction and training activities on sensitive species and sensitive habitat. | ⊘ | ⊘ | ⊘ |
| Impacts from the spread of nonnative species on sensitive species and sensitive habitat. | ⊘ | ⊘ | ⊘ |
| Impacts from construction and training activities on general habitat and wildlife. | ⊙ | ⊙ | ⊙ |
| Threat to migratory birds. | ⊙ | ⊙ | ⊙ |
| Noise and visual impacts. | ⊙ | ⊙ | ⊙ |
| Runoff impacts on marine wildlife and coral ecosystems. | ○ | ○ | ○ |

LEGEND:

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact
N/A = Not applicable

### *Proposed Action (Preferred Alternative)*

#### *Significant but Mitigable to Less than Significant Impacts*

*Impact 1: Impacts from fires on sensitive species and sensitive habitat.* Although no live-fire exercises are proposed at DMR, human-induced fires could occur as a result of the Proposed Action. Sources of fire include engines, pyrotechnics, nonlive fire, and cigarettes. Fires are a great threat to the natural communities in Hawai‘i and could cause major impacts on biological resources, as discussed extensively in Section 5.10.2 of this report. Construction, training, and use of the Dillingham Trail would increase the threat of wildfire in the Wai‘anae Mountains. The rugged terrain can limit the suppression and control of fires, which are likely to spread unchecked into areas that contain sensitive species.

Vegetation communities that could be affected by the spread of fire include those within the DMR ROI, such as those that follow:

- Nonnative vegetation (approximately 6,847 acres [2,771 hectares]);
- Lowland dry forest and shrubland (approximately 29 acres [11.7 hectares]);
- Coastal dry shrubland and grassland (approximately 56 acres [22.6 hectares]); and
- Lowland mesic forest and shrubland (approximately 194 acres [78.5 hectares]).

Impacts of fire on vegetation communities are discussed in Section 5.10.2 and could include the following:

- Removal of aboveground biomass;
- Soil erosion;
- Changes in community composition resulting from changes in soil texture and composition, moisture, light availability, and nutrient availability; and
- Invasion of nonnative species.

Federally listed and sensitive species have the potential to occur in the southern portion of the DMR ROI, on the northern edge of the Wai'anae Mountains (Tables 6-19 and 6-20). These species could be adversely affected by the spread of fire into their habitats. Approximately 14 acres (5.6 hectares) of BSAs also occur within the DMR ROI and could be affected in the event that a wildland fire occurred at DMR.

The Proposed Action would not directly affect threatened or endangered species, but, due to the risk of fire ignition associated with military activities, the disturbance or destruction of federally listed species resulting from a wildland fire is considered a potentially significant and mitigable impact.

To help prevent the ignition and spread of fire, the Army would follow guidelines in the *IWFMP, O'ahu and Pōhakuloa Training Areas*. This includes the construction of two firebreak roads at DMR and would help prevent the spread of training-induced fires. The mitigation measures listed below would decrease the impacts of fire on sensitive species from construction and the increased use of the DMR military vehicle trail to less than significant levels.

*Regulatory and Administrative Mitigation 1.* The Army will implement the terms and conditions identified in the Biological Opinion for current force and SBCT proposed training on the island of O'ahu including the development and implementation of the O'ahu Implementation Plan to aid in the stabilization of listed species. The BO is available upon request.

The Integrated Wildland Fire Management Plan for Pōhakoloa and O'ahu Training Areas was updated on October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts associated with wildland fires. The plan is available upon request.

*Additional Mitigation 1.* No additional mitigation measures were identified for this impact.

*Impact 2: Impacts from construction and training activities on sensitive species and sensitive habitat.* The Proposed Action would have a significant but mitigable impact on sensitive species and sensitive habitat.

The effects of fire, as described in Impact 1, would have the most significant impacts on listed species and their habitat. Federally listed and sensitive species are known to occur or have the potential to occur in the southern portion of the DMR ROI (Figures 6-17). This includes the Hawaiian common moorhen, Hawaiian duck, Hawaiian coot, the black-necked stilt, the Hawaiian hoary bat, *Hibiscus brackenridgei* ssp. *mokuleianus, Schiedea kealiae,* and *Nototrichium humile*. These species would be adversely affected by the spread of fire into their habitats. (The Army has surveyed for bird species listed above annually over the last nine years but none have been identified as occurring on DMR during this time.)

Impacts from noise associated with use of the Dillingham trail would affect sensitive waterfowl if any were present in the project area.

*Regulatory and Administrative Mitigation 2.* The Army will implement all the terms and conditions defined in the Biological Opinions issued by USFWS for current force and SBCT proposed actions on the islands of O'ahu and Hawai'i. The terms and conditions which implement the reasonable and prudent measures determined during this consultation will be incorporated into the proposed action. These measures will help avoid effects and compensate for impacts on listed species that would result directly and indirectly from implementation of the proposed action. The Biological Opinions are available upon request.

The Army will implement land management practices and procedures described in the ITAM annual work plan to reduce erosion impacts (US Army Hawai'i 2001a). Currently these measures include: implementation of a training requirement integration (TRI) program; implementation of an Integrated Training Area Management (ITAM) program; Sustainable Range Awareness (SRA) program; development and enforcement of range regulations; implementation of an Erosion and Sediment Control Management Plan; coordinating with other participants in the Koolau Mountains Watershed Partnership (KMWP); and continued implementation of land rehabilitation projects, as needed, within the Land Rehabilitation and Maintenance (LRAM) program. Examples of current LRAM activities at KTA include: revegetation projects involving site preparation, liming, fertilization, seeding or hydroseeding, planting trees, irrigation, and mulching; a combat trail maintenance program (CTP); coordination through the Troop Construction Coordination Committee (TCCC) on road maintenance projects; and development of mapping and GIS tools for identifying and tracking progress of mitigation measures.

*Additional Mitigation 2:* The Army proposes to fence or flag where practicable any sensitive plant communities from activities that may take place in the ROI. The Biological Opinions outline fencing for the majority of the sensitive species. USARHAW will evaluate if additional fencing may be necessary.

*Impact 3: Impacts from the spread of nonnative species on sensitive species and sensitive habitat.* The construction of Dillingham Trail and its use would introduce more invasive species to the area, which would have both short-term and long-term impacts on sensitive plants and wildlife.

Trail construction would increase the number of people in the area, which would increase the introduction and spread of nonnative species, particularly plant species whose seeds can be easily carried by humans on their shoes, clothing, equipment, and vehicles. Activities associated with Dillingham Trail and activities along this trail could facilitate the spread of nonnative species into the native wiliwili forest and the adjacent rare Lonomea forest. The Lonomea forest supports sensitive species *Schiedea kealiae* (a federally listed plant), ʻahakea, and kokiʻo.

Invasive plants have an advantage in a stressed environment and can often out-compete native species, which are not adapted to an environment created through human activity. Nonnative species that can survive in a foreign habitat often have evolutionary adaptations that allow them to better withstand human-related effects on the environment and are more tolerant of habitat degradation. These species can spread rapidly throughout a disturbed habitat and, in doing so, alter the habitat and its associated ecosystem. Native wildlife would be drastically affected by the alteration of landscape and vegetative cover, particularly if the native vegetation that they feed on were reduced.

Long-term elevated use of Dillingham Trail resulting from the Proposed Action would lead to long-term increases in the spread of nonnative species at DMR and habitats along the proposed Dillingham Trail. There would be an increase of conventional trucks and Strykers on the roads to DMR and the proposed Dillingham trail. Soil and wind erosion would increase as a result of the introduction of these larger, heavier vehicles and the increase in total vehicles needed to go to and from DMR to support the elevated training. (See section 6.9) The Proposed Action would increase the likelihood of a fire in the ROI, as detailed in Impact 1. Nonnative species often benefit from fires, due to their ability to colonize areas following a burn. Also, the presence of nonnative species often provides fuel for wildfires, makes fires larger, and facilitates the spread of fire.

Changes in vegetation can also adversely affect wildlife at sensitive times of their lifecycles by altering elements that they depend on, such as shelter. The threat of animals introduced into the areas surrounding the military vehicle trail by construction and use of the Dillingham Trail is considered low due to the relative absence of risk factors. The airport at DMR is mainly used recreationally by gliders and is not used regularly for inter-island or international transportation. This means there is a low risk that nonnative species will be brought directly to DMR from outside the state, and therefore introduction of vector species and material is not likely. The Proposed Action would not be expected to affect the populations of feral ungulates or other nonnative mammals. However, increased transport of troops among sub-installations and between islands could increase the likelihood of nonnative plants or invertebrates colonizing new areas. Nonnative invertebrates may be introduced into these areas as a result of construction and increased traffic, which would provide a vector for nonnative species in the area. An example of a potential invasive invertebrate is the black twig borer, which is not currently found in DMR. If this species were introduced there, it would find the host *Bobea* species, which is a commonly available host species for the borer in other locations.

In summary, increasing training at DMR, constructing the Dillingham Trail, increasing the number of people, increasing the number of vehicles, and increasing total usage of the trail could increase the number and type of nonnative plants and animals at DMR, causing an increase in the impact on sensitive species.

*Regulatory and Administrative Mitigation 3.* As required in the terms and conditions of the Biological Opinions, the Army will:

- Educate soldiers and others potentially using the facilities and roads in the importance of cleaning vehicles, equipment and field gear.

- Educate contractors and their employees about the need to wear weed-free clothes and to maintain weed-free vehicles when coming onto the construction site and to avoid introducing non-native species to the project site.

- Prepare a one-page insert to construction contract bids informing potential bidders of the requirement.

- Inspect and wash all military vehicles at wash rack facilities prior to leaving SBMR, KTA, or PTA to minimize the spread of weeds, such as fountain grass, and animal (invertebrate) relocations.

USARHAW will follow HQDA guidance developed in consultation with the Invasive Species Council and compliance with Executive Order 13112, which determines Federal Agency duties in regards to preventing and compensating for invasive species impacts. USARHAW will agree to all feasible and prudent measures recommended by the Invasive Species Council that would be taken in conjunction with SBCT action to minimize the risk of harm. The Implementation of an Environmental Management System will further improve the identification and reduction of environmental risks inherent in mission activities.

In accordance with USDA regulations and requirements, cargo originating outside of Hawai'i will be inspected by USDA and certified to ensure it is not carrying the brown tree snake or other reptiles before transporting cargo for use on training ranges.

*Additional Mitigation 3:* The Army proposes to use native plants in any new landscaping or planting efforts where practicable. When practicable, natural habitats would remain intact or adjacent areas would be restored as habitat.

### *Less than Significant Impacts*

*Impacts from construction and training activities on general habitat and wildlife.* General SBCT training would occur on established roads or trails, as well as areas designated for maneuver training throughout the installation. Biological resources would not be expected to be affected by maneuvers on existing roads and trails. In addition, the use of the UAV would not be expected to affect biological resources during general operation. No new areas would need to be cleared for the use of the UAV.

As part of the Proposed Action, off-road training using the Stryker vehicle would occur within DMR. Wildlife in these areas would be expected to sustain minor adverse impacts as a result of off-road maneuvers. Wildlife would generally be expected to vacate areas that are being used for off-road maneuvers, but wildlife that do not vacate areas being used for maneuver could sustain injuries. The most likely species to be affected by off-road maneuvers would be ground-nesting birds or small mammals. There are no native ground-nesting birds breeding in the off-road maneuver area, or native small mammals occurring in this area, so the impact on general terrestrial wildlife is considered less than significant.

Off-road training would occur only in previously disturbed areas and would not affect native ecosystems. Approximately 98 percent of the land area at DMR is dominated by nonnative species. The natural communities within the boundary of DMR are two types of lowland dry communities that are on the cliff slopes at the southern end of the training area. These areas would not be used for maneuver training and therefore would not be affected by the use of the Stryker vehicle. The construction of Dillingham Trail would not fragment any natural vegetation communities. The trail is located in areas of agricultural use, and the vegetation that surrounds these areas is primarily nonnative species with some common natives.

A wetland delineation of DMR was conducted in the spring and summer of 2002 following procedures outlined in the ACOE 1987 wetland delineation manual; results were published in a report dated August 2002 (USACE 2002d). Those conducting the survey identified one jurisdictional wetland on DMR (USACE 2002d). The wetland is spring fed, is dominated by primrose willow, and is approximately 287 square yards (240 square meters) (USACE 2002d). This perched wetland is within the ROI but outside of the area that will be used for maneuver training.

An additional wetland area was investigated at DMR. Based on an evaluation by the Corps of Engineers, Honolulu District, Regulatory Branch, dated September 4, 2002, the wetland area was determined to be non-jurisdictional and, therefore, not regulated under Section 404 of the Clean Water Act. (See Appendix E).

*Threat to migratory birds.* The presence of the FTI antennas could significantly affect migratory bird species known to occur in the DMR ROI, especially those that migrate at night (USFWS 2000). Although the exact number of bird fatalities from tower collisions in Hawai'i is not known, birds are killed in large numbers worldwide by antenna support structures each year (USFWS 2000). This is a violation of the MBTA (16 USC 703-712), which prohibits taking or killing migratory birds. Tower size is also considered a factor, with towers taller than 200 feet (61 meters) responsible for the greatest number of bird fatalities (Manville 2000). The

FTI antennas would be no taller than 100 feet (33 meters) and would be mounted on existing structures where practicable. A full description of the FTI antennas is in Appendix D.

Migratory bird species known to occur at DMR that could be adversely affected by the Proposed Action include the white-tailed tropicbird, black-crowned night heron, barn owl, golden plover, and northern cardinal (USARHAW and 25th ID [L] 2001a). USFWS tower guidelines (USFWS 2000), attached in Appendix I-2, would be integrated into the Proposed Action to ensure that MBTA species would not be affected by the construction and placement of antennas in the SBCT ROI. Key avoidance measures include using no lighting or guy wires on the towers and keeping all towers below 199 feet. UAVs would fly over the training area as discussed Section 5.4. The UAV activity is not anticipated to threaten migrating birds.

*Noise and visual impacts.* Increased movement of vehicles along Dillingham Trail would lead to an increase in human noise, which could have adverse effects on wildlife by deterring them from using the land to forage, rest, or breed. General SBCT training would occur only in areas already used for training at DMR. No new helicopter use would be added to that now used at Dillingham. There will be new use of UAV flights, but this would be over military ranges and would have minimal impact. Airfield use is ongoing and thus aircraft noise is not expected to significantly affect wildlife species at DMR.

These impacts are expected to be less than significant based on the highly developed nature of much of the proposed trail area and the limited use of the trail once it is built. Noise produced as part of proposed training activities would be mitigated by ongoing Army environmental management (Section 2.2.4). Additionally the Army has agreed in the Biological Opinion to notify USFWS if it observes any threatened or endangered avian species at DMR. The Army, in coordination with USFWS, also will establish natural noise barriers if federally listed wetland bird species are present at the nearby Dillingham Ranch pond and will conduct surveys of the pond near the DMR trail to determine presence of and federally listed wetland bird species. If any are present the Army will determine if these species are nesting and if trail noise is having an adverse impact. These measures would ensure that noise and visual impacts on sensitive species would be less than significant.

Less than significant impacts on marine wildlife resources in the DMR ROI are expected as a result of military aircraft noise. UAVs are unlikely to occur over water in the DMR ROI due to difficulty of deployment in the proximity of civilian aircraft. The air-water surface is an extremely effective barrier for noise. Airborne noise is transmitted to the underwater environment only when the noise source is essentially directly overhead (Richardson et al. 1995). Ambient noise levels on shorelines are already quite high naturally, and marine mammals and sea turtles have adapted to this. No aircraft are known to land on the beach or shoreline. Flights at DMR ROI would be relatively infrequent, short-lived, and unlikely to traverse the same section of coast or offshore area every time.

Less than significant impacts on marine wildlife resources in the DMR ROI are expected as a result of SBCT related military aircraft visual events because there would be no change in aircraft use at DMR except for the introduction of UAVs. The probability of significant aircraft visual impacts on marine wildlife at a population level as a result of SBCT aircraft activities in the coastal waters or shoreline of the DMR ROI is considered to be low and less than significant based on flight use patterns described above.

*No Impacts*

*Runoff impacts on marine wildlife and coral ecosystems.* No impacts from potential runoff are expected for marine wildlife resources or coral. No increase in run-off as a result of SBCT activities is expected. DMR is on the leeward side of the island, so storm runoff is minimal. The expected increase in erosion, described in Section 6.08, would be within the natural range due to rainfall and runoff variation, and no impacts are expected on marine wildlife. Short-term impacts from construction and use of the trail would be reduced to less than significant levels by implementing standard construction BMPs for runoff control. There are no contaminants moving off the ranges, and surface water and groundwater are not expected to be contaminated (see Section 6.8, Water Quality). There is not expected to be any runoff carrying contaminants from UXOs to nearshore ocean waters. There are no UXOs in the marine ROI. No water-contaminating activities are occurring in the upland portions of the marine ROI habitat, so there would be no direct effects from runoff on marine wildlife or coral reefs and their associated organisms.

The Army initiated an informal consultation with NOAA Fisheries in accordance with Section 7 of the ESA. NOAA Fisheries concurred with the Army's determination that the proposed action was not likely to adversely affect federally listed species, marine mammals, or designated essential fish habitat. (See Appendix E).

### Reduced Land Acquisition Alternative

The impacts associated with RLA would be identical to those described for the Proposed Action.

### No Action Alternative

No Action would result in no new impacts on biological resources, but would involve a continuation of existing impacts. An in-depth analysis of current force training impacts on DMR biological resources can be found in the *O'ahu Training Areas INRMP* (USARHAW and 25th ID[L] 2001a) and the *Endangered Species Management Plan Report (ESMPR) for O'ahu Training Areas* (R. M. Towill Corp. 1997b). All conservation measures detailed in the 2003 BO for Routine Military Training and Transformation of the 2nd Brigade 25th ID(L) at U.S. Army Installations on the island of O'ahu (USFWS 2003d) will be enacted under this alternative as well. A synopsis of No Action Alternative impacts is given below.

*Significant but Mitigable to Less than Significant Impacts*

*Impact 1: Impacts from fire on sensitive species and sensitive habitat*. Impacts from fire on sensitive species and sensitive habitat would continue under No Action. Several current force actions are potential sources of fires at DMR, including vehicle traffic (R.M. Towill, Corp. 1997b). There is a high risk of fire due to troop training in the DMR dry Mokulē'ia region (R.M. Towill, Corp. 1997b). To reduce potential impacts from fire, the Army will implement the terms and conditions identified in the Biological Opinion for current force and SBCT proposed training on the island of O'ahu including the development and implementation of the O'ahu Implementation Plan to aid in the stabilization of listed species. In addition, the Army has developed an Integrated Wildland Fire Management Plan (IWFMP) to minimize impacts from fire by undertaking the following:

- Constructing two firebreak roads at DMR;
- Regularly updating incident command system contact personnel and reviewing fire control protocols;
- Posting signs about the Army's regulations concerning ignition sources; and
- Improving fire education and awareness by preparing educational materials on fire hazards and preventive measures.

*Impact 2. Impacts from construction and training activities on sensitive species and sensitive habitat.* There have been and would continue to be impacts on the listed plants and wildlife. Vehicle and dismounted maneuvers, along with nonlive-fire training at DMR, occurs primarily on disturbed portions of the ROI that are of low value to Hawai'i's listed species. However, the effects of fire, spread of nonnative species, noise pollution and visual presence of humans in or nearby designated and sensitive habitats negatively affects listed species that use or would potentially use this area.

The Army has completed ESA_Section 7 consultation for the impacts on federally listed species from routine training at DMR; the same mitigation measures described under the Proposed Action would apply here. Ongoing programs that would lessen the impact on listed species and their sensitive habitat include the ecosystem management plan, endangered species management plan, and INRMP (USARHAW and 25th ID[L] 2001a; R. M. Towill Corp. 1997b). The measures outlined in these plans (for example, monitoring and outplanting) would help avoid effects and would compensate for impacts on listed species that would result directly and indirectly from implementing the No Action.

*Impact 3. Impact from the spread of nonnative species on sensitive species and sensitive habitat.* The impact on sensitive species resulting from the spread of nonnative species would continue under No Action. Nonnative plants and animals, some of which may be invasive, have likely been introduced and would continue to be introduced into natural areas at DMR. Under the status quo of No Action, impacts on biological resources would continue at current levels. In compliance with the BO and EO 13112 on invasive species, the Army would continue to undertake all feasible and prudent measures to minimize the risk of harm caused by invasive species. Several habitat-modifying introduced plants are documented as having invaded DMR's natural areas. Species such as koa haole, guinea grass *(Panicum maximum),* and Christmas berry *(Schinus terebinthifolius)* are particular threats. These species, along with other invasive plant species, are expected to continue to spread further as a result of current actions. Introduced invertebrates at DMR could include the invasive black twig borer, which is a known pest of plant species that occur at DMR and is suspected to be at the site. Provisions are made for reducing these impacts in the O'ahu Training Areas INRMP (USARHAW and 25th ID[L] 2001a) by surveying for nonnatives, fencing out invasive mammals, increasing weed eradication, and removing nonnative invertebrates. These impacts are minimized by limiting training areas, keeping inventories of species of concern with the potential to occur at SBMR, and promoting conservation by educating the military and the general public, all of which are included in ongoing Army environmental management programs (Section 2.2.4).

### *Less than Significant Impacts*

*Impacts from construction and training activities on general habitat and wildlife*. Troop and other foot traffic in or adjacent to native forests would continue to impact natural communities, plants, and snails (R. M. Towill Corp. 1997b). These impacts are minimized by limiting training areas, keeping inventories of species of concern with the potential to occur at DMR, and promoting conservation by educating the military and the general public, all of which are included in ongoing Army environmental management programs (Section 2.2.4) Training impacts would continue to be managed to limit trampling and overall loss of habitat range (R. M. Towill Corp. 1997b).

*Threat to migratory birds*. Current force activities would continue to have a less than significant impact on migratory birds. Status quo activities in the ROI may incidentally affect migratory birds but are unlikely to severely disturb birds, considering the highly disturbed nature of the present training area.

*Noise and visual impacts.* Noise would continue to be produced as a result of current activities. Noise would have an adverse impact on animals in the area due to disturbance but would not significantly affect their behavior and would not lead to a population level decline. Studies such as the *Final Report: A Study to Determine the Effects of Noise from Military Training on the Endangered O'ahu 'Elepaio* (HINHP 1998) show that Army-related noise on O'ahu has not significantly affected species, including sensitive species, such as the 'elepaio. There are no visual impacts under this alternative.

### *No Impacts*

*Runoff impacts on marine wildlife and coral ecosystems.* SBCT activities at DMR are not expected to result in runoff impacts on marine wildlife and coral ecosystems due to limited activities that would occur there.

The Army initiated an informal consultation with NOAA Fisheries in accordance with Section 7 of the ESA. NOAA Fisheries concurred with the Army's determination that the proposed action was not likely to adversely affect federally listed species, marine mammals, or designated essential fish habitat. (See Appendix E).

## 6.11 CULTURAL RESOURCES

### 6.11.1 Affected Environment

#### *Region of Influence*

The ROI for this project area includes DMR and the proposed easement for Dillingham Trail from SBMR to DMR.

#### *Native Hawaiian History and Tradition*

The most important places associated with spiritual beings, myths, legendary stories, and oral histories in the vicinity of DMR are located along the shoreline, above the installation on the upper slopes of the mountains, and to the west in Ka'ena.

Perhaps the best known traditional spiritual association with this region is at its westernmost end, Ka'ena Point, where the souls of the dead were believed to begin their journey into the afterlife at Leinaaka'uhane. Every Hawaiian island was said to have such a place; on O'ahu it was this great stone whose name literally means "the leaping off place of ghosts." Also at the point, the demigod Maui is said to have tried to hook the island of Kaua'i with his fishhook, named Manaiakalani, to bring it closer to O'ahu; the Pōhaku o Kaua'i remains offshore, the only souvenir of the failed effort.

Farther east, the name of the ahupua'a Kawaihāpai (lifted or carried water) commemorates the water that was sent in response to prayers for deliverance from a terrible drought. To combine a number of versions of the legend: After most people had fled the region, two priests who had stayed behind to pray finally saw a hog-shaped cloud coming toward them from the direction of Kahuku; soon after, they saw water pouring from a cliff. The upland spring that watered the region after this miracle was said never to fail.

Several of the ahupua'a of the western Waialua coast, where DMR is located, recognize a fishing god named Kāne'aukai who is said to have floated to the island in the form of a log or a stone looking for his sisters. They in turn were looking for their brother who had been banished from their faraway home. When Kāne'aukai arrived at O'ahu, he turned himself into human form, manifested himself to the fishermen, and became their deity.

Of the archaeological sites on DMR, six appear to have been primarily agricultural in function, with temporary habitation structures frequently included among the terraces or other agricultural field features. The presence of one sacred site, the Site 191 heiau, indicates the possible ceremonial/symbolic importance of the area and the use of at least a portion of the area in traditional Hawaiian ritual activities. Information gathered by McAllister from informants concerning this heiau indicated that its traditional name is Kawailoa Heiau. Yoshinaga (1977) has recommended that Site 416, the Keālia-Kawaihāpai Complex, be preserved as an example of a traditional Hawaiian agricultural complex. Sand deposits underlie the northern (coastal) portion of DMR, and it is possible that Hawaiian burials may be located in these deposits. Burials have been found in the coastal sand dunes north of the installation (Bath 1987).

### *Historic Overview*

Four ahupuaʻa (traditional land units, as discussed in Section 3.11) cross DMR. Most of the installation lies within Keālia and Kawaihāpai, but the western end extends into Kaʻena and the eastern tip barely reaches into Mokulēʻia. DMR is located on the western shore of Waialua District, a region noted in the pre-Contact era as the home of many kahuna (magicians, teachers, experts of various kinds) and their schools. This fertile region was a major food supplier for Honolulu markets as the city grew in the 19th century.

Waialua was home during the traditional era to some of Oʻahu's best and worst rulers. Māʻilikūkahi, who ruled in the 14th or 15th century, was raised partly in Waialua and is said to have maintained a kulanakauhale (village) there. Māʻilikūkahi is credited on Oʻahu with establishing land divisions that lasted through the traditional era. He is also known for ending human sacrifice and for a benevolent reign that was followed by generations of peace.

The district also saw its share of bad times, including a particularly cruel chief who was eventually driven off by his people. One interpretation of the name Waialua, which may reflect that episode, is "doubly disgraceful." The legendary cannibals of Helemanō, more often associated with the Helemanō area on the central plateau area, are also said to have tried to settle first in Waialua but to have been driven off.

Archaeological evidence of prehistoric land use and settlement on DMR is limited. Offshore were rich deep water fishing grounds, no doubt exploited by residents of this region. Along the coast fronting DMR was a line of sand dunes in which Hawaiians buried their dead. Evidence of the use of the level area behind the dunes has largely been obliterated by the runway construction, but Handy and Handy indicate that Kawaihāpai once had a sizeable area of loʻi fields for growing taro, while in Keālia, where the coastal plain is narrower, taro was grown in a narrow strip of land behind the dunes (Handy and Handy, 1972). Along the slope at the foot of the Waiʻanae Mountains are a number of agricultural features, including terraces, indicating the cultivation of crops along the gulches that cut through the area. Handy and Handy mention sweet potatoes, sugar cane, bananas, and ʻawa as crops that would have been planted here (Handy and Handy, 1972). Part of the slope area was set aside as a sacred place, on which Kawailoa Heiau was constructed. The well-watered slopes behind DMR were a source of water that was channeled down the mountainside into the irrigated taro fields below.

The fertile region was home to a thriving community of small land-holders until the advent of large-scale ranching. Missionary John Emerson, who arrived in Waialua in 1832, witnessed serious conflict between native inhabitants and upland ranchers. Cattle and horses, allowed to roam free, damaged or destroyed native gardens and homes; the Hawaiians protested to no avail.

After the Great Mahele, a number of Hawaiians claimed land (often familiar family grounds) from the government. In an 1863 mission report, Emerson claimed that more "common natives" owned land in Waialua than anywhere else on Oʻahu. Both Native Hawaiians and western residents obtained grants of land covering all of DMR. On these lands they cultivated sugar cane and newly introduced crops: wheat, corn, rice, and coffee.

The land that now makes up DMR became a ranch in the 1800s and was also used for sugar farming. DMR was established by EO of the President in 1927, but it did not come into its full use as a military airfield until World War II. In 1948 the Air Force took over administration of DMR. Subsequently the reservation was transferred to the Army, under whose administration it remains (Tomonari-Tuggle 2002).

#### *Previous Consultations and Reports*

##### *Traditional Cultural Properties Surveys*
No study has been undertaken to identify Native Hawaiian traditional cultural places on DMR, although Anderson (1998) has conducted archival research of Hawaiian traditions and early historic land grants and noted the cultural importance of Site 191, Kawailoa Heiau.

##### *Historic Buildings Surveys*
No historic buildings surveys have been undertaken at DMR, although the remnants of some structures were recorded during the archaeological surveys (see discussion below).

##### *Archaeological Surveys*
DMR and adjacent areas have received numerous archaeological investigations of varying intensities (Anderson 1998; Bath 1987; Drolet and Schilz 1992; McAllister 1933; McGerty and Spear 2001; Moblo 1991; Rosendahl 1977), in addition to field checks by IARII, which used GPS to record accurate location data for archaeological sites (IARII 2003). The Bishop Museum surveyed 65 acres (26.3 hectares) of DMR in 1977. More recently, McGerty and Spear surveyed close to 100 percent of DMR and conducted shovel tests to determine the presence or absence of cultural deposits, to obtain dating and functional information, and to assess site significance. Based on their subsurface testing, McGerty and Spear concluded that the likelihood of finding subsurface traditional Hawaiian deposits increases along the stream banks at the north end of the military reservation, despite World War II land modifications in the area (McGerty and Spear, 2001, 135). The present field check for the SBCT transformation project identified three additional historic or military structures.

#### *Known Prehistoric and Historic Resources*
Nineteen archaeological sites have been identified on DMR, of which three are newly located. Two sites are centrally located and 17 are in the south; four of those are on the southeast boundary near where Dillingham Trail would enter the installation. One site (a ranching period cattle chute, Site 5480) is at the installation boundary where Dillingham Trail would enter DMR (IARII 2003, Chapt. IV).

Anderson (1998) identifies most of the edges of Dillingham as high probability areas, particularly the hill slopes in the southern portion, where several sites have already been recorded and the area has remained relatively undisturbed.

A series of historic dredged channels lie between the base of the mountain range and the flats at the bottom of the mountains in the southern and southeastern portion of DMR. These historic channels represent an important period of DMR history (see McGerty and Spear 2001). The northern flats of DMR were found to have archaeological sites of possible historical military significance. During the survey by McGerty and Spear (2001), several historic features were recorded, including a loading dock and 11 runway, taxiway, and apron surfaces (IARII 2003). GANDA conducted the first survey of the proposed easement for Dillingham Trail (GANDA 2003b), and they recorded five historic period sites within the corridor. The sites included the Wilson Ditch, an irrigation ditch dated to the early part of the 20th century, the Halstead Mill, consisting of a basalt and mortar smokestack dated to the last part of the 19th century, and three historic bridges constructed in 1952 (GANDA 2003b).

Table 6-22 provides an overview of prehistoric and historic archaeological sites identified at DMR and their NRHP status. Archaeological sites identified on the installation include seven traditional Hawaiian (prehistoric and early historic) sites, 11 historic agricultural or military sites, and six military sites (Table 6-23) (IARII 2003; GANDA 2003a). Sixteen sites were recommended as eligible for listing on the NRHP, although two buildings (building numbers 30 and 33) of the Nike-Hercules Missile Battery (Site 5492) were demolished in 1997 (McGerty and Spear 2001). No evaluation has been made of the three sites found during the 2002 survey. Twenty-one military structures on Dillingham are over 50 years of age (Table 6-24). These are all World War II military facilities built in 1942 and should be evaluated for their eligibility for the NRHP. They include air raid/fallout shelters, air field aprons and runways, and range support facilities (IARII 2003). Twelve other structures build during the Cold War era have not yet been evaluated as potentially significant Cold War properties.

**Table 6-22**
**Summary of Known Cultural Resources at DMR**

| | Archaeological Sites | Sites Listed, Eligible, or needing DE | Area Surveyed for Archaeological Sites | Buildings over 50 Years Old | Buildings Listed, Eligible, or Needing DE |
|---|---|---|---|---|---|
| Dillingham and Dillingham Trail | 24 | 24 (DE) | 100% | 21 | 21 (DE) |

Source: IARII 2003, GANDA 2003b

### *Potential for Unknown Resources*

Sites in the flat northerly areas of DMR tend to be of historic military significance and are in areas that have been highly disturbed by modern agriculture and runway construction. However, since this area was heavily used in prehistoric and early historic times, there is a possibility of buried archaeological sites, particularly in areas unaffected by modern land use (Handy 1940; Handy and Handy 1972; Rosendahl 1977). Sand deposits in portions of DMR may contain burials, as these have been found in dune deposits on the coastal side of Farrington Highway (Bath 1987). Figure 6-19 shows archaeological sensitivity areas at DMR.

**Table 6-23**
**Archaeological Sites at DMR**

| Site No. | Description | Use | Period |
|---|---|---|---|
| 191 | Paved platforms, terraces, Kawailoa Heiau | Religious | Prehistoric |
| 416 | Terraces, stacked stone walls, walled enclosures, Keālia-Kawaihāpai Complex | Agriculture | Prehistoric/ historic |
| 5479 | Concrete buildings (2) | Communication | WW II |
| 5480 | Wooden structure | Cattle chute | ranching |
| 5481 | Cement structures (4) | Waste water | Military |
| 5482 ** | Cement-lined well | Agriculture | Historic |
| 5483 | Terraces, walls, mounds | Habitation, agriculture, ranching | Traditional, historic |
| 5484 | Terraces, modified boulders | Traditional agriculture, temporary habitation, historic | Traditional, historic |
| 5485 | Terraces, enclosures, walls | Agriculture, ranching | Traditional, historic |
| 5486 | Terraces, modified overhangs, walls | Temporary habitation, agriculture | Traditional |
| 5487 | Terraces, roads | Military, early agriculture | Historic |
| 5488 | Roads, cement structures | Military | WW II, 1960s |
| 5489 | Cement, basalt structures | Military | 1940s-1970s |
| 5490 | Excavated channels | Water control | Historic |
| 5491 | Terraces, modified wet cave | Agriculture | Traditional, historic |
| 5492 | Concrete buildings (2) | Nike missile installation | 1960s |
| D1 | Underground cement tank | Military | Historic |
| D2 | Cement foundation | Military | Historic |
| D3 | Cement bunker with lookout | Military | WWII |
| G-1 | Wilson ditch | Agricultural - irrigation | Historic |
| G-2 | Halstead mill | Agriculture - milling | Historic |
| G-3 | Concrete bridge | Transportation | Historic |
| G-4 | Concrete bridge | Transportation | Historic |
| G-5 | Concrete bridge | Transportation | Historic |

Sources: IARII 2003; GANDA 2003b

**Table 6-24**
**Historic Military Buildings on DMR**

| Facility No. | Description | Year Built | Historical Period |
|---|---|---|---|
| 00316 | Air/fallout shelter | 1942 | World War II |
| 00343 | Air/fallout shelter | 1942 | World War II |
| 00638 | Range support facility | 1942 | World War II |
| 00651 ** | Range support facility | 1942 | World War II |
| 00700 | Air/fallout shelter | 1942 | World War II |
| 00701 ** | Air/fallout shelter | 1942 | World War II |
| 00702 | Air/fallout shelter | 1942 | World War II |
| 00703 | Air/fallout shelter | 1942 | World War II |
| 1111B | Fw runway surface | 1942 | World War II |
| 11201 | Fw taxiway surface | 1942 | World War II |
| 11202 | Fw taxiway surface | 1942 | World War II |
| 11203 | Fw taxiway surface | 1942 | World War II |
| 11204 | Fw taxiway surface | 1942 | World War II |
| 11301 | Fw pk apron surface | 1942 | World War II |
| 11302 | Fw pk apron surface | 1942 | World War II |
| 11303 | Fw pk apron surface | 1942 | World War II |
| 11304 | Fw pk apron surface | 1942 | World War II |
| 11310 | Fw pk apron surface | 1942 | World War II |
| 11601 ** | Ac maint apron surface | 1942 | World War II |
| 12601 ** | Truck loading/unloading | 1942 | World War II |
| 84100 ** | Water treatment building | 1942 | World War II |

**Structure is listed on the DPW real property list but is not shown on the installation real property map.
Source: IARII 2003

**Figure 6-19**
Archaeological Sensitivity Areas, Dillingham Military Reservation

## 6.11.2 Environmental Consequences

### *Summary of Impacts*

There could be significant impacts on archaeological resources from training activities at DMR. Significant impacts on ATIs could also result from construction and training. As explained in the mitigation sections below, the severity of these impacts will be mitigated by compliance with the PA the Army has developed in consultation with the Hawai'i SHPO, the ACHP, and others. The PA is provided in Appendix J.

**Table 6-25**
**Summary of Potential Cultural Resources Impacts at DMR**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Impacts on historic buildings | ○ | ○ | ○ |
| Impacts on archaeological resources from range and facility construction | ○ | ○ | ○ |
| Impacts on archaeological resources from training activities | ⊗ | ⊗ | ⊙ |
| Impacts on archaeological sites from construction of FTI | ⊙ | ⊙ | ○ |
| Impacts on ATIs | ⊗ | ⊗ | ○ |
| Impacts on archaeological sites from road or trail construction | ⦸ | ⦸ | ○ |
| Impacts on archaeological sites from road use | ⊙ | ⊙ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.
* Impacts may be mitigable to less than significant.

LEGEND:

| | | | | |
|---|---|---|---|---|
| ⊗ | = Significant | + | = | Beneficial impact |
| ⦸ | = Significant but mitigable to less than significant | N/A | = | Not applicable |
| ⊙ | = Less than significant | | | |
| ○ | = No impact | | | |

There are significant but mitigable to less than significant impacts on archaeological resources from the construction of roads and trails. Mitigation measures for archaeological resources that may be affected by road or trail construction will include evaluation of NRHP eligibility and avoidance or data recovery of significant eligible sites.

Less than significant impacts are expected on archaeological sites from constructing the FTI antenna and from using Dillingham Trail.

### ***Proposed Action (Preferred Alternative)***

#### *Significant Impacts*

*Impact 1: Impacts on archaeological resources from training activities.* Training would be conducted at DMR by squad-, platoon-, and company-size units of the Stryker Brigade. In general this training would involve the same size units and the same training activities as are currently conducted by the Army at DMR. The difference between current use and proposed use concerns the use of Stryker vehicles, which have the potential to affect archaeological sites in ways that current maneuvers do not, potentially damaging cultural resources. Most of the unconstrained area for off-road maneuvers with Strykers consists of the level ground in the north and central portion of DMR, although a small area in the southeast corner of the installation is also mapped as unconstrained. If tactical vehicles are permitted to move freely in all areas now mapped as unconstrained, some sites that are recommended as eligible for the NRHP could be adversely affected.

Training would occur in areas that are marked as moderate or high sensitivity in regard to the probability of encountering archaeological sites. However, in the level areas, the main concern is the potential for subsurface cultural deposits, especially human burials. Unless these deposits are near the surface, adverse effects from tactical vehicle training should be minimal.

Because most archaeological sites at DMR are on the densely vegetated steep slopes of the Wai‘anae Mountains in the south portion of the installation, Strykers will not be able to maneuver off-road in the vicinity of these sites. However, in one area in the southeast, with gentler slopes and less dense vegetation, natural conditions will not restrain Stryker mobility.

Sites 5481, 5484, and 191 are within or adjacent to this unconstrained area. Native Hawaiians consider Site 191, Kawailoa Heiau, sacred.

In addition to the potential impact on archaeological sites, a series of dredged channels lie below the sites at the higher elevations, in the area between the base of the mountain range and the flats. McGerty and Spear (2001) note that the features “average 4.50 m (14.8 ft), bottom width, to 9.00 m (30 ft) top width, by 3.00 m (9.8 ft) to 5.00 m (16.5 ft) high on each side.” These channels at the bottom of the mountains in the southern and southeastern portion of DMR will be avoided by the Proposed Action because they protect the northern flats from possible flooding (McGerty and Spear 2001).

As mentioned above, one of the major cultural resource concerns at DMR is the potential for human burials and buried cultural deposits in the sand deposits in the coastal half of the installation. The primary area of concern would be the high sensitivity areas around the runways. The mitigation measures below will reduce the severity of the impact but not to less than significant levels.

*Regulatory and Administrative Mitigation 1.* The Army will evaluate archaeological sites within training areas related to SBCT. Sites determined to be eligible for the NRHP and sites pending evaluation will be identified and avoided through protective measures, to the full extent practicable. If avoidance of identified archaeological sites or newly discovered sites is not feasible, the Army will consult in accordance with the PA to determine the appropriate mitigation for the damage to the sites, such as data recovery or other mitigation measures. To address the accidental discovery of archaeological sites, human remains, or cultural items, the Army has developed an IDP as part of the PA.

The Army will monitor any subsurface excavations in the coastal area and the high sensitivity area around the runways area. The Army will place constraints on any training activities that might involve substantial below surface impacts.

*Impact 2: Impacts on Areas of Traditional Importance.* The archaeological survey of the proposed alignment has not necessarily identified TCPs or ATIs, although some of the archaeological sites identified might be considered ATIs, including gravesites and temples or heiau. Site 191, in the southeast of DMR, Site 191, the Kawailoa Heiau, is known as a sacred site. Construction activities and use of Dillingham Trail could damage or destroy such resources as a result of direct or indirect activities, as described in Impact 1. The mitigation measures below will reduce the severity of the impact but not to less than significant levels.

*Regulatory and Administrative Mitigation 2.* Facility construction or training area uses will be designed to avoid identified traditional places and limit visual impacts on TCPs by site location, design, and orientation, where feasible.

If avoiding identified TCPs or ATIs is not feasible because of interference with the military mission or risk to public safety, the Army will consult with the SHPO and Native Hawaiians in accordance with the PA to identify impacts and to develop appropriate mitigation measures. Mitigation for impacts on the cultural landscape could include consulting with Native Hawaiians and having a cultural monitor oversee construction.

The Army will continue to provide Native Hawaiians with access to traditional religious and cultural properties, in accordance with AIRFA and Executive Order 13007, on a case-by-case basis. This access program will be expanded to include new land acquisitions.

The Army previously identified Native Hawaiian burial sites in the SBCT ROI. The Army completed notification and consultation for these burial sites, in accordance with NAGPRA, and left these human remains in place. To address any impacts on any burial sites, or an inadvertent discovery of Native Hawaiian human remains or funerary objects, the Army will abide by all notification and consultation requirements outlined in Section 3 of NAGPRA.

### *Significant Impacts Mitigable to Less Than Significant*

*Impact 3: Impacts on archaeological resources from Dillingham Trail construction.* Construction of Dillingham Trail between DMR and SBMR would involve a corridor 15 feet (4.6 meters) wide with 3-foot-wide (0.9-meter-wide) shoulders on both sides.

Constructing Dillingham Trail would involve vegetation removal and grading soil, as well as the regular use of heavy equipment. All of these activities could result in destruction or damage of archaeological resources or indirect damage by contributing to soil erosion.

Additionally, construction activities could expose or disturb previously undiscovered cultural resources. Dillingham Trail crosses areas with some potential for archaeological resources and several areas with very low potential due to heavy recent agricultural disturbance.

One identified archaeological site, Site 5480 (a ranching period cattle chute), is at the east end of the access road/runway near the sub-installation boundary. If the trail were to connect with the existing road and alterations or widening is required, Site 5480 could be affected. The five historic period sites (Wilson Ditch, Halstead Mill, and the three bridges), discovered along the Dillingham Trail proposed alignment, could be affected if widening is required or from vibrations from heavy equipment. The mitigation measures and implementation of the PA will reduce any impacts on archaeological resources to less than significant.

*Regulatory and Administrative Mitigation 3.* The Dillingham Trail alignment between DMR and SBMR has been surveyed for cultural resources. In accordance with the PA, the Army will identify cultural properties, will evaluate cultural properties for NRHP eligibility, and will implement avoidance strategies to the full extent practicable. GIS and GPS information will be provided to project designers to ensure sites are considered in the design and construction of all the proposed military vehicle trails and training roads in WPAA. If it is not possible to avoid archaeological sites, the Army will consult in accordance with the PA to determine the appropriate mitigation for the damage to the sites, such as data recovery or other mitigation measures. To address the accidental discovery of archaeological sites, human remains, or cultural items, the Army has developed an IDP as part of the PA.

### *Less than Significant Impacts*

*Impacts on archaeological sites from construction of FTI.* The FTI project at DMR would construct two antennas within the installation boundary and one on Dillingham Ridge to the southwest of the installation. These would each require construction of a 15-foot (4.5-meter) by 20-foot (6.1-meter) concrete pad supporting an equipment tower and shed. Construction of the pad, shed, and support structure would require vegetation grubbing, site grading and leveling, some subsurface excavation, and the use of heavy construction equipment. These activities could damage or destroy previously undiscovered archaeological resources, as described above. However, the Army has conducted pedestrian surveys of the areas designated for construction and identified no cultural resources on the proposed antenna sites; additionally, indications suggest that no subsurface deposits exist, as at least one of the sites on the installation has been previously disturbed (Zulick and Lucking 2002). To ensure no impact on cultural resources, the Army will monitor to protect subsurface cultural resources discovered during construction activities.

*Impacts of road use on archaeological resources.* The regular use of Dillingham Trail by Army forces would result in increased access by ground troops into the area (resulting in possible vandalism of archaeological sites), possible off-road vehicular movement, and erosion from road use and maintenance. The trail alignment has been surveyed, but it is possible that archaeological sites are within the buffer zone. Troop movements along Dillingham Trail could cause site destruction or damage to archaeological resources directly through vandalism or accidental damage, or indirectly through soil erosion. After construction is completed, installation cultural resources staff will regularly monitor the trail and inspect for any damage to archaeological sites. Soldiers and installation personnel will receive instruction regarding avoidance of identified sites, as outlined in the IDP.

#### *Reduced Land Acquisition Alternative*

The impacts associated with RLA Alternative would be identical to those described for the Proposed Action.

#### *No Action Alternative*

Under No Action, there would be no significant impacts on cultural resources at DMR. Dillingham Trail and the FTI would not be constructed, so there would be no risk of damage to known or undiscovered archaeological resources.

##### *Less than Significant Impacts*

*Impact on archaeological resources from training activities*. Ongoing training activities at DMR would include continued off-road vehicle use. This would result in ongoing impacts on cultural resources in the training area caused by ground troop activities, off-road vehicle movement, and subsurface excavations. Archaeological resources on the training areas are monitored following exercises to document adverse effects on the sites. Under No Action, current training would continue and there would be no additional impacts on cultural resources or changes in cultural resources management policies. USARHAW will continue efforts to inventory eligible historic properties in compliance with Section 110 of the NHPA, and future project planning will comply with Section 106 and its implementing regulations. Impacts on cultural resources will be mitigated in compliance with these regulatory requirements.

##### *No Impacts*

Other activities at DMR under No Action include regular use of runways for military exercises; however, these activities have no impact on cultural resources at the installation. Army activities at DMR would include regular inventories and maintenance of cultural resources in compliance with federal law and current management practices. Under the status quo of No Action, impacts on cultural resources would continue at current levels.

## 6.12 HUMAN HEALTH & SAFETY HAZARDS

### 6.12.1 Affected Environment

The following section describes the affected environment pertaining to human health and safety hazards as a result of military actions at DMR.

#### *Hazardous Materials and Waste Management*

Any hazardous waste that accumulates during training exercises at DMR is managed at hazardous waste storage points until the DRMO picks up the waste and ships it directly off-island for proper disposal (Akasaki 2002b). Hazardous waste and materials generated and used at DMR are regulated by the same federal, state, and Army regulations as at SBMR. The regulations include implementation of the current Army Hazardous Waste SOPs and the Army Spill Contingency Plan.

#### *Specific Health and Safety Hazards*

This section addresses specific human health and safety hazards associated within DMR. These hazards consistently affect the environment and often have specific regulations that govern their use, storage, and disposal.

*Ammunition*

During field exercises, support units are located at Dillingham Airfield. DMR also supports night training for aviation units, although it has a very limited maneuver area. Ammunition is restricted to blanks and is prohibited on the runway. Non-aerial smoke is allowed in designated areas but is prohibited on the runway. Maneuver training is not permitted on the portion of the airfield that is leased to the State of Hawai'i unless prior state approval is obtained. Although some areas are suspected to contain UXO, live-fire activities do not take place at DMR (Garo 2002a). Additionally, there are no designated impact areas or associated surface danger zones on DMR.

DMR provides the space for infantry and associated support units to maneuver. As further discussed in Chapter 2, this maneuver is conducted in a dry- or blank-fire scenario; that is, bullets are not fired. Blanks are used in rifles and machine guns, along with MILES equipment (Garo 2002a).

*Installation Restoration Program*

No IRP sites are under investigation on DMR.

*Lead*

The properties of and regulations for lead are described in detail in Section 3.12 of this document. Lead survey information for the DMR is maintained on the DPW lead and asbestos database.

*Asbestos*

The properties of and regulations for asbestos are described in detail in Section 3.12 of this document. Asbestos survey information for DMR is maintained on the DPW lead and asbestos database. The DPW has surveyed for ACM at 13 locations on DMR. Nine of these surveys found the presence of friable ACM in buildings, all of which were set for demolition (USARHAW 2002d).

*Polychlorinated Biphenyls*

The former DMR transformer site consists of two transformer pads at an abandoned generator building on the former Nike missile launch facility. The concrete block building housed the emergency power generators and two fenced enclosures for the power distribution transformers. The transformers used at this site were of the type that typically contained PCB in cooling oil.

As part of a supplemental assessment in 1997, soil samples for PCBs were taken from around the two transformer pads on the north and east sides of the generator building. Concentrations exceeding the EPA Region IX preliminary remedial goals for future residential use scenarios were detected in samples from three of the five locations around the north transformer pad. No PCBs were detected around the perimeter of the east transformer pad.

Under current site uses, the former transformer site does not appear to pose a significant threat to human health and the environment. However, changes in site uses could create new, more immediate targets and associated risks if the surface soil contained hazardous material or waste contamination.

*Electromagnetic Fields*

Standard Army communications equipment is present at DMR and is operated by qualified personnel per technical publications. The public has access to Dillingham Airfield, which has sources of EMF typical to airfields.

*Petroleum, Oils, and Lubricants*

Only one UST remains in use on DMR and is maintained by the Department of Transportation. All other USTs either were removed from the ground or were abandoned in place in compliance with EPA regulations.

Appendix K-4 lists all current and decommissioned USTs and LUSTs on DMR. Additionally, this table provides location, responsible party, construction, and content information of all USTs and inspection and remediation status information for all LUSTs. This information is maintained by DPW personnel. All LUST sites on DMR have been remediated and have been issued a clean closure status, with the exception of tanks 7 and 8, which have not been cleaned and may contain residual fuel (Bourke 2002c).

All industrial fueling is conducted from the fueling station on SBMR. Fuels, oils, or other hazardous materials needed for training exercises are brought with the unit to the military reservation and staged in a temporary storage point. Unused materials either are brought back with the unit or are properly stored for pickup and disposal by DRMO-HI.

There are no known ASTs or OWSs on DMR.

*Pesticides/herbicides*

The Natural Resources Department, a division of the DPW, is the only pesticide/herbicide user on DMR, though no pesticides/herbicides are stored anywhere on DMR. Pest management for DMR is covered under the USAG-HI Installation Pest Management Plan (Yamamoto 2002).

*Wildfires*

There is a high risk of fire during the summer in the relatively dry Mokulēʻia region (USARHAW and 25th ID[L] 2001a, 134). Cigarettes, vehicles, and bivouac activities are the major sources of fire risk from military training. There are records for only two fires at DMR since 1996 (USARHAW and 25th ID[L] 2003, 7-4), both of which occurred in training area P-1 (east and southeast of the airstrip). They burned a total of 6 acres (2.4 hectares) and were both caused by pyrotechnics. A lack of data precludes analysis.

Fire suppression is not a high priority because of the few rare and endangered species on DMR relative to other Oʻahu subinstallations (USARHAW and 25th ID[L] 2001a, 134). Also, no live-fire training takes place, and the terrain is not conducive to high erosion rates if vegetation is absent. There are no RAWS on DMR to aid in determining weather conditions and the threat of wildfires. Through mutual aid agreements, the City and County of Honolulu Fire Department would assist the Army with initial wildfire suppression.

Five wildfire areas have been designated, based on the location of existing roads (USARHAW and 25th ID[L] 2003, 7-6 through 7-8). Each area was assigned an ignition potential, fuels hazard, and habitat value, based on the best currently available information. As a result, the airstrip and cantonment have no prevention priority. The area outside the firebreak road has a moderate wildfire prevention priority. Areas P-2 and P-3 (west and southwest of the airstrip and south of area P-1) have a moderately high prevention priority. Area P-1 has a high prevention priority.

Figure 6-20 shows the location of proposed fire management facilities. Fire protection in the fire management area includes firebreaks and fuels modification (USARHAW and 25th ID[L] 2003, 7-9). According to the IWFMP, there are no firebreaks at DMR, though there are a number of roads that would serve as firebreaks during fire suppression, and two firebreaks are planned for the near future. The first to be constructed will be completed in 2005 and will follow existing roads, though some roads will have to be improved considerably. The firebreak will start on the eastern side of DMR, will continue across the southernmost taxiway west for approximately a third of a mile (0.5 kilometer), and then will turn north and continue to the Dillingham airstrip. The second firebreak will be constructed in 2006 and will separate most of DMR from the hills to the south. This break will start in the same location on the eastern side of the installation but will first run south along the eastern installation border. It will turn to the west at the base of the mountains and will follow contours until it meets a powerline corridor. It will follow this corridor to the western boundary, where it will turn north until it meets the Dillingham airstrip. Training would be allowed outside of the firebreaks but would be limited to no ignition sources of any kind.

**Figure 6-20**
Fire Management Facilities at Dillingham Military Reservation

Pyrotechnics, blanks, smoking, and cooking/warming fires would not be allowed anywhere outside of the second firebreak at any time. Until the second firebreak is completed, this restriction would apply to the first firebreak. Until the first firebreak is completed, this restriction would apply to any area outside of P-1 and the Dillingham airstrip.

According to the IWFMP, fuels contained by the finished firebreaks at DMR may be considered for prescribed burning (USARHAW and 25th ID[L] 2003, 7-9). This would depend on financial and resource availability and the discretion of the Wildland Fire Program Manager. Any prescribed burning would follow all guidelines in place and would require proper environmental documentation and consultation with the USFWS. No prescribed burning would take place outside of completed firebreaks.

There is no RAWS at DMR. Schofield Barracks Range Control is responsible for retrieving weather data (USARHAW and 25th ID[L] 2003, DMR-6). The burn index, as determined by the fire danger rating system, would be used to rank fire danger based on known ignition sources. The fire danger rating system uses green and red to characterize fire conditions at DMR.

Dillingham Trail would be approximately 15 miles (24.1 kilometers) long and would provide military vehicle access between DMR and SBMR. The proposed trail route is flanked by vegetation capable of being involved in a wildfire.

According to the IWFMP, fuels along Dillingham Trail will be kept at less than 20 percent crown cover, as visually estimated (USARHAW and 25th ID[L] 2003, 7-9). Because there is little vegetation along the trail due to extensive agriculture, maintenance of this corridor should be minimal. The trail will be monitored once each spring to determine the need for fuels management. Any area with fine fuels or shrub cover greater than 20 percent crown cover would be noted and managed. Locations that are overgrown will be managed either through the application of herbicide or by cutting the grass or shrubs until they are in compliance.

### 6.12.2 Environmental Consequences

#### *Summary of Impacts*

This section is a discussion of the potential impacts of implementing the Proposed Action and alternatives at DMR. Both current activities that occur at DMR and proposed projects and actions associated with the Proposed Action are discussed in detail in Chapter 2. There is only one significant impact associated with human health and safety hazards at DMR under the Proposed Action or the RLA Alternative. Although DMR is a strictly nonlive-fire training installation, blank ammunition and the transportation of combustible materials, such as fuel and ordnance, could create a significant impact. This impact could be reduced to less than significant through mitigation.

All other human health and safety hazard issues were identified as being either less than significant or having no impact at all. Impacts and methodology and significance thresholds are discussed in Chapter 4, Section 4.12.1. Table 6-26 summarizes the potential human health and safety hazards for DMR that have been identified in this analysis.

**Table 6-26**
**Summary of Potential Human Health & Safety Hazard Impacts for DMR**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Hazardous materials management | ⊙ | ⊙ | ○ |
| Hazardous waste management | ⊙ | ⊙ | ○ |
| Ammunition | ○ | ○ | ○ |
| Unexploded ordnance | ○ | ○ | ○ |
| General training | ⊙ | ⊙ | ○ |
| Installation restoration program sites | ○ | ○ | ○ |
| Lead | ○ | ○ | ○ |
| Asbestos | ○ | ○ | ○ |
| Polychlorinated biphenyls | ○ | ○ | ○ |
| Electromagnetic fields | ⊙ | ⊙ | ⊙ |
| Petroleum, oils and lubricants | ⊙ | ⊙ | ○ |
| Pesticides/herbicides | ○ | ○ | ○ |
| Biomedical waste | ○ | ○ | ○ |
| Radon | ○ | ○ | ○ |
| Wildfires | ⊘ | ⊘ | ⊙ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | |
|---|---|---|---|
| ⊗ = | Significant | + = | Beneficial impact |
| ⊘ = | Significant but mitigable to less than significant | N/A = | Not applicable |
| ⊙ = | Less than significant | | |
| ○ = | No impact | | |

### *Proposed Action (Preferred Alternative)*

*Significant Impacts Mitigable to Less than Significant*

*Impact 1: Wildfires.* Following the construction/upgrade of Dillingham Trail, units would transport materials and equipment via military vehicles. Transportation of personnel and use of flammable or combustible materials such as fuel or ordnance (i.e., weaponry or equipment) could increase the potential for starting a wildfire, especially in areas not previously used frequently. However, the IWFMP does not comprehensively address fire management actions for Dillingham Trail. The use of the trail by the Army would increase potential sources of wildfire ignition from Army training in areas that do not have established fire management actions, such as fire prevention and fire suppression. Unlike training activities conducted at DMR, the trail would not always be near an installation where access to Army fire suppression resources would be readily available. A wildfire could damage animal and plant communities, damage cultural resources, and contribute to soil erosion by removing vegetation. The mitigation measures below will reduce the impact to less than significant.

*Regulatory and Administrative Mitigation 1.* . The IWFMP for Pōhakoloa and O'ahu Training Areas was updated in October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts associated with wildland fires. Public and firefighter safety is the first priority in every fire management activity. The plan considers the potential need for firebreaks and/or fuel breaks at each installation, along with other safety concerns. The plan is available upon request.

### *Less than Significant Impacts*

*Hazardous materials management*. The Proposed Action would not significantly increase hazardous materials usage at DMR. Short-term impacts would be associated with roadway construction activities. Construction-related activities would require the use of hazardous materials in slight excess of existing quantities. However, contract specifications control the use of hazardous materials and require compliance with federal, state, and local requirements and with installation policy on hazardous materials. The US Army follows strict SOPs for storing and using hazardous materials. Therefore, no new procedures would need to be implemented to store or use the construction-related hazardous materials. Excess quantities of unused hazardous materials would be removed at the completion of construction.

Although the roadway proposed to be constructed between SBMR and DMR would be primarily composed of gravel, road grades steeper than 10 percent would be paved with asphalt or concrete. These materials would also be used in the construction of supporting provisions such as guardrails and signage. MSDS information on asphalt and concrete are summarized in Chapter 4, Section 4.12. According to the MSDS filed under the OSHA 29 CFR 1910.1200, there would be no significant impact from hazardous materials, and no mitigation would be necessary.

*Hazardous waste management*. Activities related to the Proposed Action would not significantly affect hazardous waste management. Roadway construction activities may result in temporary generation of small amounts of hazardous waste. The US Army follows strict regulations and standard operating procedures for the temporary storage and disposal of hazardous waste. The Army would be required to manage and dispose of hazardous waste generated by operations through DRMO in accordance with existing regulations and protocols regarding storage, use, and disposal. Hazardous waste associated with construction activities would cease to be generated at the completion of construction. Operational activities associated with the Proposed Action would not affect hazardous waste management. Therefore, there would be no significant impacts, and no mitigation would be required.

*General training*. General training activities under the Proposed Action would not likely result in any significant impacts. These training activities may expose additional areas to potential military training equipment leaks, spills, or drips to the environment, a less than significant, long-term adverse impact. USARHAW would, during any on-site operational activities within a specific project area, implement the SOP measures discussed in Chapter 5, Section 5.12 to minimize the potential for spills or other harm to the environment. Therefore, there would be no significant impact, and no mitigation would be necessary.

*Electromagnetic fields.* FTI sites could potentially introduce EMF to DMR. Only one of the FTI sites would be outside the boundary of the installation. It would be on top of a ridgeline and outside the northern boundary of MMR, which is south of DMR.

The public would continue to have access to Dillingham Airfield, however, as discussed in Chapter 5, Section 5.12.2, access to FTI sites would be controlled in order to prevent exposure to EMF. Proper signage and fencing would be incorporated into the construction of the FTI facility. There would be no significant impact on the public from EMF exposure. No mitigation would be necessary.

*Petroleum, oils and lubricants (POLs).* Although Dillingham Trail would be primarily composed of gravel, road grades steeper than 10 percent would be paved with petroleum asphalt or concrete. These materials would also be used in the construction supporting provisions such as guardrails and signage.

Although OSHA does not categorize petroleum asphalt as carcinogenic, serious health problems can result from extended or improper exposure. Skin contact and breathing of mists, fumes, or vapors would be avoided by the construction team. Construction and disposal activities would be conducted in accordance with federal, state, and local regulations.

UAV and Strykers would be used at DMR under the Proposed Action. Maintenance and handling of the vehicles would take place on SBMR under existing SOPs. Since the use of these vehicles at DMR provides the potential for spills or leaks, DPW maintains a spill contingency plan and an SOP plan. These plans outline proper operating and emergency response procedures and responsibilities. No storage tanks are located within the project areas and no new storage tanks would be installed as a result of the Proposed Action. Although Strykers would be used on DMR under the Proposed Action, they would continue to be maintained at SBMR and maintenance impacts are discussed in Chapter 5, Section 5.12.2. The Proposed Action would not pose any significant impacts from POLs, and no mitigation would be required.

*No Impacts*

*Ammunition*. Ammunition management, handling, and use at DMR would not be affected by activities associated with the Proposed Action. DMR would maintain nonlive-fire training. There would be no ammunition impact on DMR, and no mitigation would be necessary.

*Unexploded ordnance (UXO)*. No new ranges would be constructed and no construction would take place on former range areas. Therefore, there would be no impacts, and no mitigation would be required.

Installation restoration program sites. No IRP sites are under investigation at DMR. Therefore, there would be no impacts, and no mitigation would be required.

Lead. As no buildings or structures would be built or demolished on DMR in conjunction with the Proposed Action, construction would not generate impacts from lead. DMR would remain a nonlive-fire training area under the Proposed Action, so lead-containing ordnance would not be introduced. Therefore, there would be no impacts, and no mitigation would be required.

Asbestos. As no buildings or structures would be built or demolished in conjunction with the Proposed Action at DMR, there would be no impacts from asbestos, and no mitigation would be required.

Polychlorinated biphenyls. Roadway construction activities associated with the Proposed Action would not generate impacts from PCBs. There is no PCB-containing equipment in the vicinity of the roadway construction project area. As there would be no construction at the DMR former transformer site location, there would be no risk of exposure from possible hazardous materials or waste contained in the surface soils, as discovered during previous site assessments. As a preventive measure, the Army should avoid driving in the vicinity of the former transformer site on DMR during maneuvers in order to avoid potential exposure. If these areas are avoided, there would be no potential impacts, and no mitigation would be required.

Pesticides/Herbicides. Activities associated with the Proposed Action would not affect pesticide/herbicide management on DMR, as the Proposed Action would not increase the amount of pesticides/herbicides used on the installation, so there would be no impact, and no mitigation would be required.

### Reduced Land Acquisition Alternative

The impacts associated with Reduced Land Acquisition would be identical to those described for the Proposed Action.

### No Action Alternative

Existing conditions would continue under No Action. Under the status quo of No Action, impacts would continue at their current levels with no increase in hazardous material use or waste generation. There would be two areas of less than significant impacts under No Action, EMF and wildfires.

Electromagnetic Fields (EMFs). EMF sources would not be introduced to the installation or areas outside the installation under No Action. Signs would continue to be posted around the perimeter of all potentially harmful EMF sources to warn people about the EMF source. DOD Instruction 6055.11 and Army Pamphlet 385-64, as well as other Army regulations pertaining to EMF, would continue to be followed. Only trained personnel would work with Army equipment emitting EMF. The public would continue to have access to Dillingham Airfield and would not be allowed near Army equipment emitting harmful EMF. There would continue to be a less than significant impact to the public from exposure to EMF.

*Wildfires.*

As there would be no change in training at DMR under No Action, the installation would continue to support nonlive-fire maneuvers. There is a high risk of fire during the summer in the relatively dry Mokulē'ia region (USARHAW and 25th ID[L] 2001a, 134). Cigarettes, vehicles, and bivouac activities are the major sources of fire risk from military training. Continued use of Army land for training under No Action would prolong the threat of wildfires. Future Army activities would continue to be guided by the 25th ID(L) and USARHAW Wildfire Management Program, which includes the WFMP and its FMAs and wildland fire SOPs, all of which are designed to prevent and manage wildfires. Army personnel would continue to practice best management practices during operations. There would continue to be less than significant impacts involving wildfires and the continued potential for wildfires.

## 6.13 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

### 6.13.1 Affected Environment

This section describes the socioeconomic resources of the DMR project area. A discussion of Native Hawaiian TCPs and ATIs and the impact of the proposed project on these resources can be found in Section 6.11, Cultural Resources. DMR is within the Waialua CCD. The population of the Waialua CCD represented approximately 1.6 percent of the population of Honolulu County in 2000. Between 1990 and 2000 the population of this area grew from 11,549 to 14,027, an increase of 21.5 percent (Table 6-27) (US Census Bureau 1990a, 2000a). Only 41.0 percent of the housing in this district was owner-occupied, and 5.7 percent was vacant in 2000 (US Census Bureau 1990a, 2000b). Approximately 9.5 percent of the population of Waialua CCD was of Hispanic origin, and 69.6 percent (9,762 persons) of the population was made up of minority ethnic groups, the largest percentage of which was Asian/Pacific Islander (37.3 percent of the population) (Table 6-27) (US Census Bureau 1990a, 2000a). The population of Waialua CCD under the age of 18 increased 19.9 percent between 1990 and 2000. Approximately 27.4 percent of the population was within this age group in 2000 (US Census Bureau 1990a, 2000c).

No military or civilian personnel are permanently stationed at DMR.

A discussion of ROI (i.e., Honolulu County) employment, unemployment, major industries, and income is provided in Section 5.13.1.

**Table 6-27**
**Waialua CCD Population Percentage by Race/Ethnicity**

| | Percent of Total Population 1990 | Percent of Total Population 2000 | Percent Change in Actual Population 1990-2000 |
|---|---|---|---|
| White | 32.4 | 30.4 | 13.9 |
| Black or African American | 1.9 | 4.3 | 168.9 |
| Native American, Eskimo, Aleut | 0.7 | 0.3 | -54.9 |
| Asian and Pacific Islander | 63.0 | 37.3 | -28.1 |
| Other and Two or More Races | 2.0 | 27.8 | 1,610.5 |
| Hispanic[1] | 9.1 | 9.5 | 26.4 |
| Minority[2] | 67.6 | 69.6 | 25.1 |

Source: US Census Bureau 1990a, 2000a
[1]Persons of Hispanic origin may be of any race.
[2]Minority includes Black or African American; Native American, Eskimo and Aleut; Asian and Pacific Islander; Other, and two or more races.

### 6.13.2 Environmental Consequences

***Summary of Impacts***

As illustrated in Table 6-28, the Proposed Action is expected to have temporary beneficial effects on employment, income, and business volume in Honolulu County and the Waialua CCD, resulting from construction and increased expenditures that would stimulate the economy within the ROI. Less than significant adverse effects on employment, income, and the economy would occur as a result of the Proposed Action because the changes to these factors would be within the capacity of society and the economy to absorb. Chapter 4 discusses the EIFS model results, and only the results pertaining to Honolulu County would be applicable to DMR. The Proposed Action would have less than significant impacts on the protection of children, because while the Army would continue to implement safety procedures, some risks to nearby populations (particularly children) are inherent to increased construction and training activities. There would be no impacts on population, schools, or housing because no new staff would be added at DMR. No disproportionate impacts on low-income or minority populations are expected as a result of the Proposed Action. No Action would have no impacts on socioeconomic or environmental justice factors or on the protection of children.

**Table 6-28**
**Summary of Potential Socioeconomic and Environmental Justice Impacts at DMR**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Population | ○ | ○ | ○ |
| Employment | ⊙+ | ⊙+ | ○ |
| Income | ⊙+ | ⊙+ | ○ |
| Economy (Business Volume) | ⊙+ | ⊙+ | ○ |
| Housing | ○ | ○ | ○ |
| Environmental justice | ⊙ | ⊙ | ○ |
| Protection of children | ⊙ | ⊙ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | |
|---|---|---|---|
| ⊗ = Significant | | + = | Beneficial impact |
| ⊘ = Significant but mitigable to less than significant | | N/A = | Not applicable |
| ⊙ = Less than significant | | | |
| ○ = No impact | | | |

***Proposed Action (Preferred Alternative)***

*Less than Significant Impacts*

Short- and long-term direct and indirect minor beneficial effects on employment, income, and business volume in Honolulu County and the Waialua CCD are expected as a result of constructing Dillingham Trail and SBCT training associated at DMR. The expenditures and employment associated with construction would increase ROI sales volume, income, and employment, as determined from EIFS model results for Honolulu County (see Table 4-14). The EIFS model and its inputs, outputs, and significance measures (RTVs) are discussed in more detail in Appendix L. The economic benefits would last only for the duration of the construction period. These changes in the specific economic parameters (sales, income, employment, and population) would fall within historical fluctuations and are considered to be minor.

*Employment.* Implementing the Proposed Action would have a less than significant impact on employment. Employment associated with the construction of Dillingham Trail would result in a temporary increase in employment. Subsequent indirect increases in employment are produced by the multiplier effect resulting from increased spending by construction employees. Increased construction employment at all SBCT installations in Honolulu County would be within the historic RTV ranges and would not be considered significant (see Table 4-14); therefore, the proportion of these increases at DMR is not considered significant, and no mitigation would be required.

*Income.* Implementing the Proposed Action would have a less than significant impact on income. Changes in income represent the wage and salary payments made to construction workers. Increased construction income at all SBCT installations in Honolulu County would be within the historic RTV ranges and would not be considered significant (see Table 4-14); therefore, the proportion of these increases at DMR is not considered significant, and no mitigation would be required.

*Economy (business volume).* Implementing the Proposed Action would have a less than significant impact on business volume. Changes in local business activity resulting from the Proposed Action include the change in the dollar value construction and procurement expenditures. Increased construction-related business volume at all SBCT installations in Honolulu County would be within the historic RTV ranges and would not be considered significant (see Table 4-14); therefore, the proportion of these increases at DMR is not considered significant. No mitigation would be required.

*Economic impacts to environmental justice.* Short- and long-term indirect minor adverse effects on environmental justice populations could occur. Approximately 78.7 percent of Honolulu County and 69.6 percent of Waialua CCD was made up of minority ethnic populations (US Census Bureau 2000a), and 9.7 percent of Honolulu County had income levels below the poverty line (US Census Bureau 2001). DMR is located in an isolated portion of O‘ahu, and no military or civilian personnel are permanently stationed at DMR. However, increased military traffic on public roads between DMR and SBMR would accompany the proposed action. Military vehicles could travel through predominantly minority residential neighborhoods. When military actions are conducted in areas accessible to the public, such as public roadways, the risk associated with the operations could extend to civilians. Noise from vehicle maneuvers could also disturb nearby residents. Risks to the public and military personnel inherent in training and day-to-day operations would be minimized or avoided through adherence to existing Army-wide, unit and installation, and other applicable safety regulations and procedures.

*Protection of children.* Implementing the Proposed Action would have a less than significant indirect impact on the health and safety of children. The Proposed Action would not directly involve children. DMR is located in an isolated portion of O'ahu, and no military or civilian personnel are permanently stationed there. Construction activities would take place in areas that are off-limits to the general public. Restricted areas would continue to be posted with signs, enclosed by a fence, or stationed with guards. Risks to children and to the general public would be minimized by strictly adhering to applicable safety regulations and procedures.

However, increased military traffic on public roads between DMR and SBMR would accompany the proposed action. Military vehicles could travel through residential areas or by schools. When military actions are conducted in areas accessible to the public, such as public roadways, the risk associated with the operations could extend to civilians. Noise from training maneuvers or vehicle operation could also disturb nearby schools or daycare centers. Risks to the public and military personnel inherent in training and day-to-day operations would be minimized or avoided through adherence to existing Army-wide, unit and installation, and other applicable safety regulations and procedures.

*No Impacts*

*Population.* Implementing the Proposed Action would have no impacts on population. The Proposed Action would not increase the population at DMR.

*Housing.* Implementing the Proposed Action would have no impact on housing. There would be no increased military population at DMR and, therefore, no increase in the demand for housing.

### Reduced Land Acquisition

The impacts associated with RLA would be identical to those described for the Proposed Action.

### No Action Alternative

*No Impacts*

Existing conditions would continue under No Action. No Action would not result in a change in the local economy or population, and no impacts on population, employment, income or the economy are anticipated. No effects on housing are expected because the number of people requiring housing on- or off-post would not change as a result of No Action. No effects on environmental justice are expected. No Action would not alter the health and safety, housing, or economic conditions of minority or low-income populations in Waialua CCD or Honolulu County. No effects on children are expected because No Action would not present any change in the public health or safety risk that could affect children. The Army would continue to provide measures to protect the safety of children, including using fencing and limiting access to certain areas.

## 6.14 PUBLIC SERVICES AND UTILITIES

### 6.14.1 Affected Environment

#### *Police, Fire, and Emergency Medical Services*

DMR has no standing medical facilities; units that come to train at DMR bring their own "combat lifesavers," who are medical technicians. In cases of medical emergency, Soldiers can be airlifted to Tripler Army Medical Center, which is only fifteen minutes by air from DMR (Garo 2002b).

DMR has no police facilities. Military police respond from SBMR, and City and County of Honolulu respond from Wahiawā, as needed. Where fire services are needed, the federal multi-agency fire response team at SBMR is called on. For both fire and police services, there is extensive coordination with Honolulu City and County fire and police departments (Garo 2003).

#### *Water Distribution*

The State of Hawai'i is responsible for maintaining the water supply at DMR through a leased contract, although the Army owns the land and infrastructure for the system. A 100,000-gallon (378,541-liter) reservoir on Kuaokalā Ridge provides water to DMR through a 6-inch (15.2-centimeter) cast iron line, assisted by a booster pump. A 4-inch (10.2-centimeter) galvanized iron line distributes potable water, and a 12-inch (30.5-centimeter) cast iron line distributes water for fire fighting. The distribution system is made up of approximately 46,325 linear feet (14,120 linear meters) of pipeline, two pumps, one well, and 10 valves. Nine fire hydrants serve the fire suppression needs of the installation. Water from the DMR system supplies operations within the base, Camp Erdman, and Air Force Ka'ena Point Satellite Tracking Station. The condition of the infrastructure for this system was rated as good to very good (C. H. Guernsey & Company 2001).

#### *Wastewater and Stormwater*

The most recent map of the stormwater and wastewater systems at DMR is dated January 30, 1958. It shows that the stormwater system at DMR consists of a network of open drainage ditches that convey surface drainage from intermittent stream channels at the foot of the slopes south of DMR and from the south side of the runway area to three underground concrete pipelines beneath the east, center, and west ends of the runway. The concrete pipelines discharge to outfalls at the shoreline of the Pacific Ocean north of DMR.

Sanitary wastewater generated at facilities at the southwest end of the runway, and south of the taxiway, is conveyed to each of two septic tanks that serve the two clusters of buildings. Sanitary wastewater from the cluster of buildings adjacent to the south side of the central portion of the runway is conveyed to a septic tank on the opposite (north) side of the runway, just north of Mokulē'ia Road. Effluent from this septic tank is discharged via a 10-inch (25.4-centimeter) pipeline to an underwater offshore outfall.

***Solid Waste Management***

Based on the waste and recycling streams generated during the third quarter of 2002, an estimated 4.0 tons of industrial solid waste is generated annually by the Ka'ena Point Satellite Tracking Station, representing about 0.1 percent of the total estimated annual industrial waste stream generated by Army installations in Hawai'i (USARHAW 2002a). DMR has no recycling services (Ching 2002a).

***Communications***

Verizon Hawai'i provides commercial telephone service, mainly from direct buried lines, which are deteriorated and have virtually no useful life remaining. ATT-HITS provides official phone service to the Army in duct lines. The Army is responsible for repairing and maintaining the official lines and for providing underground ducts for the commercial phone lines (C. H. Guernsey & Company 2001).

***Electricity and Natural Gas***

A 12.47-kV distribution circuit receives power from HECO and distributes it to DMR via 0.2 mile (0.32 km) of overhead primary distribution lines, owned by the Army. Within the DMR service area, there is 0.2 mile (0.32 km) of secondary overhead distribution lines and 0.2 mile (0.32 km) of underground secondary distribution lines. Approximately 12 electrical service connections, owned by the State of Hawai'i, and six 25-kVA pole-mounted transformers are within the DMR service area; three of these transformers feed Army loads. The condition of both the overhead and underground lines has been classified as poor to marginal, with less than 20 percent of their useful life remaining. The condition of the three Army pole transformers was rated as fair to good, with 40 to 60 percent of their useful life remaining (C. H. Guernsey & Company 2001).

A pump providing water to Ka'ena Point is powered by a DMR line, and the State of Hawai'i is powering its field operations and hangars from a connection to the Army's secondary line (C. H. Guernsey & Company 2001).

### 6.14.2 Environmental Consequences

***Summary of Impacts***

As illustrated in Table 6-29, less than significant long-term adverse effects are expected from the Proposed Action. The increases in the number of Soldiers training at DMR would increase demand on utilities and services. Additional utilities would be provided for the projects requiring increased capacity; otherwise, the existing systems have adequate capacity to provide for these changes. No substantial increase in demand on these systems is expected at DMR because no new staff would be added and no additional training facilities would be constructed.

**Table 6-29**
**Summary of Potential Public Services and Utilities Impacts at DMR**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Impacts on police, fire, and emergency medical services | ⊙+ | ⊙+ | ○ |
| Impacts on water distribution | ⊙ | ⊙ | ○ |
| Wastewater and stormwater impacts | ○ | ○ | ○ |
| Solid waste management | ⊙ | ⊙ | ○ |
| Impacts on communications | ○+ | ○+ | ○ |
| Impacts on electricity and natural gas | ⊙ | ⊙ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⃠ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact
N/A = Not applicable

### *Proposed Action (Preferred Alternative)*

#### Less Than Significant Impacts

*Police, fire, and emergency medical services.* Minor long-term adverse effects on law enforcement, fire protection, and emergency medical services are expected. The increase in training activities and the number of Soldiers involved in training could increase the demand for these services, but they should be adequate to accommodate such an increase. Jurisdiction would not change for any law enforcement agencies or fire departments. Moving most military traffic to Dillingham Trail would improve safety on public roads, which would be a beneficial effect.

*Water distribution.* Minimal long-term adverse effects are expected from the Proposed Action. Increased training maneuvers could increase the demand for potable water at DMR; however, no new staff would be added and no additional training facilities would be constructed. Construction of Dillingham Trail should not place an increased demand on the potable water system. Therefore, this increase should not have a significant adverse effect on the potable water supply system.

*Solid waste management.* Minimal long-term adverse effects are expected from the Proposed Action. Construction of Dillingham Trail would generate construction and demolition waste that could reduce the useful life of the landfill; however, this reduction should be negligible and this waste stream could be minimized by recycling. Increased training maneuvers could increase solid waste generation at DMR, but this increase should be within the capacity of the existing waste collection and disposal system. No new staff would be added and no additional training facilities would be constructed; therefore, this increase should not have a significant adverse effect on the solid waste disposal system.

*Electricity.* Minimal long-term adverse effects are expected from the Proposed Action because no new staff would be added and no additional training facilities would be constructed. The new Stryker training maneuvers would not be expected to place an increased demand on the electrical distribution system.

*No Impacts*

*Wastewater and stormwater.* Long-term adverse effects would not occur under the Proposed Action because no new staff would be added and no additional training facilities would be constructed. Construction of Dillingham Trail would include drainage improvements, culverts at stream crossings, grass and concrete swales, and drainage structures and lines to manage stormwater runoff. New training maneuvers would not generate increased wastewater or create additional impervious surfaces and is not expected to significantly increase the rate or volume of stormwater runoff.

*Communications.* The Proposed Action could have beneficial effects on the telephone system at DMR. The construction of Dillingham Trail would include placing new telecommunications lines along the side of the new paved road. The Proposed Action is expected to have no long-term adverse effects on the telephone system because no new staff would be added, no additional training facilities would be constructed, and new training maneuvers would not place additional demand on existing systems.

Army staff members have conducted an electromagnetic compatibility study for the Proposed Action in which it considered over 65,500 frequency records from the civil sector and other federal government agencies. The results indicate no significant interference problems should be encountered on O'ahu from operating the FTI system (US Army Development Test Command 2003).

### Reduced Land Acquisition Alternative

The impacts associated with Reduced Land Acquisition would be identical to those described for the Proposed Action.

### No Action Alternative

*No Impacts*

Under No Action, existing conditions would continue. Jurisdiction would not change for any law enforcement agencies or fire departments, nor would there be increased demands on existing services. The demand for water, wastewater collection and treatment, solid waste collection and disposal, communications systems, and electricity would not change because no new facilities would be constructed, no additional training would occur, and no new personnel would be added.

# Final Environmental Impact Statement

# Transformation of the 2nd Brigade, 25th Infantry Division (L) to a Stryker Brigade Combat Team in Hawai'i

## Volume 2

*Prepared for*
Department of the Army
Office of the Secretary of the Army
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and

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Honolulu Engineer District
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# CHAPTER 7

# KAHUKU TRAINING AREA/
# KAWAILOA TRAINING AREA

# CHAPTER 7
# KAHUKU TRAINING AREA/KAWAILOA TRAINING AREA

## 7.1 INTRODUCTION

This chapter discusses the affected environment and environmental consequences of project activities at KTA and KLOA. Levels of analysis by resource area will vary within this chapter because the sensitivity of resources and level of project activity vary from one area to another. For instance, cultural resources impacts at KLOA are not discussed in as much detail as at KTA because project-related activity at KLOA would have limited impacts on cultural resources compared to project activity at KTA.

The proposed project at KTA would involve constructing various training and support facilities on KTA. From HMR, Drum Road would be used to access KTA. Training activities and locations would change on the installation and along Drum Road. The following text provides a description of these proposed activities; for detailed construction information, see Appendix D, Construction Details. Potential environmental impacts associated with these proposed activities are discussed in detail throughout the remainder of this chapter.

### 7.1.1 Proposed Action

#### *Construction*

<u>*Construction of Tactical Vehicle Wash*</u>

The proposal is to construct a tactical vehicle wash facility with six wash stations and a new water system. The water system would consist of two pump stations, each with motors and controls. There would be a midpoint pump station and a tank with level controls to control pump operation. Pumps and tanks would be installed inside a pump house with natural ventilation. Included would be a 10-foot by 10-foot (3-meter by 3-meter) pump-only pump house and a midpoint 10-foot by 15-foot (3-meter by 5-meter) pump house for pump and storage tank. The wash stations would be sized to support a 60-foot-long (18-meter-long) by 12-foot-wide (4-meter-wide) vehicle. The primary facility would consist of the preparation area and wash stations. The wash stations would use a high-pressure wash system and would recycle water to minimize wastewater disposal. The water would flow through a water sediment basin, an equalization basin, and oil-water separators and would be recycled into a water supply reservoir.

*Construction of Combined Arms Collective Training Facility*

Construction activities at the CACTF would consist of a new 0.27-acre (0.11-hectare) facility space. Approximately 1,765 square feet (164 square meters) of facilities would be demolished and approximately 187 acres (76 hectares) be graded during the construction of a 560-acre (227-hectare) CACTF. The facility would include tactical movement trails, simulated firing points, obstacles, targets, and other infrastructure. Range support facilities would include a combined command control and after-action review building, a storage building, an ammunition breakdown building, a latrine, a covered mess hall, and an access road. Project construction would involve earth movement, grading, and other typical construction activities.

*Construction of Fixed Tactical Internet*

A group of antennas strategically placed throughout the installation and training areas would be constructed. As a result, radios within military vehicles would be able to receive and process both voice and data signals. Four antennas would be installed at each proposed site. Existing tower sites would be used when possible. Two antennas are approximately four feet (1 meter) long and two inches (0.05 meter) in diameter. The other two antennas are approximately 10 feet (3 meters) long and 2 inches (0.05 meter) in diameter. All would be mounted on antenna masts or on existing utility poles, towers, or buildings. Each site would be 20 feet (6 meters) by 25 feet (8 meters), including a 15-foot (5-meter) by 20-foot (6-meter) concrete pad for the support structure and shed. Sites would be accessed via existing roads in all cases. No security lighting would be installed at the sites. Equipment sheds would house two radios and four batteries. Of the four locations evaluated for construction of the FTI antennas on O'ahu, a maximum of eight will be selected from the locations represented in the EIS. Locations will be chosen based on the most suitable locations for communication logistics and avoidance of environmental concerns, such as cultural and biological resources.

### Deployment

No range and training land impacts would be associated with this activity group.

### Training

*Use of the CACTF*

This facility will allow the SBCT to train its units how to both defend and attack in an urban environment. The contiguous maneuver area will provide the commanders the flexibility to develop multiple training scenarios that will meet the Army training requirements. Blank ammunition, certain pyrotechnics, and live-fire SRTA would be used. Training would include the use of SRTA, also known as blue-tip ammunition, which uses a plastic ball projectile. Although SRTA is classified as live-fire training in accordance with AR 385-63, the maximum range of this ammunition is only 300 to 700 yards (274 to 640 meters), depending on the caliber used.

*General SBCT Training*

Training activities would include military training on lands outside of developed areas (for example, cantonment areas). Such training would include mounted maneuver training and other dismounted military training on 4,569 acres (1,849 hectares) at KTA. Most of the training by SBCT forces would be similar to that being conducted by light infantry brigades. Each major element of the SBCT is composed of a number of smaller units. Individual training activities often consist of section, team, squad, and platoon-sized units operating in a dispersed but coordinated manner.

Training would include establishing and using tactical and logistical operations and administrative centers, as well as smaller more dispersed activities, such as bivouac. As with current training, exercises would continue to be at the squad through brigade level. General SBCT training would likely occur from 180 to 242 days per year.

Field activities, or training exercises, could involve a wide variety of activities, such as vehicle movement, maneuvers, and convoys, foot maneuvers, bivouacking, limited aviation training, and staff training. Trafficable areas available for maneuver training are indicated on maneuverability maps shown in Chapter 2. Blank ammunition, certain pyrotechnics, and SRTA live-fire are the only types of ammunition allowed for training at KTA; aerial pyrotechnics are not authorized.

*Use of Upgraded Drum Road*

Drum Road runs from the end of the paved road at HMR to the end of the paved road at KTA. Military personnel could use the road to get from HMR through KLOA to the training areas at KTA. Potential construction impacts and impacts from use by current forces are being evaluated in a separate NEPA document but the use of this road by Strykers is evaluated in this EIS.

#### *Proposed Action Impacts*

Table 7-1 is a list of environmental impacts by specific SBCT project and resource category. This gives the public and reviewers a more detailed evaluation of impacts deriving from specific SBCT-related actions.

### 7.1.2 Reduced Land Acquisition

Project activities at KTA would be the same under the RLA Alternative as those under the Proposed Action.

#### *RLA Alternative Impacts*

Table 7-2 is a list of environmental impacts by specific SBCT project and resource category. This gives the public and reviewers a more detailed evaluation of impacts deriving from specific SBCT-related actions.

### 7.1.3 Public Comments

Public scoping comments on SBCT project activities at KTA focused on potential impacts related to the following:

- Public access to trails and other open space;
- Continued hunting and other recreational activities;
- Flooding in the area proposed for new buildings; and

The proposed Drum Road, including potential erosion impacts.

During the DEIS public comment period, public comments on the SBCT project activities at KTA focused on the following:

- Impacts on endangered and threatened species and sensitive habitats;
- Impacts from invasive and nonnative species;
- Impacts from fire;
- Increased erosion from training;
- Impacts from $PM_{10}$ and fugitive dust;
- Noise and health and safety impacts from increased flights;
- Revegetation and reclamation issues;
- Impacts on cultural resources;
- Cleanup after closure;
- Sites of contamination;
- Impacts from hazardous materials and waste, such as asbestos, depleted uranium, lead, and RDX;
- Recreational access;
- NPDES permit issues;
- Easement acquisitions;
- Electricity supply;
- Water supply impacts;
- Impacts on the locally unemployed;
- Funding for public roads;
- Impacts on traffic;
- Impacts on scenic views;
- Impacts on perennial streams;
- Impacts on the groundwater aquifer; and
- Impacts from flooding.

**Table 7-1**
**SBCT Project Impacts under Proposed Action at KTA**

| 1391 Project # | SBCT Project Title | Location | Land Use | Visual Resources | Airspace | Air Quality | Noise | Traffic | Water Resources | Geology and Soils | Biological Resources | Cultural Resources | Human Health & Safety Standards | Socioeconomics /EJ | Utilities |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57415 | Tactical Vehicle Wash Facility | KTA | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⊙ | ⊙+ | ⊙ |
| 57305 | Combined Arms Collective Training Facility | KTA | ⊗ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⦸ | ⊗ | ⊙ | ⊙+ | ⊙+ |
| N/A | Fixed Tactical Internet | KTA | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ○+ | ○+ |
| N/A | SBCT Training | KTA/KLOA | ⊙ | ⊙ | ○ | ⦸ | ⊙ | ⊙ | ⦸ | ⊗ | ⊗ | ⊗ | ⦸ | ⊙ | ⊙ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

PA = Proposed Action
RLA = Reduced Land Acquisition
NA = No Action
⊗ = Significant impact
⦸ = Significant but mitigable to less than significant impact
⊙ = Less than significant
○ = No impact
+ = Beneficial impact
N/A = Not applicable

**Table 7-2**
**SBCT Project Impacts under RLA Alternative at KTA**

| 1391 Project # | SBCT Project Title | Location | Land Use | Visual Resources | Airspace | Air Quality | Noise | Traffic | Water Resources | Geology and Soils | Biological Resources | Cultural Resources | Human Health & Safety Standards | Socioeconomics /EJ | Utilities |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57415 | Tactical Vehicle Wash Facility | Kahuku | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊙ | ⊙+ | ⊙ |
| 57305 | Combined Arms Collective Training Facility | Kahuku | ⊗ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊗ | ⊙ | ⊙+ | ⊙+ |
| N/A | Fixed Tactical Internet | KTA | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ○+ | ○+ |
| N/A | SBCT Training | KTA/KLOA | ⊙ | ⊙ | ○ | ⊘ | ⊙ | ⊙ | ⊘ | ⊗ | ⊗ | ⊗ | ⊘ | ⊙ | ⊙ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

PA = Proposed Action
RLA = Reduced Land Acquisition
NA = No Action
⊗ = Significant impact
⊘ = Significant but mitigable to less than significant impact
⊙ = Less than significant
○ = No impact
+ = Beneficial impact
N/A = Not applicable

## 7.2 LAND USE/RECREATION

The land uses and recreational resources for KTA, KLOA, and Drum Road were identified through review of the state Land Use District designations (State of Hawai'i 2002a), the state designations for Agricultural Lands of Importance to the State of Hawai'i (State of Hawai'i 2002a), the City and County of Honolulu Land Use Ordinance zoning (City and County of Honolulu 2001), the Ko'olau Loa Sustainable Communities Plan for KTA (City and County of Honolulu 2002b), the North Shore Sustainable Communities Plan for KLOA (City and County of Honolulu 2000a), and the City and County of Honolulu Real Property Assessment Division data for Tax Map Key identifications and property boundaries (City and County of Honolulu 2003).

### 7.2.1 Affected Environment

#### *Land Use*

*Kahuku Training Area*

KTA is in northern O'ahu, on the northern terminus of the Ko'olau Mountains (Figure 7-1). It is the second largest Army maneuver training area on O'ahu (Nakata Planning Group, LLC 2002a). KTA consists of 9,398 acres (3,803 hectares) of which 4,569 acres (1,849 hectares) are considered maneuverable (Nakata Planning Group, LLC 2002a). KTA can support multiple infantry battalion-sized[1] ARTEP missions. Training areas, helicopter landing zones, and parachute drop zones on KTA are shown on Figure 7-1. Ammunition used on KTA is currently limited to blanks and pyrotechnics (e.g., smoke and incendiary devices), but no pyrotechnics are allowed in training areas A1 and A3 or within 3,281 feet (1,000 meters) of the KTA borders. There are no existing ordnance impact areas or SDZs on KTA. There is no cantonment area at KTA; areas that support Army-related operations include the range control compound in Training Area B2 and three smaller compounds on KTA.

Military land uses within KTA project areas are listed in Table 7-3. About half of KTA lands are within the state-designated Conservation District Resource Subzone (described in Table 5-4), and the remaining lands are within the Agricultural District (Figure 7-2). The northern half of KTA is zoned by the county as Ag-2 General Agricultural District, and the southern half is zoned P-1 Restricted Preservation District (City and County of Honolulu 2001). The state ALISH map (Figure 7-3) shows unique agricultural lands at KTA (State of Hawai'i 2002a); however, these lands are currently used for military training (City and County of Honolulu 2002b). Inactive windmills and associated structures within KTA boundaries were removed in 2003 (Hannigan 2003).

KTA's primary nonmilitary land use is for recreation, specifically hiking, biking, and hunting (Figure 7-4; USARHAW and 25th ID[L] 2001a). The 2.5 mile Kaunala Trail is located in the west-central portion of KTA (Na Ala Hele 2003). The trail is open for hiking and bicycling

[1] A battalion consists of 300 to 1,000 Soldiers (USACE Mobile District 2001).

**Figure 7-1**
Land Use at Kahuku Training Area

**Figure 7-2**
State Land Use District Map Kahuku and Kawailoa Training Areas

**Figure 7-3**
Agricultural Lands of Importance to the State of Hawai'i Kahuku and Kawailoa Training Areas

**Figure 7-4**

Public and Army Hunting Areas and Hiking Trails Kahuku and Kawailoa Training Areas

**Table 7-3**
**Kahuku Training Area Project Areas and Land Uses**

| Project Title | Existing Land Use |
|---|---|
| Tactical Vehicle Wash Facility | Training |
| CACTF | Training |
| Fixed Tactical Internet | |
| Kawela (Kahuku) 1 | Training |
| Kawela (Kahuku) 2 | Training |

Source: City and County of Honolulu 2001

on weekends and state and national holidays, if the Army is not conducting maneuvers in the area. The Pūpūkea Summit Trail passes along the border of KTA and extends south along the eastern border of KLOA (R. M. Towill Corp. 1997a). Hiking along this trail is allowed with an Army DPW permit. Bicycle races are sometimes held on KTA, and the Hawaiʻi Motorsports Association leases the motorcross course in Training Area A1, sponsoring 12 motorcross races per year (R. M. Towill Corp. 1997a).

KTA includes two Army-maintained hunting areas (USARHAW and 25th ID[L] 2001a). The Kahuku Hunting Area, which includes game bird hunting, is in Training Area A1 and the Pūpūkea State Public Hunting Area is in Training Area A3. Conditions for hunting at KTA are presented in Table 7-4. The Integrated Natural Resources Management Plan proposes the following management objectives for recreational resources at KTA (USARHAW and 25th ID[L] 2001a):

- Develop a system with the DLNR for allowing weekday access into training area A-3 when the area is not in use by the military.
- Develop signage and educational materials for hiking trails and motorcross events.
- Develop maps of the trails on KTA for distribution with access permits, including level of difficulty and natural resources issues.
- Investigate a method to monitor potential conflicts between training actions and public recreation in KTA in conjunction with the Division of Forestry and Wildlife.
- Work with the DLNR to expand public and Army hunting areas in KTA.
- Develop educational materials regarding the effect of trespass motorcross use for distribution at sanctioned events.
- Pursue additional cooperation with Hawaiʻi Motorsports Association to develop facilities for the benefit of both parties.
- <u>Increase patrol levels on KTA and work with Hawaiʻi Motorsports Association to establish penalties to help curb trespass motorcross use.</u>
- <u>Pursue additional cooperation with Hawaiʻi Motorsports Association to develop facilities for the benefit of both the Army and the Hawaiʻi Motorsports Association</u>

(for example, installing a water catchment system and planting native Hawaiian plants for erosion control).

### *Kawailoa Training Area*

KLOA is located south of KTA, on the western slope of the Koʻolau Mountain Range (Figure 7-5). KLOA is the largest training area on Oʻahu. KLOA consists of 23,348 acres

**Table 7-4**
**Hunting at Kahuku Training Area**

| Conditions | Pūpūkea State Public Hunting Area A-3 | Kahuku Army Hunting Area A-1 |
|---|---|---|
| **Game to be taken** | Wild pigs and wild goats. | Wild pigs.<br>Game birds: Ring-necked pheasant and green pheasant; Japanese quail, Erckels' Francolin, Barred dove, and Spotted dove. |
| **Permitted hunting methods** | Rifles, shotguns, handguns, knives, spears, bows and arrows. Dogs are permitted, but must be kept under physical restraint and control except when actually hunting. | Wild pigs can be hunted with knives and spears. Dogs are permitted, but must be kept under physical restraint and control except when actually hunting.<br>Game birds can be hunted with a shotgun no larger than 12-gauge and shot size no larger than No. 6. |
| **Open hunting periods** | Year-round. | Wild pigs: February to October.<br>Game birds: November through January. |
| **Open hunting days** | Saturdays, Sundays, and state holidays unless military training activities have been announced prior to a weekend or holiday. | Days when area is not used for motorcross racing or military training. |
| **Special Conditions and Restrictions** | Access from Pūpūkea Road (subject to military activities). | Only one hunting group (of two to six people) is allowed at a time and permits are issued by the Provost Marshall on a first-come, first-serve basis (subject to military activities). |
| **Hunters** | Persons who have the appropriate hunting license, tags, permits, or permit tags on their person and who have signed in at the state hunter checking station. | Active duty, reserve duty, and retired military personnel and authorized family members and US Department of Defense civilian employees and their civilian guests are allowed to hunt in these areas. Hunters must have a valid State of Hawaiʻi hunting license and must check in and out with Military Police at Schofield Barracks. |

Sources: DLNR 1999a; USARHAW and 25th ID(L) 2001a

**Figure 7-5**
Land Use Kawailoa Training Area

(9,449 hectares) of which 5,310 acres (2,149 hectares) are suitable for maneuver training activities (Nakata Planning Group, LLC 2002a). KLOA can support small infantry unit maneuvers and helicopter training. The remaining land is considered unsuitable for maneuver training, but can support mountain and jungle warfare training. In these areas, troop deployment is limited to single file, small unit movement on ridgelines. Ammunition used at KLOA is limited to blanks; no pyrotechnics or live-fire are allowed (Nakata Planning Group, LLC 2002a).

KLOA is included in the state-designated Conservation District Resource and Protective Subzones (described in Table 5-3) (Figure 7-2). The west-central portion of KLOA includes land areas designated by the state as Prime agricultural land (Figure 7-3). One of these areas is the Pu‘u Kapu landing zone. Most of KLOA is included in the Kawailoa Forest Reserve and the southern portion of KLOA includes the ‘Ewa Forest Reserve. The ‘Ewa Forest Reserve is also a state hunting area (Figure 5-10). Table 5-12 presents the conditions of this hunting area, located north of SBER.

The Poamoho Ridge Trail is in the southern portion of KLOA (Na Ala Hele 2003). This trail is closed to the public pending permission from Dole Food Co., Inc. Schofield-Waikāne Trail, located along the southern boundary of KLOA, is owned and managed by the state and the Army. This 3.5-mile (5.6-kilometer) long trail ends on the Ko‘olau Mountain Ridge. Written permission is required from Schofield Barracks Range Control to access Schofield-Waikāne Trail and a permit is needed from Army Support Command.

#### *Drum Road*

Drum Road is an existing dirt and gravel road from Helemanō Military Reservation to KTA. The road alignment crosses through a state-designated Agricultural District and Conservation District Resource, General, and Limited Subzones (Figure 7-2). The alignment also crosses through portions of the state's Prime agricultural land; however, the majority of this alignment is on existing roads (Figure 7-3). The northern portion of Drum Road is within the state's Special Management Area (Figure 7-6). The upgrade of this road is evaluated under a separate NEPA document and is discussed under Cumulative Impacts in Chapter 9.

### *Ownership*

#### *Kahuku Training Area*

The federal government owns the majority of KTA, and the state owns most of Training Area A1 and Training Area A3, which it leases to the Army. Figure 7-7 shows the KTA land parcels, and Table 7-5 lists Tax Map Keys (defined in Chapter 3) of the affected land parcels and the associated landowners and lessees.

**Figure 7-6**
Special Management Area Map Kahuku and Kawailoa Training Areas

**Figure 7-7**
Affected Parcels Map for Kahuku Training Area

### Kawailoa Training Area

KLOA landowners include the State of Hawai'i, Dole Foods Division of Castle and Cooke, Bernice Pauahi Bishop Estate, and the City and County of Honolulu (leased to the Audubon Society). Figure 7-8 shows the KLOA land parcels, and Table 7-6 lists Tax Map Keys (defined in Chapter 3) of the affected land parcels and the associated landowners and lessees.

**Table 7-5**
**Kahuku Training Area Landowners and Lessees**

| Tax Map Key | Landowner (Lessee) |
|---|---|
| 56005010 | James Campbell Trust Estate |
| 56007003 and 004 | United States of America |
| 56008001 to 004 | United States of America |
| 57002001 | United States of America |
| 57002002 | United States of America |
| 57002003 | United States of America |
| 57002004 | United States of America |
| 57002005 | United States of America |
| 57002006 | City & County of Honolulu |
| 57002019 | Kuilima Resort Co. |
| 57002008 to 018 | James Campbell Trust Estate |
| 57004001 | United States of America |
| 57004002 | United States of America |
| 58002001 | United States of America |
| 58002002 | State of Hawai'i (The United States of America) |
| 58002003 | United States of America |
| 58002005 | United States of America |
| 58002006 | United States of America |
| 59006026 | State of Hawai'i (The United States of America) |

Source: City and County of Honolulu 2003

### Drum Road

Landowners along the Drum Road alignment include the City and County of Honolulu (leased to the Audubon Society), Bernice Pauahi Bishop Estate, and Dole Food Co., Inc. Figure 7-8 shows the Drum Road land parcels, and Table 7-7 lists Tax Map Keys (defined in Chapter 3) of the affected land parcels and the associated landowners and lessees.

**Figure 7-8**
Affected Parcels Map for Kawailoa Training Area

**Table 7-6**
**Kawailoa Training Area Landowners and Lessees**

| Tax Map Key | Landowner (Lessee) |
|---|---|
| 53011009 | State of Hawaiʻi |
| 61002002 | City and County of Honolulu (leased to the Audubon Society) |
| 62011012 | Lehue L. Shelley |
| 62011013 | Dole Food Co., Inc. |
| 62011015 | Lehue L. Shelley |
| 62011016 | Dole Food Co., Inc. |
| 62011017 | Dole Food Co., Inc. |
| 62011018 | Dole Food Co., Inc. |
| 62011019 | Dole Food Co., Inc. |
| 63001001 | Bernice Pauahi Bishop Estate Trustees: aka Kamehameha Schools (Waialua Sugar Co., Inc.) |
| 63001002 | Dole Food Co., Inc. |
| 63001003 | Dole Food Co., Inc. (Hawaiian Electric Co., Ltd.) |
| 63001004 | Bernice Pauahi Bishop Estate Trustees: aka Kamehameha Schools (Waialua Sugar Co., Inc.) |
| 63001005 | Dole Food Co., Inc. (Hawaiian Electric Co., Ltd.) |
| 72001006 | State of Hawaiʻi (United States of America) |

Source: City and County of Honolulu 2003

**Table 7-7**
**Drum Road Landowners and Lessees**

| Tax Map Key | Landowner (Lessee) |
|---|---|
| 61002002 | City and County of Honolulu (leased to the Audubon Society) |
| 61006001 | Bernice Pauahi Bishop Estate Trustees: aka Kamehameha Schools |
| 63001004 | Bernice Pauahi Bishop Estate Trustees: aka Kamehameha Schools (Waialua Sugar Co., Inc.) |
| 61007001 | Bernice Pauahi Bishop Trust Estate: aka Kamehameha Schools |
| 62011001 | Bernice Pauahi Bishop Trust Estate: aka Kamehameha Schools |
| 64002001 | Dole Food Co., Inc. |
| 62011021 | Bernice Pauahi Bishop Estate Trustees: aka Kamehameha Schools (New ʻŌpaeʻula Ranch) |
| 64004001 | Dole Food Co., Inc. |
| 64004003 | United States of America |

Source: City and County of Honolulu 2003

### *Surrounding Land Use*

*Kahuku Training Area*

Land to the north and east of KTA is agricultural and includes the town of Waiale‘e, with the Waiale‘e Beach Park (City and County of Honolulu 2000a). Land farther north and east, beyond Kamehameha Highway, includes the Turtle Bay Resort, Kawela Bay Beach Park, Punamanō National Wildlife Refuge, an aquaculture facility, Ki‘i National Wildlife Reserve, the town of Kahuku, Mālaekahana State Recreation Area, Lā‘ie Point County Park, and Brigham Young University. Forest and agricultural land is to the southeast, and KLOA is south and southwest of KTA. Land west of KTA includes agricultural land, Pūpūkea Paumalū Forest Reserve, the Pūpūkea Paumalū Homesteads, and Camp Paumalū. Land uses to the northwest of KTA include agriculture, park, and rural communities. The properties abutting KTA are zoned for Preservation or Agricultural uses (City and County of Honolulu 2001). The surrounding properties are zoned Ag-1 Agricultural District with the exception of F-1 Military and federal zoned lands at the northern and southern ends of the property. The Ko‘olau Loa Sustainable Community Plan depicts existing access from the Kahuku District Park into KTA with the goal of maintaining access to this area of the Ko‘olau Mountain Range (City and County of Honolulu 2002b).

*Kawailoa Training Area*

KLOA is bordered by KTA on the north; on the east by private land, Kaipapa‘u Forest Reserve, Hau‘ula Forest Reserve, and Sacred Falls State Park; on the south by SBER; and on the west by private agricultural lands. The eastern side of the Ko‘olau Mountain Range with the Ahupua‘a O Kahana State Park are to the east of the southern end of KLOA. The Ahupua‘a O Kahana State Park (formerly Kahana Valley State Park) was established as a living park with the primary purpose to nurture and foster native Hawaiian culture and spread knowledge of its values and ways (DLNR 2003d). SBER is located to the south, and private agricultural lands are to the west.

*Drum Road*

Land uses surrounding Drum Road are open and forested areas, agriculture, and military/federal (City and County of Honolulu 2000a). The northern portion of the road is near the Waimea Valley, which includes Waimea Falls Park.

### *Surrounding Land Ownership*

*Kahuku Training Area*

The land surrounding KTA is owned by James Campbell Trust Estate, the State of Hawai‘i, Property Reserve, Inc., Dole Food Co., Inc., the City and County of Honolulu (leased to the Audubon Society), Girl Scout Council, Antonio Narvaez, Comstat Corporation, and Obayashi Corporation (USARHAW and 25th ID[L] 2001a).

*Kawailoa Training Area*

Owners of land surrounding KLOA include the federal government, the State of Hawai‘i, James Campbell Trust Estate, the City and County of Honolulu (leased to the Audubon

Society), Bernice Pauahi Bishop Estate, Dole Food Co., Inc, Property Reserve, Inc., and Waialua Sugar Co.

*Drum Road*

Owners of land surrounding the Drum Road alignment include those listed in Table 7-7.

### 7.2.2 Environmental Consequences

***Summary of Impacts***

Table 7-8 provides a summary of impacts associated with land use and recreation at KTA/KLOA. Significant impacts on land use would occur under the Proposed Action and the RLA Alternative, where operation of a live-fire training facility (CACTF) would result in a surface danger zone preventing unauthorized access within KTA . When the KTA CACTF is active, USARHAW would establish all prudent measures to prevent unauthorized access within the newly established SDZs during training. Less than significant impacts on land use would occur during the temporary construction of the projects and due to SBCT training on lands currently used for current training. There would be no impacts under No Action.

**Table 7-8**
**Summary of Potential Land Use/Recreation Impacts at KTA/KLOA**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Conversion of agricultural land to training land | N/A | N/A | N/A |
| Impacts on natural resources management and recreational land use | ⊗ | ⊗ | ○ |
| Construction of Fixed Tactical Internet in a Conservation District | N/A | N/A | N/A |
| Impacts on land use during construction activities | ⊙ | ⊙ | ○ |
| SBCT training on lands currently used for current training | ⊙ | ⊙ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | | | |
|---|---|---|---|---|---|
| ⊗ | = | Significant | + | = | Beneficial impact |
| ⃠ | = | Significant but mitigable to less than significant | N/A | = | Not applicable |
| ⊙ | = | Less than significant | | | |
| ○ | = | No impact | | | |

***Proposed Action (Preferred Alternative)***

*Significant Impacts*

*Impact 1: Impacts on natural resources management and recreational land use.* Projects associated with KTA and use of Drum Road would not affect natural resources management areas.

Authorized recreational uses at KTA, including hunting, hiking, biking and motorcross, would not change with the Proposed Action. However, unauthorized recreational access may be adversely affected by additional fencing and signs restricting access, which are necessary due to the proposed live-fire use of the area. Construction and operation of the CACTF would convert general maneuver lands to a live-fire facility, using SRTA only. SRTA has a maximum range of approximately 2,300 feet (700 meters) and an effective range of approximately 246 feet (75 meters). When the range is in use, any traffic (on foot or in unprotected vehicles) within the SDZ would be prohibited. Presently, traffic – such as unauthorized public access - is not strictly controlled at KTA. A significant impact would be associated with the introduction of live-fire training in an area used for low-intensity, generally dismounted, training because of additional restrictions on unauthorized recreational access.

*Regulatory and Administrative Mitigation 1*. No regulatory and administrative mitigation has been identified for this impact. Mitigation to address safety issues is discussed in Section 7.12.

*Additional Mitigation 1*. No additional mitigations have been identified.

#### Less Than Significant Impacts

*Impacts on land use during construction activities.* Land uses may be affected due to construction activities. This action would have short-term less than significant impacts limited to the localized and temporary nature of construction activities.

*SBCT Training on lands currently used for training*. Most of the land area within KTA and along Drum Road that would be used for general SBCT training is currently being used for training. The primary land use difference between current training and SBCT training is the introduction of the Stryker vehicle. This would result in the land being more intensively used following the Proposed Action, with vehicle traffic between SBMR and KTA increasing from 4 to 12 times per year, with vehicle density increasing from 40 to between 18 and 145 (an increase of 269 vehicles on the road). No impacts on land uses or recreation are expected due to this proposed change.

### Reduced Land Acquisition Alternative

The impacts associated with RLA are identical to those described for the Proposed Action.

### No Action

#### No Impacts

Under No Action, transformation would not occur, so no major changes to training areas would take place in Hawai'i. The Army would continue to operate and maintain its range, training areas, and support facilities in order to meet its current training mission requirement. However, the level of training would change occasionally in response to this requirement and as a result, the land uses of these areas may change. As appropriate, these actions would be evaluated under separate NEPA analysis. If future changes could affect the environment, NEPA documentation would be prepared.

## 7.3 VISUAL RESOURCES

### 7.3.1 Affected Environment

The following discussion of visual resources is divided into two subject areas, KTA and Drum Road/KLOA. The ROI includes all areas within the line of sight of proposed activities or changes on KTA or Drum Road/ KLOA. The ROI, therefore, includes a wide corridor of land along the proposed route of Drum Road through KLOA, including views from adjacent roadways (Wilikina Drive, Kamananui Drive, and Kamehameha Highway), coastal and nearshore areas, and adjacent trails and forest preserve areas.

KTA and Drum Road/KLOA are within the geographic area addressed in the Koʻolau Loa and North Shore Sustainable Communities Plan areas of the General Plan for the City and County of Honolulu. Although the Koʻolau Loa Sustainable Communities Plan provides specific recommendations for KTA (City and County of Honolulu 1999, 3-7), the guidelines do not pertain to visual resource management. The plan does include guidelines for preserving scenic resources, defined as mountain and shoreline areas, natural drainages, parks, and golf courses (City and County of Honolulu 2002b, 3-1).

The North Shore Sustainable Communities Plan states that views of scenic resources, such as the Waiʻanae and Koʻolau Mountain Ranges, as well as more gradual slopes, or pali, nearer to the coast, the coastline, the Pacific Ocean and views from public places, including major roadways, should be preserved. Developers should minimize the impact on these scenic resources, and interagency and private sector should be encouraged to participate and cooperate in creating, maintaining, and enhancing views and visual resources on the North Shore (City and County of Honolulu 2000a, 3-17).

#### *Landscape Character*

*Kahuku Training Area and Kawailoa Training Area*

KTA and KLOA are adjacent to each other and are included in the Kawailoa Forest Reserve. The southern portion of KLOA includes the ʻEwa Forest Reserve. The visual landscape of the area generally is characterized by panoramic views of the Pacific Ocean and the Koʻolau Mountain Range or coastal plain and pali. KTA and KLOA extend from a gently sloping coastal plain, into moderately sloping rougher bluffs, and finally into the steep irregular ridgelines of the Koʻolau Mountain Range. Valleys and pali separate the coastal areas from the upland portions of KTA and KLOA and dominate the foreground and middleground views from the coastal area. The Koʻolau Mountain Range is a background feature, although it is largely obscured along much of the coastal area by vegetation and topography.

Human-made features on KTA are limited to roads, antenna support structures and windmills, and a few structures dispersed throughout the area. Most of the structures on KTA are obscured by vegetation or topography; nevertheless, those that are visible contrast sharply with the natural elements of the visual field. Human-made features on KLOA include roads, trails, and the Puʻu Kapu landing zone.

Vegetation in the coastal plain and pali is a mixture of grasses, shrubs, and mature trees. Vegetation on the ridges in the background includes forest and woodland communities. Vegetation softens the edges of the topography in the area and, because of the viewing distance, the texture and color of vegetation on the ridges is more uniform in appearance. The surrounding area has a high degree of modification, particularly along the coast where there are numerous buildings, roads, fences, power lines and other infrastructure, and agricultural activities. The area in and around KTA and KLOA is considered to have high visual quality due to the panoramic views, the intactness of most views, and the integrated form of the natural features.

#### *Drum Road*

Drum Road is in KTA and along the western boundary of KLOA, an area generally characterized by the irregular form of the Ko‘olau Mountain Range ridges and valleys with few human-made features. Vegetation ranges from grass and shrubs to mature trees. Variation in vegetation patterns and topography result in a coarser visual texture and a more varied and integrated visual setting. The views from the higher elevations are more enclosed due to the canopies of mature trees, although occasional panoramic views of the ocean, coastal plain, and surrounding mountains occur throughout this area. Due to the panoramic views, the lack of substantial modifications that break up the views, and the integrated form of the natural features, this area has a high visual quality.

Drum Road occupies the middleground or background of views from most surrounding areas such that much of the visual detail is lost. Most easterly and southeasterly views of the road are completely or occasionally obstructed by vegetative screening or topography.

### *Sensitive Views*

The Ko‘olau Loa Sustainable Communities Plan has designated several panoramic views in the area of KTA, including the views inland (mauka) from the Kamehameha Highway along Mālaekahana Bay (south of Kahuku) (City and County of Honolulu 2002b, [Open Space Map]).

The North Shore Sustainable Communities Plan designates inland views from the Kamehameha Highway between Hale‘iwa and Waiale‘e as continuous scenic views, while easterly views toward KTA and Drum Road/ KLOA from the Kamehameha Highway, between the Poamoho Stream channel and Hale‘iwa, are designated as intermittent scenic views (City and County of Honolulu 2000a, 3-15). In addition, a large number of recreational areas along the north shore, including Waiale‘e Beach County Park, Pahipahi‘ālua Beach, Kawela Bay Beach Park, the Turtle Bay and Kahuku golf courses, Pu‘uhōnua O Mālaekahana Park, Mālaekahana State Recreation Area, and La‘ie Point County Park, are considered sensitive viewing areas.

As discussed in Section 7.2, Land Use, the Army permits only limited recreational uses on KTA. These uses are largely limited to weekends and holidays and times when the Army is not conducting maneuvers. These uses include hiking on the Kaunala Trail in the west central portion of KTA, hiking on the Pūpūkea Summit Trail, along the border of KTA and extending south along the KLOA and SBER border, hunting in the Kahuku Hunting Area in training area A1, hunting in the Pūpūkea State Public Hunting Area in training area A3, and occasional bicycle and motocross races in training area A1.

### 7.3.2 Environmental Consequences

#### *Summary of Impacts*

Projects proposed on KTA, including the new CACTF, a tactical vehicle wash facility, and antenna support structures, are generally screened by higher terrain or heavy vegetative cover. SBCT-related activities would not require significant changes in landform and vegetative cover. Taking into account the existing conditions at proposed SBCT-related project sites and the distance to off-post viewing areas, no significant impacts to visual resources would be associated with the Proposed Action on KTA. Potential impacts to visual resources are summarized in Table 7-9.

**Table 7-9**
**Summary of Potential Visual Resources Impacts at KTA/KLOA**

| Impact Issues | Proposed Action | | Reduced Land Acquisition | | No Action | |
|---|---|---|---|---|---|---|
| | KTA | KOLA | KTA | KOLA | KTA | KOLA |
| Impairment of view during the construction phase | ⊙ | ○ | ⊙ | ○ | ○ | ○ |
| Modification of existing view | ⊙ | ⊙ | ⊙ | ⊙ | ○ | ○ |
| Alteration of the landscape character | ⊙ | ⊙ | ⊙ | ⊙ | ○ | ○ |
| Consistency with visual resource policies | ⊙ | ⊙ | ⊙ | ⊙ | ○ | ○ |
| Impairment of view from visible fugitive dust | ⊙ | ○ | ⊙ | ○ | ○ | ○ |
| Alteration nighttime light and glare | ⊙ | ○ | ⊙ | ○ | ○ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⦸ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact
N/A = Not applicable

#### *Proposed Action (Preferred Alternative)*

*Less than Significant Impacts*

*Modification of the existing view.* SBCT-related construction on KTA would be only partially visible along most of the north coastal area due to a bluff just inland of the Kamehameha Highway that obstructs views. Terrain to the northeast of KTA is slightly more open and permits partial views of KTA. The proposed FTI antenna on KTA would be visible but at such a distance from any sensitive view points that it would not be distinguishable. Neither the CACTF at the former Nike site nor the proposed location of the vehicle wash facility would be visible from outside KTA.

The CACTF and the proposed FTI antenna to be constructed at the former Nike Command Site would be visible from outside KTA but views would be partially visible from points along the Kamehameha Highway corridor beginning near Kuilima Point in the west and extending easterly to approximately Makahoa Point. This area includes the Turtle Bay Resort, the town of Kahuku and several beach and recreational areas along the northeast coast. The distance to the Nike Command Site from these points is such that little detail is discernable and views are frequently limited by heavy vegetation. Photo 7-1 depicts the view from Kamehameha Highway at the entrance to the Turtle Bay Resort.

Photo 7-1. View from entrance to Turtle Bay Resort looking south.

The view from this location is partly obstructed by plantings along the roadside, which is typical along much of the route between Haleʻiwa to the west and this location. Although vegetation in the area varies, trees are the predominant vegetation immediately inland of the highway. The coastal bluffs are clearly visible in the middleground of this view. These bluffs are the dominant landform feature and extend along the entire route of the highway, obstructing portions of the inland view. The slopes of the Koʻolau Mountain Range are visible in the background from this viewpoint, although they are at such a distance that little detail is discernable. From this vantage point, the SBCT-related project sites are not visible.

The view along the northeast coastal region is more open, although still partly obstructed by terrain and vegetation. Photo 7-2 depicts the view from Kamehameha Highway at Charlie Road, the primary entrance to KTA. The coastal bluffs are clearly visible in the foreground and middle ground. This view clearly depicts the visual obstruction associated with these landforms. The slopes of the Koʻolau Mountain Range, as seen in the previous Photo 7-1, are not visible from this vantage point. From this vantage point, the SBCT-related project sites are not visible.

Implementing the Proposed Action would result in a change in the type and an increase in the number of vehicles employed by the 2nd Brigade. The Stryker vehicle would allow training units to drive off-road and over steeper terrain than current vehicles. Nevertheless, as described above, terrain and vegetation in the area would obstruct views from off-post of most roads, including Drum Road, used in training or access to KTA. As a result of the terrain and vegetation on and near KTA, SBCT-related training activities, and construction of the tactical vehicle wash and CACTF would not be expected to alter the landscape character or modify any existing views.

Photo 7-2. View from intersection of Kamehameha Highway and Charlie Road (primary entrance to KTA) looking southwest.

None of the SBCT project sites are visible from the Kaunala and Pūpūkea Summit recreational trails, which lie to the south and west in the Kahuku Forest Reserve.

Continued and expanded use of Drum Road would add inconsistent visual elements to the area but this impact would be less than significant due to the intermittent and transient nature of the use, and the fact that most views of Drum Road would be obscured by vegetation and terrain. This impact would also be partially offset by the beneficial impact on views from major highways and other nearby visually sensitive areas, such as coastal parks and beaches, that would occur as a result of the reduction in highly visible military convoys on public roadways.

*Alteration of landscape character*. The Proposed Action on KTA would introduce new structures and additional training maneuvers that would be incompatible with the surrounding natural features. Because these new features would largely be obscured by topography and vegetation and would be at such distances from sensitive viewing locations that visual detail would be lost, these features are not expected to significantly alter the landscape character.

*Impairment of view during the construction phase.* Construction on KTA would not be visible from surrounding sensitive viewing areas.

*Consistency with visual resource policies*. Construction and training on KTA and Drum Road would occur in areas that would not alter views from public roadways or sensitive view areas and would be substantially consistent with the visual preservation objectives stated in the Koʻolau Loa and North Shore sustainable communities plans.

*Impairment of view from visible fugitive dust.* As discussed in Section 7.5, training at KTA would increase fugitive dust in two ways. Fugitive dust $PM_{10}$ emissions from military vehicle use on unpaved roadways and off-road areas would increase. Wind erosion from areas disturbed by vehicle maneuver activity would increase. Also, Section 7.9 discusses soil erosion. Wind would create visible fugitive dust clouds similar to dust generated during agricultural plowing. Because of prevailing winds the visible dust will likely disperse within minutes. Also, the training areas are largely outside the public viewshed. It is assumed the fugitive dust and soil mitigation identified in Sections 7.5 and 7.9 would be implemented to keep soil erosion and compaction to a minimum. As a result, visual impacts would be less than significant with respect to visible fugitive dust.

*Alteration of nighttime light and glare.* Under the Proposed Action, the use of nighttime lighting devices, such as flares, during training might increase slightly. The use of these devices is not expected to increase dramatically because Soldiers would train using night vision goggles. Also, any new lighting will be shielded to minimize glare. Visual impacts would be less than significant with respect to altering nighttime light and glare.

### Reduced Land Acquisition

The impacts associated with the RLA are identical to those described for the Proposed Action.

### No Action Alternative

#### Less than Significant Impacts

The existing baseline for visual resources would continue under No Action. No other significant training, construction, or land use changes are proposed under No Action that would result in any visual resource impacts on KTA.

# 7.4 AIRSPACE

## 7.4.1 Affected Environment

The affected airspace environment is described below in terms of its principal attributes, namely controlled and uncontrolled airspace, special use airspace, military training routes, en route airways, airports and airfields, and air traffic control. Jet routes, all above 18,000 feet (5,486 meters), are well above the activities proposed and are thus not considered as part of the ROI. The maximum height of each individual FTI antenna is 100 feet or the FAA-approved height, whichever is lower. Prior to final design, the Army will coordinate with the FAA to ensure that each antenna does not obstruct air navigation, including approach and departure clearance near any runway or airfield.

### *Controlled and Uncontrolled Airspace*

The airspace in the KTA/KLOA ROI is composed of uncontrolled Class G airspace, from the surface to a ceiling of 1,200 feet (366 meters), and controlled Class E airspace over 1,200 feet (366 meters) above the rest of the ROI, unless the special use airspace, discussed separately below, is activated.

Appendix F provides a full definition of the different classes of airspace and an explanatory diagram.

### *Special Use Airspace*

The A-311 alert area lies above KTA, extending to 500 feet (152 meters) AGL. Its effective altitudes, time of use, and controlling agency are given in Table 7-10. Alert areas are depicted on aeronautical charts to inform nonparticipating pilots of areas that may contain a high volume of pilot training or an unusual type of aerial activity.

**Table 7-10**
**Special Use Airspace in the KTA/KLOA Airspace ROI**

| Number/Name | Effective Altitude (in feet) | Time of Use | Controlling Agency |
|---|---|---|---|
| A-311 | To 500 AGL (to 152 meters AGL) | 0700-2200 | No A/G |

Source: NACO 2002
Notes:
A = Alert area; No A/G = No air to ground communications

### *Military Training Routes*

There are no formal, published military training routes in the KTA/KLOA airspace ROI. The A-311 alert area, which extends beyond the ROI, is used for helicopter training exercises, with an average of 3,500 aircraft movements per month (Ahching 2002a, 2002b).

### *En Route Airways*

No low altitude en route airways enter or transect the ROI. However, general aviation aircraft use the airspace in the ROI. This includes all civil aviations operations other than scheduled air services and unscheduled air transport operations for hire.

### *Airports and Airfields*

There are no airports, airfields, or heliports in the ROI.

### *Air Traffic Control*

Air traffic in the ROI is managed by the Honolulu Control Facility.

## 7.4.2 Environmental Consequences

### *Summary of Impacts*

Table 7-11 summarizes impacts on airspace. Neither the Proposed Action, the Reduced Land Acquisition, nor No Action would have impacts on airspace in the ROI.

**Table 7-11**
**Summary of Potential Airspace Impacts at KTA/KLOA**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Reduction in navigable airspace | ○ | ○ | ○ |
| New or modified special use airspace | ○ | ○ | ○ |
| Change to a military training route | ○ | ○ | ○ |
| Change in en route airways, or IFR procedure | ○ | ○ | ○ |
| Restriction of access to airport/airfield | ○ | ○ | ○ |
| Obstruction to air navigation | ○ | ○ | ○ |
| Aviation Safety | ○ | ○ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⦸ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact
N/A = Not applicable

### *Proposed Action (Preferred Alternative)*

No Impacts

Reduction in Navigable Airspace. There would be no requirement for new or modified special use airspace associated with the Proposed Action or any requirement for the imposition of any flight restrictions, thus no reduction in the ROI's navigable airspace.

New or Modified Special Use Airspace. The proposed UAV flights would normally be conducted within the R-3109 and R-3110 restricted area complex southwest of KTA or within the W-189 warning area off the northern coast of O'ahu; thus, the UAV flights would use existing special use airspace. Although the nature and intensity of utilization varies over time and by individual special use airspace area, the proposed UAV flights represent precisely the kinds of activities that the special use airspace was created for. The UAV flights would not represent an adverse impact on special use airspace and would not conflict with any airspace plans, policies, or controls.

Change to a military training route. There are no published military training routes in the ROI, and no new aircraft activity is proposed at KTA or KLOA. Consequently, no changes to military training routes would result.

Change in en route airways, or IFR procedures. There are no low altitude en route airways in the ROI, and no new aircraft activity is proposed. Consequently, no changes to existing or planned IFR minimum flight altitudes, published or special instrument procedures, or IFR departure procedures would be required, and VFR operations would not be required to change from a regular flight course or altitude.

Restriction of access to airports/airfields. With no new aircraft activity associated with the Proposed Action, access to, or the use of, airports/airfields available for public use would not be affected, and commercial or private airport/airfield arrival and departure traffic flows would not be affected.

Obstruction to air navigation. Construction of two 100-foot (31-meter) FTI antenna on KTA would be well below the 500-foot (152-meter) above ground level threshold for an obstruction to air navigation specified by the FAA (FAA 2001); thus, this would not constitute an obstruction to air navigation.

Aviation safety. With no new aircraft activity proposed, no new aviation safety issues, and no adverse impacts on public health and safety are anticipated. The strict procedures and rules in place governing flight operations in both controlled/uncontrolled navigable airspace and special use airspace, coupled with the Army's excellent aviation safety record in Hawai'i make future adverse impacts on public health and safety extremely unlikely.

For those UAV flights that could not be contained wholly within restricted area or warning areas, their operations would be conducted in accordance with well-defined FAA procedures for remotely operated aircraft. At least 60 days before UAV operations, the FAA regional office in Honolulu would have to approve the UAV flights, which would be contingent on the Army demonstrating that the flights would be as safe as those for manned aircraft. Methods include radar observation, forward or side-looking cameras, electronic detection systems, observation from one or more ground sites, or a combination thereof (FAA 2001). In addition, coordination, communications, route and altitude procedures, and lost link/mission abort procedures would all have to be identified. Authorized UAV flights and the other proposed training activities at KTA would have no adverse impact to aviation safety and thus public health and safety.

### *Reduced Land Acquisition Alternative*

The impacts associated with Reduced Land Acquisition would be identical to those described for the Proposed Action.

### *No Action Alternative*

*No Impacts*

The existing baseline for airspace would continue under the No Action Alternative. Continued support for status quo current force training at KTA would have no impacts on navigable controlled/uncontrolled airspace, special use airspace, military training routes, en route airways, or airports/airfields, nor would it create obstructions to air navigation in the airspace ROI. Thus, there would be no impacts on airspace because none of the factors considered in determining impacts apply.

## 7.5 AIR QUALITY

### 7.5.1 Affected Environment

There are no air quality monitoring stations close to KTA or KLOA. The closest air quality monitoring stations are on the south side of O'ahu. Vehicle traffic, aircraft flight operations (mostly helicopters), and training munitions represent the majority of Army emission sources that are present intermittently at KTA and KLOA. Vehicle operations at KLOA are very limited and consist primarily of vehicle traffic between Schofield Barracks and KTA or KLOA. Most training at KLOA involves dismounted troop maneuvers and helicopter activity.

The Army has a remote weather station at KTA. Data from that station are used primarily in a real-time context for fire management. Consequently, comprehensive data summaries are not available. Two years of data from the KTA station show an average hourly wind speed of 13.7 mph (22 kmph) and a maximum hourly average wind speed of 34 mph (15.2 kmph). Hourly average wind speeds exceeded 9.9 mph (15.9 kmph) 75 percent of the time. Hourly average wind speeds at KTA exceeded the 15 mph (24 kph) threshold commonly associated with wind erosion processes about 40 percent of the time.

### 7.5.2 Environmental Consequences

***Summary of Impacts***

Two significant but mitigable air quality impacts have been identified at KTA under the Proposed Action or the RLA Alternative. Fugitive dust $PM_{10}$ emissions from military vehicle use on unpaved roadways and off-road areas would increase by 315 tons (286 metric tons) per year compared to No Action conditions. Visible dust is a clear indication of airborne $PM_{10}$ concentrations that are typically in the range of several thousand micrograms per cubic meter. It takes only a few hours of such concentrations to produce a 24-hour average that exceeds the state and federal 24-hour average $PM_{10}$ standard of 150 micrograms per cubic meter. $PM_{10}$ represents the size fractions of suspended particulate matter that are likely to penetrate into the lower respiratory tract, creating potential adverse health effects. The substantial increase in fugitive $PM_{10}$ emissions from military vehicle use at KTA, the potential for exceeding the federal 24-hour $PM_{10}$ standard, and the potential impacts to quality of life quality of life for those using recreational facilities in the KTA vicinity result in a significant air quality impact at KTA under the Proposed Action and the RLA. The impact from fugitive dust emissions would be reduced to a less than significant level through mitigation programs that include the use of washed gravel on military vehicle trails; periodic application of dust control chemicals; monitoring of ambient PM10 concentrations; and/or development of an adaptive management program to manage training area lands and modify training procedures as necessary to ensure compliance with federal air quality standards.

Wind erosion from areas disturbed by vehicle maneuver activity would increase by about 163 tons (148 metric tons) per year compared to No Action. The substantial increase in fugitive PM10 emissions from wind erosion at KTA, the potential for exceeding the federal 24-hour $PM_{10}$ standard, and the potential impacts to quality of life quality of life for those using recreational facilities in the KTA vicinity result in a significant but mitigable to less than significant air quality impact at KTA under the Proposed Action and the RLA. The air quality impact from wind erosion at KTA would be reduced by management actions that help to maintain a high level of vegetation cover. In addition, the procedures used for estimating potential wind erosion may not adequately account for the persistence of high soil moisture conditions at KTA. High soil moisture conditions effectively eliminate wind erosion even if vegetation cover is substantially reduced on vehicle maneuver areas. The limited and somewhat scattered acreage at KTA subject to vehicle maneuver activity further reduces the potential magnitude of dust concentrations generated by wind erosion. Consequently, actual wind erosion problems at KTA are expected to be limited and should be amenable to control by management activities included in the DuSMMoP and ITAM programs.

Construction associated with KTA under the Proposed Action or Reduced Land Acquisition would include two FTI antennas, a tactical vehicle wash, and the CACTF. Maximum annual emissions from construction would create too small a net increase in ozone precursor emissions to have a measurable effect on ozone levels and would not affect the attainment status of the area. Nitrogen oxide emissions from construction equipment would be 21.5 tons (19.6 metric tons) in 2005, and less than 12 tons (11 metric tons) per year for the remainder of the construction period (through 2008). Nitrogen oxide emissions are of concern primarily as an ozone precursor. Emissions of ozone precursors from construction activities associated with the Proposed Action or the RLA Alternative would be too small to have a measurable effect on ozone levels, and would not change the attainment status of the area.

Ordnance use at KTA would decrease under the Proposed Action or Reduced Land Acquisition. Most ordnance would be blank ammunition or SRTA, with some smoke devices, flares, and simulators used at KTA. Because emission quantities from ordnance use are very small and include only trace quantities of hazardous components, no significant air quality impacts would occur and the attainment status of the area would not change.

SBCT transformation would add the Stryker armored vehicle to the tactical and support vehicle inventory used at KTA. As a result, vehicle use and resulting vehicle engine emissions would increase at KTA under the Proposed Action or Reduced Land Acquisition. The net increase in military vehicle engine emissions would be 1.3 tons (1.2 metric tons) per year for reactive organic compounds, 12.4 tons (11.3 metric tons) per year for nitrogen oxides, 3.9 tons (3.5 metric tons) per year for carbon monoxide, 0.14 ton (0.13 metric ton) per year for sulfur oxides, and 1.1 tons (1 metric ton) per year for $PM_{10}$. These increases in military vehicle engine emissions would be too small to have meaningful effects on ambient air quality conditions or to affect the attainment status of the project area. Consequently, the increase in military vehicle engine emissions would have a less than significant impact on air quality.

The addition of UAV flight operations at KTA and KLOA under the Proposed Action or the RLA Alternative would result in a less than significant increase in overall aircraft emissions associated with use of these areas.

There would be a slight increase in the risk of wildfires at KTA under the Proposed Action or the RLA Alternative, but emissions associated with wildfires at KTA would remain a less than significant impact. No personnel are based at KTA or KLOA, so there would be no air quality impacts at KTA or KLOA from changes in personnel numbers under the Proposed Action or the RLA Alternative.

Table 7-12 summarizes the significance of air quality impacts at KTA and KLOA under the Proposed Action, RLA, and No Action.

**Table 7-12**
**Summary of Potential Air Quality Impacts at KTA/KLOA**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Emissions from construction activities | ⊙ | ⊙ | ○ |
| Emissions from ordnance use | ⊙ | ⊙ | ⊙ |
| Engine emissions from military vehicle use | ⊙ | ⊙ | ⊙ |
| Fugitive dust from military vehicle use | ⦸ | ⦸ | ⊙ |
| Wind erosion from areas disturbed by military vehicle use | ⦸ | ⦸ | ⊙ |
| Emissions from increased aircraft operations | ⊙ | ⊙ | ⊙ |
| Emissions from wildfires | ⊙ | ⊙ | ⊙ |
| Other emissions from personnel increases | ○ | ○ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | | | |
|---|---|---|---|---|---|
| ⊗ | = | Significant | ○ | = | No impact |
| ⦸ | = | Significant but mitigable to less than significant | + | = | Beneficial impact |
| ⊙ | = | Less than significant | N/A | = | Not applicable |

### *Proposed Action*

#### *Significant Impacts Mitigable to Less Than Significant*

*Impact 1: Fugitive dust from military vehicle use.* As many as 216 vehicles would travel along Helemanō Trail and Drum Road for a single exercise at KTA. Most vehicles probably would not travel to KTA and return to SBMR on the same day. For modeling purposes, the Army used a conservative estimate of 300 vehicles per day. Resulting $PM_{10}$ emissions would be approximately 476 tons (432 metric tons) per year, an increase of about 315 tons (286 metric tons) per year compared to No Action conditions.

Approximately 20 percent of the net increase in fugitive $PM_{10}$ emissions would be associated with vehicle travel on unpaved roads, while the remaining 80 percent represents potential emissions from off-road vehicle maneuver activity.

As discussed in Section 4.5, dispersion modeling analyses have been performed to better evaluate the potential for violating the federal $PM_{10}$ standard due to fugitive dust emissions associated with military vehicle use. Modeling results for vehicle convoys along the Helemanō Trail were presented in Figure 5-11. Most vehicles on the Helemanō Trail would continue along Drum Road to KLOA and KTA. If road surfaces are dry and winds are light, even relatively modest numbers of vehicles can create sufficient dust to cause downwind $PM_{10}$ concentrations of more than 150 micrograms per cubic meter. In the absence of any dust control measures, daily traffic volumes of about 100 vehicles per day have the potential for causing $PM_{10}$ problems at locations within 2,000 feet (610 meters) of the roadway. Lower daily traffic volumes could cause $PM_{10}$ problems over shorter distances, and higher daily traffic volumes could cause $PM_{10}$ problems over larger distances.

Potential $PM_{10}$ problems from vehicle traffic on Helemanō Trail and Drum Road can be reduced substantially by a combination of feasible mitigation measures, including the use of washed gravel for surfacing military vehicle trails and/or implementing a dust management program that may include road paving or periodic application of chemical dust suppressants. Alternative dust control compounds include environmentally friendly hygroscopic salts (such as calcium chloride or magnesium chloride solutions) and synthetic polymer compounds (such as polyvinyl acetate or vinyl acrylic). If properly applied, dust control measures for unpaved roads would be expected to achieve at least 90 percent control of fugitive dust under the weather conditions and roadway use levels prevalent at USARHAW installations.

Fugitive dust generated by military vehicle maneuver traffic inside KTA poses the greatest potential for creating either nuisance conditions at nearby off-post locations or localized violations of the state or federal 24-hour average $PM_{10}$ standards. $PM_{10}$ represents the size fractions of suspended particulate matter that are likely to penetrate into the lower respiratory tract, creating potential adverse health effects.

KTA provides only limited areas suitable for off-road vehicle maneuver training. As indicated in Figure 2-5, available vehicle maneuver areas occur as multiple noncontiguous parcels. Most of the parcels suitable for vehicle maneuver exercises are along the northern and northeastern sides of KTA. In addition to small unit exercises, both company level and battalion level exercises are held at KTA. Modeling results for a company level exercise are presented in Figure 7-9, and modeling results for a battalion level exercise are presented in Figure 7-10. Small unit maneuvers are not expected to involve sufficient vehicle activity to create off-post $PM_{10}$ problems.

As was the case for the military vehicle trail modeling, the modeling analysis for vehicle maneuver exercises assumes that ground surface conditions are dry. In reality, ground surface conditions are likely to have sufficient moisture to substantially reduce fugitive dust emissions. As indicated in Figure 7-9, high $PM_{10}$ concentrations from a company level exercise would be limited to on-post locations even if such an exercise was conducted when ground surface conditions were dry. Battalion level exercises, on the other hand, have the potential for creating $PM_{10}$ concentrations that would exceed the level of the state and federal $PM_{10}$ standards at off-post locations (see Figure 7-10). However, high $PM_{10}$ concentrations from battalion level exercises would only occur if the ground surface is dry.

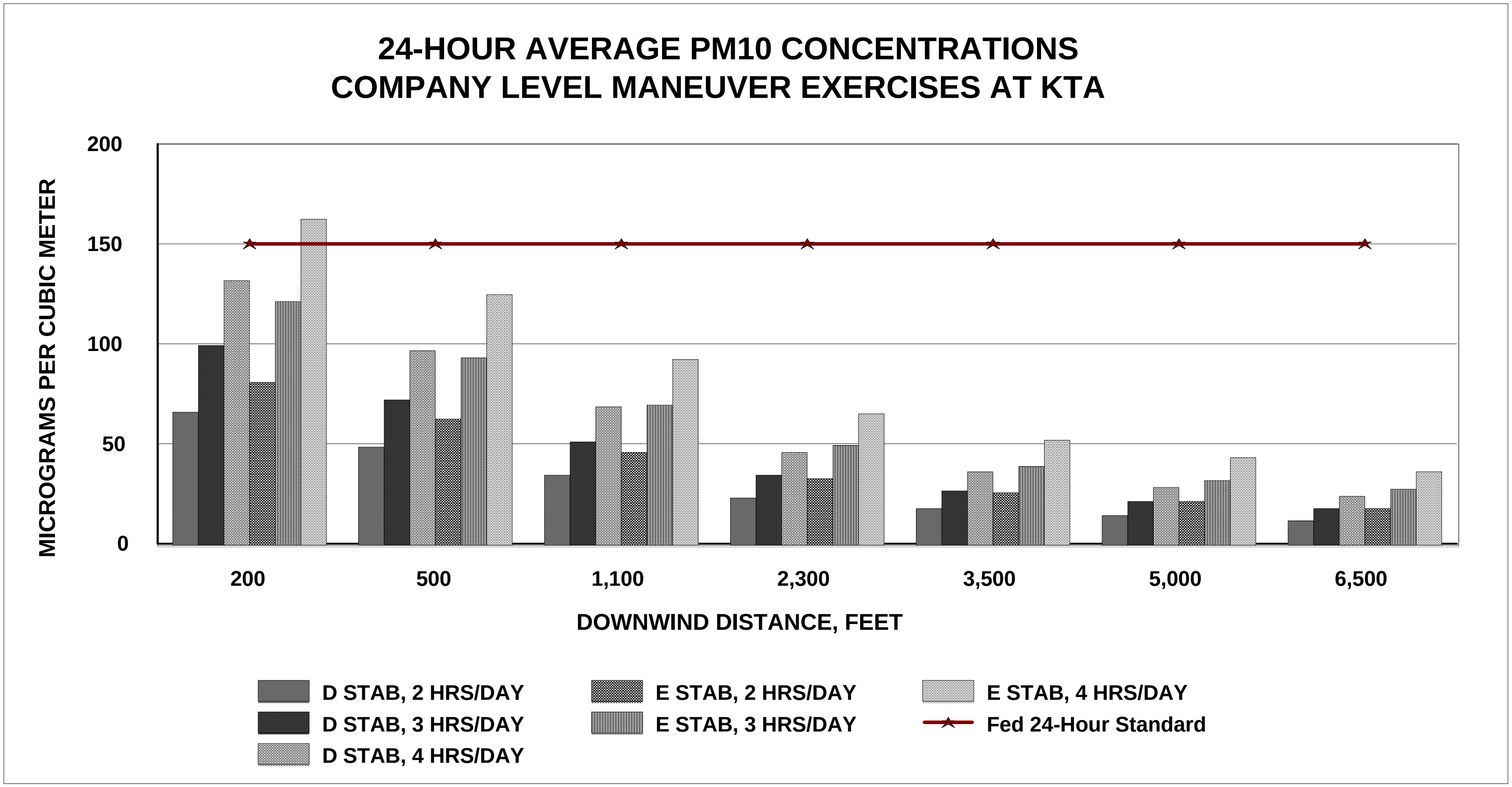



Chart shows potential $PM_{10}$ concentrations under two atmospheric stability conditions (neutral D stability and mild inversion E stability) and varied durations of vehicle maneuver activity during one or two company level exercise events in a single calendar day.

Figure 7-9. Potential $PM_{10}$ Concentrations Downwind of Company Level Vehicle Maneuver Exercise Activity at KTA

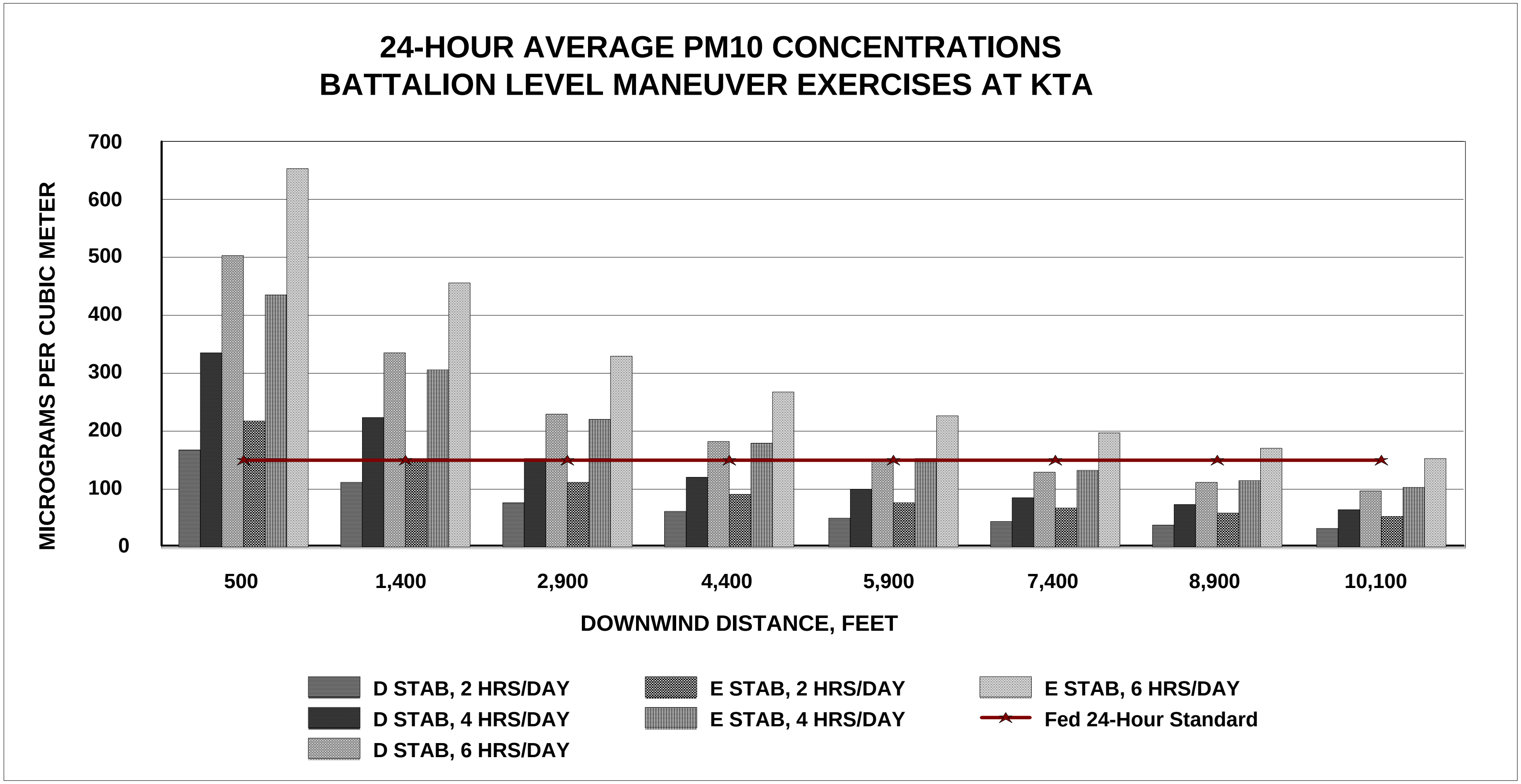



Chart shows potential $PM_{10}$ concentrations under two atmospheric stability conditions (neutral D stability and mild inversion E stability) and varied durations of vehicle maneuver activity during one or two battalion level exercise events in a single calendar day.

Figure 7-10. Potential $PM_{10}$ Concentrations Downwind of Battalion Level Vehicle Maneuver Exercise Activity at KTA

The impact of fugitive dust emissions from vehicle maneuver exercises would be reduced to a less than significant level through an Army commitment to an adaptive management program that adjusts the size and design of vehicle maneuver training events at KTA according to prevailing soil moisture conditions. The Proposed Action would have a significant but mitigable to less than significant impact from fugitive dust on air quality.

*Regulatory and Administrative Mitigation 1.* The Army will develop and implement a DuSMMoP for the training area, which will address measures such as, but not limited to, restrictions on the timing or type of training during high risk conditions, vegetation monitoring, dust monitoring, soil monitoring, and buffer zones to minimize dust emissions in populated areas. The Army will use the plan to determine how training will occur in order to keep fugitive dust emissions below CAA standards for $PM_{10}$ and soil erosion and compaction to a minimum. The Army will monitor the impacts of training activities to ensure that emissions stay within the acceptable ranges as predicted and environmental problems do not result from excessive soil erosion or compaction. The plan will also define contingency measures to mitigate the impacts of training activities that exceed the acceptable ranges for dust emissions or soil compaction.

The Army will continue to implement land restoration measures identified in the INRMP. Mitigation measures include, but are not limited to, implementation of the ITAM program to identify and inventory land condition using a GIS database; coordination between training planners and natural resource managers; implementation of land rehabilitation measures identified in the INRMP; monitoring of the effectiveness of the land rehabilitation measures; evaluation of erosion modeling data to identify areas in need of improved management; and implementation of education and outreach programs to increase user awareness of the value of good land stewardship.

To reduce fugitive dust associated with the use of military vehicle trails, the Army will implement dust control measures such as dust control chemical applications, the use of washed gravel for surfacing, spraying water, or paving sections of trails. The extent of gravel washing would have to balance dust reduction goals with engineering requirements for achieving a stable roadway surface. Selection of the appropriate dust control products would be based on testing alternative products on dirt and gravel road segments. Based on general characteristics and performance elsewhere, environmentally friendly synthetic polymers (such as polyvinyl acetate and vinyl acrylic) and hygroscopic salt solutions (such as calcium chloride or magnesium chloride) appear to be the most promising groups of dust control agents. The Army will monitor road surface conditions and will apply palliatives as necessary. If moisture levels are adequate to suppress dust, then application of dust palliatives would not be necessary. To the extent possible, the Army would plan dust suppressant applications to be scheduled to immediately precede periods of significant convoy traffic.

*Impact 2: Wind erosion from areas disturbed by military vehicle use.* Off-road vehicle activity can reduce or eliminate vegetation cover in affected areas, resulting in increased susceptibility to wind erosion. The amount of off-road vehicle activity at KTA would increase by 89 percent under the Proposed Action. This increase in off-road vehicle activity would reduce vegetation cover in the affected maneuver areas. An estimated 257 tons (233 metric tons) per year of $PM_{10}$ would be generated by wind erosion from the affected areas. This would represent a net increase of about 163 tons (148 metric tons) per year compared to No Action.

As discussed for PTA in Section 8.5, dispersion modeling results for a 10,000-acre (4,047-hectare) area have been used to assess the extent to which high $PM_{10}$ concentrations might be generated by wind erosion. $PM_{10}$ emission rates from wind erosion are significantly higher at WPAA than at KTA due to differences in soil types, rainfall frequency, and soil moisture levels during dry periods. In addition, only about 620 acres (251 hectares) of land in several scattered parcels are available for off-road vehicle maneuver activity at KTA, while extensive contiguous acreage is available for vehicle maneuver activity at PTA. Thus, the analysis performed for PTA provides a very conservative indicator of potential wind erosion problems at KTA. When the differences in emission rates for wind erosion are taken into consideration, the analysis performed for PTA indicate that wind erosion at KTA is unlikely to generate $PM_{10}$ levels at off-post locations that would exceed state and federal air quality standards. The Army's DuSMMoP would help mitigate potential wind erosion problems by providing a management tool that would help limit damage to vegetation from off-road vehicle maneuver activity. Thus, wind erosion from the KTA is considered a significant but mitigable to less than significant air quality impact.

*Regulatory and Administrative Mitigation 2.* The Army will implement mitigation measures as described in Regulatory and Administrative Mitigation 1.

### *Less than Significant Impacts*

*Emissions from construction activities.* The Proposed Action would include three construction projects at KTA occurring from 2005 into 2008. Construction projects would include a CACTF, a tactical vehicle wash facility, and two FTI towers. Figure 7-11 summarizes estimated emissions from the three construction projects according to current construction schedules. Nitrogen oxide emissions from construction equipment would be 21.5 tons (19.6 metric tons) in 2005, and less than 12 tons (11 metric tons) per year for the remainder of the construction period (through 2008). Nitrogen oxide emissions are of concern primarily as an ozone precursor. Emissions of ozone precursors from construction activities associated with the Proposed Action would be too small to have a measurable effect on ozone levels, and would not change the attainment status of the area. Construction contractors will comply with the provisions of Hawai'i Administrative Rules, Sec. 11-60.1-33, on Fugitive Dust as part of the requirements of construction contracts. Consequently, construction activities at KTA would have a less than significant air quality impact under the Proposed Action.

*Emissions from ordnance use.* Use of the CACTF at KTA would involve SRTA in addition to blank ammunition. Some pyrotechnic devices also would be used at KTA. Only blank ammunition would be used at KLOA. Due to changes in the nature of training activities, the annual quantity of ammunition used at KTA and KLOA would decrease by about 34 percent under the Proposed Action, compared to No Action. Emissions from ordnance use have not been quantified, but, as discussed for SBMR in Chapter 5, Section 5.5.2, pollutant emission quantities from ordnance use are small. Based on the general nature of detonation

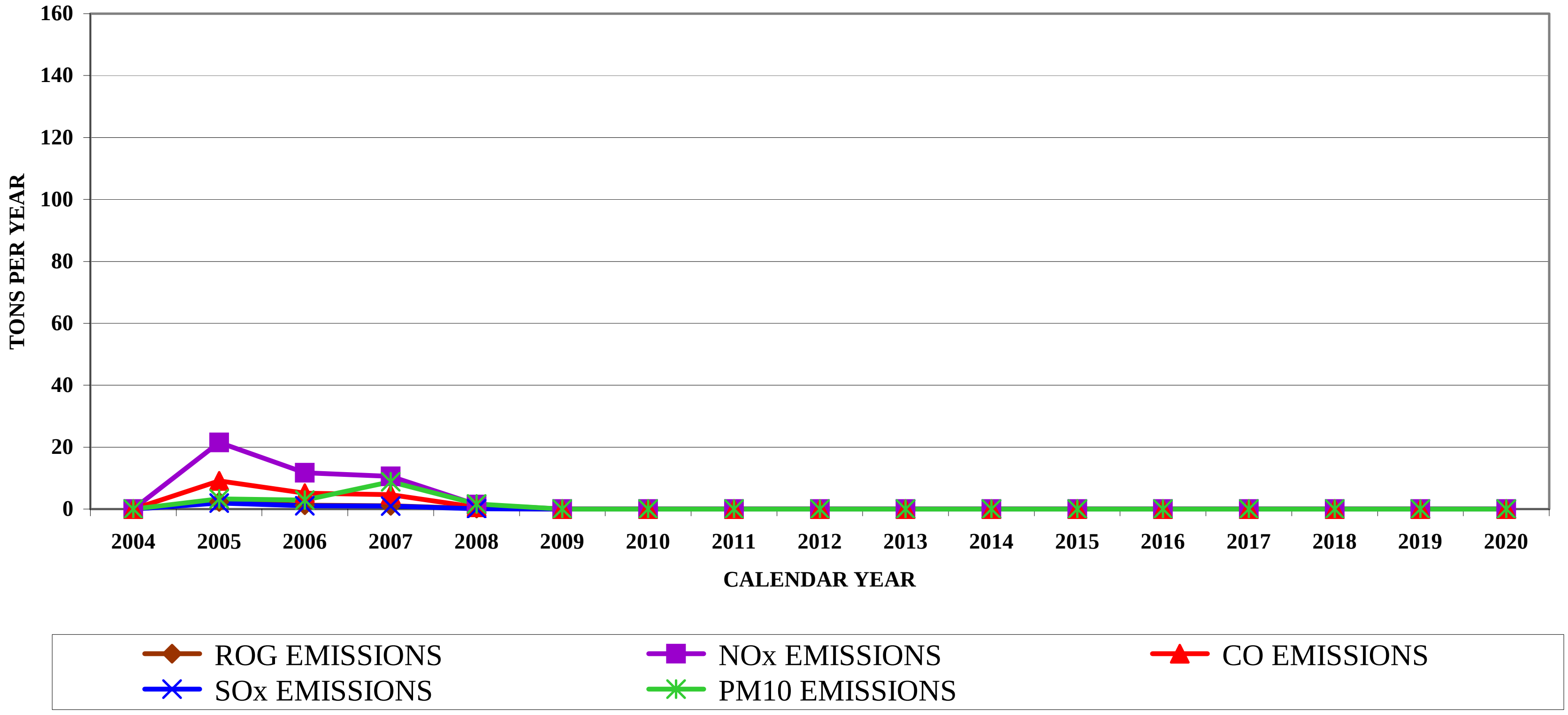



Figure 7-11 Annual Construction Emissions at Kahuku Training Area

processes and the very low emission rates that have been published in studies of munitions firing and open detonations, emissions associated with ordnance use at KTA and KLOA pose very little risk of creating adverse air quality impacts. Consequently, air quality impacts from munitions use under the Proposed Action are considered less than significant.

*Engine emissions from military vehicle use.* Military vehicle use at KTA and KLOA would result in as many as 241 vehicles participating in a single exercise. The change in overall vehicle use would represent a 77 percent increase in VMT and an 80 percent increase in vehicle operating hours, compared to No Action. Annual military vehicle emissions would increase by 145 percent compared to No Action conditions. Figure 7-12 summarizes the estimated net increase in annual engine emissions from military vehicle use at KTA and KLOA under the Proposed Action. The net increase in military vehicle engine emissions would be 1.3 tons (1.2 metric tons) per year for reactive organic compounds, 12.4 tons (11.3 metric tons) per year for nitrogen oxides, 3.9 tons (3.5 metric tons) per year for carbon monoxide, 0.14 ton (0.13 metric ton) per year for sulfur oxides, and 1.1 tons (1 metric ton) per year for $PM_{10}$. The net increase in military vehicle engine emissions would be too small to have meaningful effects on ambient air quality conditions or to affect the attainment status of the project area. Consequently, emissions from military vehicle use at KTA and KLOA would be a less than significant impact under the Proposed Action.

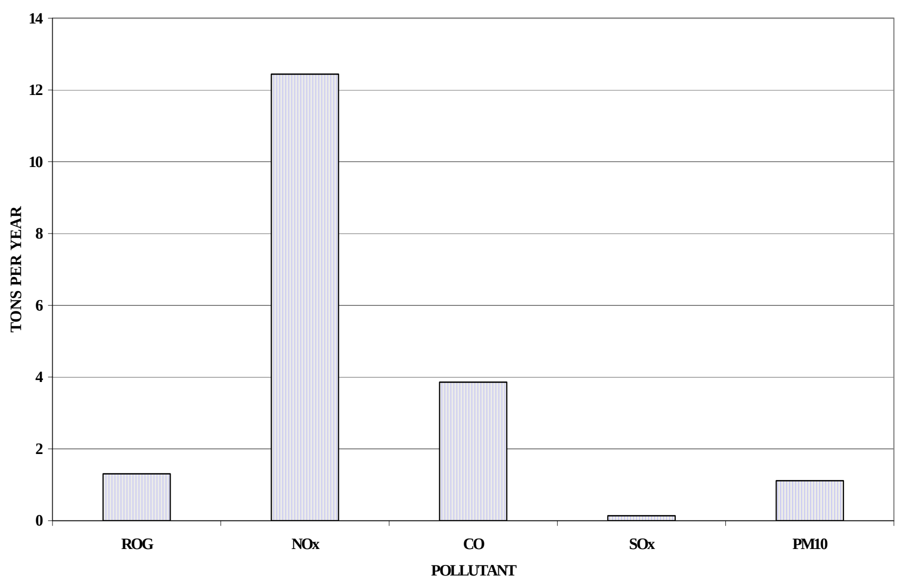



Figure 7-12. Net Change in Military Vehicle Emissions for the Proposed Action: Kahuku Training Area

*Emissions from increased aircraft operations.* The Proposed Action would not result in any major change to Army helicopter flight operations in Hawai‘i. Some UAV flight activity could be based at KTA, but the total flight time would be relatively low. The net increase in emissions resulting from UAV flight activity would be too small to have a meaningful effect on ambient air quality conditions. Consequently, the increase in aircraft emissions at KTA and KLOA under the Proposed Action would be a less than significant impact.

*Emissions from wildfires.* The Proposed Action would include the use of SRTA at KTA, which might create a slightly increased risk of wildfires. However, overall ordnance use at KTA and KLOA would decrease by 34 percent compared to No Action. Consequently, there would be little change in the overall risk of wildfires. Because the overall frequency and size of wildfires at KTA and KLOA is not expected to change substantially from present conditions, emissions from wildfires would be a less than significant impact under the Proposed Action.

*No Impact*

*Other emissions from personnel increases.* No Army personnel are based at KTA or KLOA, and the installations do not have any stationary emission sources, so the Proposed Action would not result in any emissions from personal vehicle use or any increase in emissions from fixed facilities at KTA.

### Reduced Land Acquisition

Air quality impacts and mitigations at KTA under the RLA Alternative would be the same as under the Proposed Action.

### No Action

*Less than Significant Impacts*

*Emissions from ordnance use.* Overall ordnance use under No Action would be 52 percent greater than under the Proposed Action or the RLA Alternative. Based on the general nature of detonation processes and the very low emission rates that have been published in studies of munitions firing and open detonations, emissions associated with training ordnance use at KTA and KLOA pose very little risk of creating adverse air quality impact; consequently, air quality impacts from continued Legacy Force munitions use under No Action is considered less than significant.

*Engine emissions from military vehicle use.* Vehicle use associated with KTA and KLOA would remain at present levels under No Action. Estimated annual emissions from vehicle engine operations would be approximately the following:

- 0.9 ton (0.8 metric ton) of reactive organic compounds;
- 8.6 tons (7.8 metric tons) of nitrogen oxides;
- 2.7 tons (2.4 metric tons) of carbon monoxide;
- 0.1 ton (0.09 metric ton) of sulfur oxides; and
- 0.8 ton (0.7 metric ton) of $PM_{10}$.

The amount of military vehicle engine emissions would be too small to have meaningful effects on ambient air quality conditions. Consequently, military vehicle engine emissions would have a less than significant impact under No Action.

*Fugitive dust from military vehicle use.* Vehicle numbers and estimated annual use levels would remain at current conditions under No Action. Fugitive dust $PM_{10}$ emissions from military vehicle use at KTA and KLOA would remain at the current level of about 161 tons (146 metric tons) per year. Because existing conditions at KTA and KLOA have not led to any known violations of state or federal ambient air quality standards, the fugitive dust from military vehicle use at KTA and KLOA would have a less than significant impact under No Action.

*Wind erosion from areas disturbed by military vehicle use.* Vehicle maneuver activity at KTA would remain the same as current conditions under No Action. An estimated 93 tons (84 metric tons) per year of $PM_{10}$ would be generated by wind erosion from the affected areas. Wind erosion from disturbed areas would be too small to have a meaningful effect on ambient air quality conditions, and therefore would be a less than significant impact under No Action.

*Emissions from increased aircraft operations.* There would be no change in aircraft operations and no increase in aircraft emissions at KTA and KLOA under No Action. Because there would be no change from current conditions and because current conditions have not been known to violate any state or federal ambient air quality standards, emissions from aircraft operations under No Action would have a less than significant impact on air quality.

*Emissions from wildfires.* The risk of wildfires at KTA and KLOA would remain the same as that for current conditions under No Action. Because the frequency and size of wildfires at KTA and KLOA is not expected to change, emissions from wildfires would be a less than significant impact under No Action.

#### *No Impact*

*Emissions from construction activities.* No construction projects are associated with No Action, so there would be no air quality impact from construction under No Action.

*Other emissions from personnel increases.* There are no personnel based at either KTA or KLOA, so No Action would not result in any emissions from added personal vehicle use or any increase in emissions from fixed facilities.

# 7.6 NOISE

## 7.6.1 Affected Environment

No noise monitoring data are available for KTA or KLOA, where the dominant noise sources are military aircraft (mostly helicopters), military vehicle traffic, and training ammunition used during Army exercises. Ordnance use at KTA is primarily blank ammunition, other training ammunition, and some pyrotechnic devices. KTA and KLOA are heavily used for helicopter training.

## 7.6.2 Environmental Consequences

### *Summary of Impacts*

Noise sources associated with project alternatives at KTA and KLOA include construction activity, ordnance use, military vehicle traffic, and military aircraft operations. Noise impacts from these sources would be less than significant under all project alternatives.

Construction projects at KTA and KLOA would be far enough from noise-sensitive areas to avoid significant noise impacts under both the Proposed Action and the RLA Alternative. There would be no construction noise impacts under No Action. The use of blank ammunition and SRTA would continue at KTA under all alternatives. The quantity of training ammunition used at KTA would decrease by about 34 percent under the Proposed Action or the RLA Alternative. Noise-sensitive land uses are far enough from KTA so that noise from use of blank ammunition would be a less than significant impact under all alternatives. Training activities at KTA could employ up to 241 vehicles at a time under the Proposed Action or the RLA Alternative, with up to 173 of those vehicles using Helemanō Trail and Drum Road to reach KTA. Resulting hourly average traffic noise levels along Drum Road would have less than significant impacts under all alternatives. Similarly, noise from vehicle maneuver activity at KTA would be a less than significant impact under all alternatives. Extensive helicopter flight operations would continue at KTA and KLOA under all alternatives. UAV flight operations also would occur at KTA and KLOA under the Proposed Action and the RLA Alternative. Noise generated by the added UAV flight activity would be a less than significant impact under the Proposed Action and the RLA Alternative.

Table 7-13 summarizes the significance of noise impacts under the Proposed Action, RLA, and No Action.

### *Proposed Action*

#### Less than Significant Impacts

*Noise from construction activities.* Three construction projects would be associated with KTA: two FTI antennas, a tactical vehicle wash facility, and a CACTF. Construction activities would occur from 2005 through early 2008. Individual pieces of construction equipment typically generate noise levels of from 80 to 90 dBA at a distance of 50 feet (15 meters). With multiple pieces of equipment operating concurrently, noise levels can be relatively high

**Table 7-13**
**Summary of Potential Noise Impacts at KTA/KLOA**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Noise from construction activities | ⊙ | ⊙ | ○ |
| Noise from ordnance use | ⊙ | ⊙ | ⊙ |
| Noise from military vehicle use | ⊙ | ⊙ | ⊙ |
| Noise from aircraft operations | ⊙ | ⊙ | ⊙ |
| Noise from added personnel vehicle traffic | ○ | ○ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | | | |
|---|---|---|---|---|---|
| ⊗ | = | Significant | + | = | Beneficial impact |
| ⃠ | = | Significant but mitigable to less than significant | N/A | = | Not applicable |
| ⊙ | = | Less than significant | | | |
| ○ | = | No impact | | | |

daytime at locations within several hundred feet of active construction sites. The zone of relatively high construction noise levels typically extends to distances of 400 to 800 feet (122 to 244 meters) from the site of major equipment operations. Locations more than 1,000 feet (305 meters) from construction sites seldom experience significant levels of construction noise.

Table 7-14 summarizes the estimated minimum distance between the sites for proposed construction projects and the nearest noise-sensitive land uses.

**Table 7-14**
**Estimated Minimum Distance Between Construction Sites and Noise-Sensitive Land Uses**

| Proposed Project | Distance to Closest Noise-Sensitive Receptor | Noise-Sensitive Land Use Type |
|---|---|---|
| S7. FTI | Not evaluated | Construction activities too limited to create noise issues |
| K1. Tactical Vehicle Wash | 9,504 feet | Residential; hospital (Kahuku) |
| K2. CACTF | 6,336 feet | Residential; hospital (Kahuku) |

Source: Tetra Tech staff analyses.

Construction of the FTI antennas would require minimal equipment and site preparation, so there would be minimal noise associated with construction of the FTI towers. Most construction noise would be associated with construction of the CACTF and the tactical vehicle wash. Construction activities would generate average daytime noise levels of about 90 dBA at a distance of 50 feet (15 meters) from the construction activity and about 70 dBA at a distance of 500 feet (152 meters). Average daytime noise levels would be less than 65 dBA at distances of 700 feet (213 meters) or more. The Ldn increment generated by construction activities would drop below 65 dBA at distances of 550 feet (168 meters) or more. No nighttime construction activity is expected. Because the nearest noise-sensitive developments are more than a mile from the construction sites, construction noise would be a less than significant impact.

*Noise from ordnance use.* Blank ammunition, SRTA, and various pyrotechnic devices are the only types of ordnance items that would be used at KTA. Only blank ammunition is used at KLOA. Small arms firing with SRTA or blank ammunition can produce relatively high peak noise levels at distances of up to 3,000 feet (915 meters) and might remain audible at distances of up to 1.5 miles (2.4 kilometers). The 1/8 second Lmax noise level from SRTA and blank ammunition is typically about 71 to 79 dBA at 2,000 feet (610 meters) and 50 to 58 dBA at 1 mile (1.6 kilometers). Noise levels from firing SRTA and blank small arms ammunition typically drops below levels that cause significant annoyance at distances of 2,500 to 3,000 feet (760 to 915 meters). The closest residential areas are about 1 mile (1.6 kilometers) from the areas where training ammunition would be used at KTA. Consequently, noise impacts from ordnance use at KTA would be less than significant under the Proposed Action.

*Noise from military vehicle use.* Most military vehicle travel to and from KTA and KLOA would occur on the Helemanō Trail and Drum Road. In addition, vehicle maneuver activity would occur at KTA. Estimated peak pass-by noise levels and average traffic noise levels for military vehicles were discussed in Chapter 5, Section 5.6.2. During an individual training activity at KTA and KLOA, up to 241 vehicles are expected to be operating at any one time, with up to 216 vehicles using Helemanō Trail and Drum Road to reach KTA. For the maximum number of vehicles, resulting hourly average traffic noise levels along Helemanō Trail and Drum Road would be about 72 dBA at a distance of 50 feet (15 meters) from the vehicle trail and about 64 dBA at 200 feet (61 meters) from the vehicle trail. Vehicle activity within KTA and KLOA would produce comparably low noise levels, so noise from military vehicle use at KTA and KLOA would be a less than significant impact under the Proposed Action.

*Noise from aircraft operations.* The Proposed Action would not result in any meaningful changes in helicopter or fixed-wing aircraft flight operations at KTA or KLOA. The only added military flight activity would involve UAV flight operations. The Shadow 200 UAV produces a noise level of 85 dBA at a distance of about 70 feet (21 meters) when the engine is at an idle power setting, and a noise level of 85 dBA at a distance of about 342 feet when the engine is at a high power setting (US Army 2001a). In most cases, the UAV is expected to operate at relatively high altitudes to avoid conflict with other helicopter and aircraft flight activity. As noted in Chapter 5, Section 5.6.2, the addition of UAV flight activity to current patterns of aircraft and helicopter flight activity would not result in any noticeable change in noise levels from aircraft flight operations. Although residents of areas near KTA or KLOA would continue to file occasional complaints about low-flying aircraft and helicopters, the complaints generally would be about discrete flyovers rather than overall average noise levels. Consequently, noise from aircraft operations at KTA and KLOA would be a less than significant impact under the Proposed Action.

### *No Impact*

*Noise from added personal vehicle traffic.* None of the personnel added under the Proposed Action would be based at KTA or KLOA. Consequently, there would be no noise from added personal vehicle traffic at KTA or KLOA under the Proposed Action.

## ***Reduced Land Acquisition***

Noise impacts at KTA under the RLA Alternative would be the same as under the Proposed Action.

## ***No Action***

### *Less than Significant Impacts*

*Noise from ordnance use.* Existing training exercises using blank or other ammunition would continue at KTA and KLOA under No Action. As discussed for the Proposed Action, use of blank or other training ammunition would have a less than significant noise impact under No Action.

*Noise from military vehicle use.* Military vehicle use associated with KTA and KLOA would be less under No Action than that under the Proposed Action or the RLA Alternative. No Stryker vehicles would be used under No Action. Noise levels produced by a continuation of existing vehicle use patterns at KTA and KLOA would have a less than significant noise impact under No Action.

*Noise from aircraft operations.* Existing patterns of aircraft and helicopter use of airspace over KTA and KLOA would continue under No Action. Although residents of areas near KTA or KLOA would continue to file occasional complaints about low-flying aircraft and helicopters, the complaints generally would be about discrete flyovers rather than overall average noise levels. Noise levels produced by a continuation of existing aircraft operations at KTA and KLOA would have a less than significant noise impact under No Action.

### *No Impact*

*Noise from added personal vehicle traffic.* There are no personnel based at either KTA or KLOA, so there would be no noise from added personal vehicle traffic at KTA or KLOA under No Action.

## 7.7 TRAFFIC

### 7.7.1 Affected Environment

#### *Regional Transportation System*

The ROI for traffic is the travel corridor between SBMR and KTA, which generally follows Kunia Road, Wilikina Drive, Kamananui Road, and Kamehameha Highway (Figure 7-13). While other resource sections consider the impacts of the use of Helemano Trail and Drum Road separately, the entire route between SBMR and KTA is considered as one system for the purposes of this traffic analysis, and it is discussed in this section because the Drum Road segment of the route is so much longer than the Helemanō Trail segment.

KTA is on the windward side of O'ahu. Access to and egress from KTA is via Drum Road or Kamehameha Highway.

#### *Local Transportation System*

*Kunia Road*

Kunia Road (SR 750) between SBMR (Trimble Road or Foote Gate) and Wilikina Drive is a four-lane divided state roadway. The posted speed limit is 35 mph (56 kph), and there are signals at the intersections with Trimble Road and Wilikina Drive.

The ADT is approximately 25,000 vpd. The morning peak hourly traffic volumes are 1,000 vph northbound and 880 vph southbound; the afternoon peak-hour volumes are 1,210 vph northbound and 840 vph southbound (HDOT 2001).

*Wilikina Drive*

Wilikina Drive (SR 803) is a four-lane divided roadway between Kunia Road and Funston Gate and a two-lane undivided roadway from Funston Gate to Kamananui Road. The posted speed limit is 35 mph (56 kph) from Kunia Road to McNair Gate and 25 mph (40 kph) from McNair Gate to Kamananui Road. There are traffic signals at the intersections with Macomb Gate and Kamananui Road.

Between Kunia Road and McNair Gate, the ADT is approximately 27,400 vehicles per day. The northbound and southbound morning peak hour volumes are 1,080 vph and 1,040 vph, respectively. During the afternoon peak hour, the northbound and southbound volumes are 1,200 vph and 1,100 vph, respectively (HDOT 2001).

Between McNair Gate and Kamananui Road, the ADT is 16,000 vehicles per day. The northbound and southbound morning peak-hour volumes are 380 vph and 650 vph, respectively. During the afternoon peak hour, the northbound and southbound volumes are 950 vph and 550 vph, respectively (HDOT 2001).

**Figure 7-13**
Peak Hour Volumes Worst Case Scenario Helemanō Trail

*Kamananui Road*

Kamananui Road is a two-lane undivided road between Wilikina Drive and Kamehameha Highway. Traffic signals are being constructed at the intersection with Kamehameha Highway. The posted speed limit is 45 mph (72 kph) between Wilikina Drive and Kaukonahua Road, and 35 mph (56 kph) between Kaukonahua Road and Kamehameha Highway. The ADT is approximately 10,300 vpd (HDOT 2001). The northbound and southbound morning peak-hour volumes are 470 vph and 350 vph, respectively. During the afternoon peak hour, the northbound and southbound volumes are 430 vph and 420 vph, respectively (HDOT 2001).

*Kamehameha Highway*

Kamehameha Highway (SR 99) connects Kamananui Road with the bypass around Hale‘iwa. Kamehameha Highway is a two-lane undivided highway, and the posted speed limit is 45 mph (72 kph). The area adjacent to the Dole Pineapple Pavilion is 35 mph (56 kph).

The ADT between Kamananui Road and Pa‘ala‘a Uka Pūpūkea Road (the entrance to HMR) is approximately 18,400 vpd. The northbound and southbound morning peak-hour volumes are 660 vph and 580 vph, respectively. During the afternoon peak hour, the northbound and southbound volumes are 720 vph and 660 vph, respectively. The ADT north of Pa‘ala‘a Uka Pūpūkea Road is approximately 14,300 vpd (HDOT 2001).

*Joseph P. Leong Highway*

Joseph P. Leong Highway is also known as the Hale‘iwa Bypass, a two-lane, undivided highway with controlled access. The posted speed limit varies between 35 and 45 mph (56 and 72 kph). The ADT along this roadway is approximately 10,000 vpd. The northbound and southbound morning peak-hour volumes are 350 vph and 280 vph, respectively. During the afternoon peak hour, the northbound and southbound volumes are 430 vph and 370 vph, respectively (HDOT 2001).

*Kamehameha Highway*

Kamehameha Highway continues through Hale‘iwa and intersects the Joseph P. Leong Highway north of Hale‘iwa and then continues to Kahuku. The speed limit is generally 35 mph (56 kph), except for a section west of the Turtle Bay Hilton that is posted for 45 mph (72 kph).

Immediately north of Hale‘iwa, the ADT is approximately 15,000 vpd. In the vicinity of Kahuku, the ADT is approximately 7,000 vpd. The eastbound and westbound morning peak-hour volumes are 210 vph and 260 vph, respectively. During the afternoon peak hour, the northbound and southbound volumes are 290 vph and 270 vph, respectively (HDOT 2001).

### 7.7.2 Environmental Consequences

#### *Summary of Impacts*

A summary of traffic impacts at KTA/KLOA is shown in Table 7-15. The Proposed Action and RLA Alternative would result in less than significant impacts on intersection operations, roadway segment operations, construction traffic, and parking. There would be no traffic impacts under No Action.

**Table 7-15**
**Summary of Potential Traffic Impacts at KTA/KLOA**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Intersection operations | ⊙ | ⊙ | ○ |
| Roadway segment operations | ⊙ | ⊙ | ○ |
| Construction traffic | ⊙ | ⊙ | ○ |
| Parking | ○ | ○ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | | | |
|---|---|---|---|---|---|
| ⊗ | = | Significant | + | = | Beneficial impact |
| ⦸ | = | Significant but mitigable to less than significant | N/A | = | Not applicable |
| ⊙ | = | Less than significant | | | |
| ○ | = | No impact | | | |

#### *Proposed Action (Preferred Alternative)*

Strykers would be used, up to multiple battalion level, for maneuver training at KTA and for off-road training. Troops would be transported to KTA from SBMR by Strykers or trucks up to one battalion level plus support trucks.

A perpetual easement of 27 acres (10.9 hectares) would be acquired for Helemanō Trail and an easement for Drum Road (also known as Kahuku Trail) upgrade to KTA. Helemanō Trail is shown Figure 2-7 in Chapter 2. The roads are proposed on private plantation roads. If the Proposed Action were implemented, Dole Food Co., Inc., would use other roads to access its agricultural lands. Helemanō Trail would be a one-lane, 15-foot wide (5-meter wide), 15-mile long (24-kilometer long) new road connecting SBMR to HMR. Drum Road would be realigned and repaved. The 10- to 24-foot wide (3- to 7-meter wide) road would be widened to 24 feet (7 meters) (two lanes) throughout, from HMR to KTA for 23 miles (37 kilometers). SBCT and the current force will use Kamehameha Highway to access KTA and KLOA until Helemanō Trail and Drum Road are completed. (Potential environmental impacts of the reconstruction of Drum Road will be addressed in a separate NEPA document, and are also considered in Chapter 9, Cumulative Impacts.) The reconstruction would accommodate larger vehicles and more traffic and would improve safety. The public would not use the proposed military use road, except for emergencies.

## *Less than Significant Impacts*

*Intersection operations.* Helemanō Trail would cross public roadways at three locations: Wilikina Drive west of Kamananui Road, Kaukonahua Road west of Kamananui Road, and Kamehameha Highway north of Pa'ala'a Uka Pūpūkea Road.

An LOS analysis was performed for the crossings using the following assumptions:

- The maximum number of vehicles was used for calculations (four convoys of 24 vehicles sequenced at 15-minute intervals);
- The convoys would stop for traffic along the public roadways, so the intersection would be two-way and stop sign controlled; and
- Although convoys would be scheduled for non-peak hours, the assumption here is that convoys would approach the public roadways during the peak hour of traffic; by assuming peak-hour conditions, a worst-case condition was analyzed.

The results of the LOS analysis are summarized in Table 7-17. According to the LOS analysis, public roadway crossings would operate at LOS C under worst-case conditions. Convoy vehicles would experience delays because they would yield to traffic along the public roadways. Because the convoys would yield to through traffic, there would be no impact on LOS on public roadways. The identified impact would be less than significant.

While no mitigation is required for project impacts on traffic congestion, the Army will operate a public Internet Web site that lists a schedule of upcoming USARHAW activities, including training and public involvement projects. Subject to force protection measures and other security measures, the site would contain USARHAW training and convoy schedules, community projects the USARHAW is involved in, any USARHAW activity or function that the public could attend, any general USARHAW news that might be of interest to the public, and USARHAW services available to the public.

*Roadway segment operations.* The number of military vehicles using the proposed military vehicle trails would be minimal. The maximum number of vehicles per convoy would be 24, and convoys would be sequenced at 15- to 30-minute intervals. Therefore, the maximum hourly volume would be 96 vehicles. Convoys would be scheduled during non-peak traffic hours, thus reducing potential impacts on peak-hour traffic conditions. No mitigation would be required.

The design criteria for a low-volume rural roadway through mountainous terrain were used to calculate the anticipated levels of service for traffic volumes on Drum Road; the results are shown in Table 7-16. The maximum traffic volume for an acceptable LOS C is 600 vehicles per hour. Because the Proposed Action would increase traffic volumes by 96 vehicles per hour and the existing roads are operating under capacity, impacts on roadway segment operations would be less than significant.

**Table 7-16**
**Levels of Service for Traffic Volumes on Rural Roadways**

| Maximum Hourly Traffic Volume[1] | Volume-to-Capacity Ratio | Level of Service |
|---|---|---|
| 1,000 | 0.71 | F |
| 900 | 0.64 | D |
| 800 | 0.57 | D |
| 700 | 0.50 | D |
| 600 | 0.42 | C |
| 500 | 0.35 | C |

Source: AASHTO 1990
[1]The hourly volume is the sum of traffic in both directions.

Before the Helemanō Trail and Drum Road are completed all SBCT military vehicles would use public roadways to access DMR and KTA/KLOA. Because convoys would still operate with a maximum hourly volume of 96 vehicles, as described above, the short-term elevated use of the roadways would operate at LOS C under worst-case conditions. While there would be noticeable delays.

**Table 7-17**
**Level of Service Analysis for KTA/KLOA**

| Intersection | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|
| | **Delay** (seconds per vehicle) | **LOS** | **Delay** (seconds per vehicle) | **LOS** |
| Helemanō Trail at Wilikina Drive | 17.9 | C | 22.0 | C |
| Helemanō Trail at Kaukonahua Road | 10.4 | C | 10.7 | C |
| Helemanō Trail at Kamehameha Highway | 20.8 | C | 21.6 | C |

Source: Phillip Rowell and Associates 2002

*Construction traffic.* The construction associated with the Proposed Action would generate additional traffic from worker vehicles and trucks. Construction is expected to take approximately one year and may include several work crews working on different segments of the road. Up to 50 construction workers would be involved. The construction traffic would be temporary and less than significant.

To minimize traffic impacts to the surrounding community during construction, a construction traffic management program would be implemented. It would call for staggering work hours to reduce impacts from construction workers during peak hours, would identify truck routes to limit truck traffic to major streets, and would designate parking for construction workers. Because project traffic does not significantly affect operations at the intersections and street segments in the project vicinity and traffic is generally free flowing, the interim construction worker traffic impacts would not be significant. No mitigation would be required.

#### No Impact

*Parking.* No parking impacts would result, and no mitigation would be required.

### Reduced Land Acquisition Alternative

The impacts associated with the RLA Alternative would be identical to those described for the Proposed Action.

### No Action Alternative

#### No Impact

The existing baseline for traffic would continue under the No Action Alternative.

*Intersection and roadway operations.* Under the status quo of No Action, use of the facility and operations would remain the same as that under existing conditions. There would continue to be no impacts to roadway segment operations and intersection operations, and no mitigation would be required.

*Construction traffic.* Under the status quo of No Action, there would continue to be no traffic generated from construction activities, and no mitigation would be required.

*Parking.* Under the status quo of No Action, there would continue to be no parking impacts, and no mitigation would be required.

# 7.8 WATER RESOURCES

## 7.8.1 Affected Environment

### *Climate*

Average annual rainfall within KTA and KLOA ranges from 40 to 50 inches (102 to 127 centimeters) near the coast to 150 inches (381 centimeters) at the summit of the Ko‘olau Mountains. Prevailing winds in summer are northeasterly trade winds; in the winter, light south to southwesterly winds prevail, but on some unprotected coastal slopes, average wind speeds of 18 to 20 knots have been recorded (USARHAW and 25th ID[L] 2001a).

Annual evaporation rates vary from about 80 inches (203 centimeters) near the coast to about 20 inches (51 centimeters) on the mountain ridges (Oki 1998).

Drum Road runs along the west slope of the Ko‘olau Mountain Range and across the Schofield Plateau, from KLOA, through KTA to SBMR. The road lies within an elevation range of about 1,000 to 1,200 feet (305 to 365 meters) msl, except in the segment between Helemanō Stream and SBMR, where the trail descends to below 900 feet (274 meters) msl. Along most of its route, the average annual rainfall is above 70 inches (178 centimeters). In the last segment, where the trail descends to SBMR, the average rainfall decreases with elevation to about 50 inches (127 centimeters) per year. Annual evaporation exceeds rainfall in this last segment.

### *Surface Water*

<u>*Surface Water Drainage in Kuhuku Training Area*</u>

Figure 7-14 shows surface water features and watershed boundaries on KTA, which straddles the northern Ko‘olau Mountain Range and contains portions of four watersheds. On the west side of KTA is the Paumalū watershed. The Paumalū watershed includes drainages from Paumalū Stream on the west to Waiale‘e Gulch on the east. The headwaters of the Paumalū Stream are in the Pūpūkea Paumalū Forest Reserve, most of which is within the boundaries of KTA. KTA does not include the downstream portion of the Paumalū Stream, but most of the watershed east of the Paumalū drainage, almost to the Kamehameha Highway, is on KTA.

To the east of Paumalū watershed and wedged between it and the ‘Ō‘io watershed farther to the east is the Kawela watershed, which includes the streams that drain to Kawela Bay—Pahipahi‘ālua Stream and Kawela Stream.

East of Paumalū and Kawela watersheds is the ‘Ō‘io watershed, which includes the upper portions of drainages from ‘Ō‘io Gulch east to Kea‘aulu Gulch, which discharges at the town of Kahuku.

Adjacent to the ‘Ō‘io watershed is the Mālaekahana watershed, which consists of the upper drainage of Mālaekahana Stream.

**Figure 7-14**
Watershed Boundaries and Drainage Features on Kahuku Training Area

The lower reaches of many of these streams have been diverted or captured for irrigation and flood control, but the upper reaches, on KTA, are generally the natural drainages.

All streams and gulches on KTA are intermittent, except for Mālaekahana Stream which is perennial (USARHAW and 25th ID[L] 2001a).

*Surface Water Drainage in the Kawailoa Training Area*

The ROI for KLOA is the same as the ROI for Drum Road (discussed below), because with the exception of traffic on Drum Road and for purposes of the impact assessment for water resources, training activities within KLOA would not differ from training activities under No Action. Therefore, the discussion of KLOA is included in the discussion of Drum Road. The portion of Drum Road that lies within or adjacent to KLOA is shown on Figure 7-14, and includes the western boundary of the northern half of KLOA.

*Surface Water Drainage on the Drum Road Route*

Figure 7-15 shows the alignment of Drum Road. Helemanō Trail, which extends from the Helemano Military Reservation to Schofield Barracks, is discussed in Section 5.8. South of KTA, Drum Road passes along the western perimeter of the KTA. First, it crosses the Waimea watershed, which is drained by several streams, including Kauwalu Gulch, ʻElehāhā Stream, Kamananui Stream, and Kaiwikoʻele Stream. (Kauwalu Gulch and ʻElehāhā Stream are both intermittent, while Kamananui and Kaiwikoʻele Streams are both perennial [flow year-round].) ʻElehāhā Stream and Kamananui Stream are tributaries of the Waimea River.

The trail passes along the ridge that forms the boundary between the head of the Keamanea, Waimea, and Kawailoa watersheds, northwest of Puʻu Kapu. At about this point, the trail follows the Pūpūkea Road and crosses inside KLOA. Here, west of Puʻu Kapu, it crosses the tiny Kawailoa watershed and then follows the ridge separating the Kawainui and Kawaiʻiki watersheds (on the east) from the Anahulu watershed (to the west). The Kawailoa watershed is a narrow east-west trending strip of land, north of Puʻu Kapu, that does not have any surface outflow but probably drains below the surface to the adjacent watersheds. The Kawainui and Kawaiʻiki streams (both perennial streams) are tributaries of the Anahulu River, which occupies the Kawailoa Gulch and discharges at Waialua Bay, north of Haleʻiwa. The junction of the two streams marks the head of the Anahulu watershed. The intake of the Kamananui Ditch and Tunnel, which was designed to divert water from the Kawainui Stream for irrigation in the Keamanea watershed, is at the downstream end of the Kawainui watershed.

The trail emerges from KLOA just east of ʻŌpaeʻula Reservoir, where it becomes a paved road. The road follows the boundary of the Kawaiʻiki watershed, then turns sharply west and continues along the ridge separating the Anahulu watershed and the ʻŌpaeʻula watershed. The ʻŌpaeʻula Reservoir is in the Anahulu watershed but is recharged by diversions from the Kawaiʻiki and ʻŌpaeʻula streams, via ditches or tunnels that cross the watershed boundaries.

**Figure 7-15**

Watershed Boundaries and Drainage Features Drum Road/Helemanō Trial

Southwest of the ʻŌpaeʻula Reservoir, Drum Road crosses the ʻŌpaeʻula watershed and the ʻŌpaeʻula Stream (a perennial stream) and then follows Twin Bridge Road, west of Bryans Mountain House. This segment of the trail is on the boundary between the ʻŌpaeʻula watershed and the Helemanō watershed.

#### *Surface Water Quality*

None of the watersheds on KTA have been identified as Category I watersheds in need of restoration. The watersheds crossed by Drum Road south of the Kawailoa watershed are identified by the state of Hawaiʻi as tier 2 Category 1 watersheds (HDOH 1998b).

Soil erosion has been identified as a potential problem in many areas of the Koʻolau Mountains. Among the major causes of soil erosion, as identified by the KMWP (Sumiye 2002), are human activities, wildfire, and soil disturbance by pigs. Human activities with the potential to cause erosion, in addition to military training, include hiking, motor biking, and illicit drug cultivation. The KMWP notes that these activities have not been identified as severe threats to watershed resources but that the watershed may be affected by these activities in the future as intensity of human use increases.

### *Groundwater*

#### *Groundwater Flow*

KTA overlies the ridge of the Koʻolau Mountain Range, which is considered to be a hydrologic boundary between the north and windward hydrologic sectors. The western side of KTA is in the Kawailoa aquifer system of the north hydrologic sector. The Kawailoa aquifer system is west of the Summit Trail and Kaunala Ridge and is the northward extension of the ridge to the west side of Kawela Bay. The Kawailoa aquifer system is within the central Oʻahu groundwater flow system (Oki 1998). Groundwater in the Kawailoa aquifer system is thought to drain northwest toward the Waimea coast.

Since 1927, annual groundwater pumping from the Kawailoa aquifer system reportedly remained below 9 MGD and ranged from 1.5 MGD in 1936 to 8.9 MGD in 1970. The State of Hawaiʻi estimates the sustainable yield of the Kawailoa aquifer system at 39 MGD. Most of the past groundwater withdrawals were reportedly from the Waialua Sugar Company's irrigation wells near Kawailoa Camp (Oki 1998). The Waialua Sugar Company ceased operating on Oʻahu in 1996.

The eastern side of KTA is in the northern end of the Koʻolauloa aquifer system of the Windward hydrologic sector. Regional groundwater flow is believed to be to the north or the northeast in this part of KTA. The State of Hawaiʻi estimates the sustainable yield of the aquifer system at 35 MGD. Most of KTA is within the Northwest Rift Zone of the Koʻolau Volcano. The Northwest Rift Zone is densely intruded by volcanic dikes, and the groundwater system at higher elevations is dominated by dike-impounded groundwater. The Northwest Rift Zone is primarily within the Koʻolau Loa aquifer system but extends into the Kawailoa aquifer system. The extreme northwest side of KTA marks the western boundary of the Northwest Rift Zone, where dike density decreases.

The coastal plain north and east of KTA is underlain by sedimentary deposits, including alluvial deposits and limestone caprock.

Drum Road crosses the upper portions of the Kawailoa and Waialua aquifer systems in the north hydrologic unit and the central part of the Wahiawā aquifer system in the central hydrologic unit.

*Groundwater Quality*

Groundwater in the high-level groundwater system of the Ko'olau Mountain Range is generally of very good quality and is used as a drinking water source. On the coastal plain, groundwater has been affected by agricultural contamination. Groundwater in the Ko'olau Loa aquifer system has been affected by pesticides used in sugar cultivation, including dibromochloropropane (DBCP) and 1,2,3-trichloropropane (TCP) (HDOH 1999b). Groundwater beneath the coastal plain north of KTA has been affected by nitrates and sulfates associated with crop fertilizers and irrigation (Tenorio et Al. 1970).

## 7.8.2 Environmental Consequences

### *Summary of Impacts*

A summary of impacts for water resources is provided in Table 7-18. Significant and mitigable impacts on surface water quality would result from the Proposed Action and RLA Alternative because Stryker off-road training would cause severe erosion on the limited terrain available at KTA. Less than significant impacts on surface water quality would result from nonpoint source chemical loading, erosion from construction activities, accidental spills on Drum Road, and flooding and erosion along Drum Road. There would also be less than significant impacts on groundwater supply from the Proposed Action and RLA Alternative.

**Table 7-18**
**Summary of Potential Water Resources Impacts on KTA/KLOA**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Impacts on surface water quality | ⦸ | ⦸ | ⦸ |
| Impacts on groundwater quality | ⊙ | ⊙ | ⊙ |
| Increased flood potential | ⊙ | ⊙ | ⊙ |
| Groundwater supply | ○ | ○ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⦸ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact
N/A = Not applicable

### *Proposed Action (Preferred Alternative)*

*Significant Impacts Mitigable to Less than Significant*

*Impact 1: Impacts on surface water quality.* Based on ATTACC modeling results, the Proposed Action would severely degrade land condition. MIMs are expected to increase from 7,211 under existing conditions, to 13,772 under the Preferred Project. Under existing conditions, the effects of maneuver training on land condition are considered moderate. However, the land condition would fall to a "severe" condition under the Proposed Action. Referring to Figure 2-5, which shows the maneuverable areas available on KTA (areas with slopes less than 30 percent and unrestricted by vegetation), it can be seen that there are relatively few large contiguous areas available for maneuver training. Therefore, the effects of training would be concentrated on the limited available land and there would be little opportunity to rotate training to other areas to allow damaged lands to recover. The implication of this in the relatively steep terrain, with high annual rainfall, is that it would also significantly increase soil erosion. Erosion would not occur all at once but would be progressive. If not mitigated, the rate of erosion would steadily increase as more land area was disturbed and vegetation cover decreased. However, with mitigation, impacts on stream water quality from sediment loading is expected to be controlled within acceptable levels. The mitigation measures below will reduce the impacts on surface water quality to less than significant.

*Regulatory and Administrative Mitigation 1.* The Army will implement design measures in accordance with new Phase II Stormwater Management Regulations of the Clean Water Act. The Army will choose the most practicable solution for the specific project or project area during design. As directed via NPDES permit approval, the contractor will be required to implement a stormwater pollution prevention program during construction.

The Army will continue to implement land restoration measures identified in the INRMP. Mitigation measures include, but are not limited to, implementing of the ITAM program to identify and inventory land condition using a GIS database; coordinating between training planners and natural resource managers; implementing land rehabilitation measures identified in the INRMP; monitoring the effectiveness of the land rehabilitation measures; evaluating erosion modeling data to identify areas in need of improved management; and implementing education and outreach programs to increase user awareness of the value of good land stewardship.

The Army will develop and implement a DuSMMoP for the training area, which will address measures such as, but not limited to, restrictions on the timing or type of training during high risk conditions, vegetation monitoring, soil monitoring, and buffer zones to minimize dust emissions in populated areas. The plan will determine how training will occur in order to keep fugitive dust emissions below CAA standards for $PM_{10}$ and soil erosion and compaction to a minimum. The Army will monitor the impacts of training activities to ensure that emissions stay within the acceptable ranges as predicted and that environmental problems do not result from excessive soil erosion or compaction. The plan will also define contingency measures to mitigate the impacts of training activities that exceed the acceptable ranges for dust emissions or soil compaction.

The Army will implement the existing spill prevention and response plan to all new lands and activities under the Proposed Action.

The IWFMP for Pōhakuloa and Oʻahu Training Areas was updated in October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts associated with wildland fires. The plan is available upon request.

For construction of low-water stream crossings, the Army will incorporate BMPs that will reduce runoff and sedimentation to aquatic environments in accordance with CWA regulations for stormwater runoff at construction sites.

### Less than Significant Impacts

*Impacts on surface water quality from nonpoint chemical loadings.* There are no live-fire exercises using ball or tracer ammunition planned on KTA, so there would be no potential for surface water quality to be affected by residual explosives residues. However, other chemicals, such as petroleum hydrocarbons that may spill or leak onto soils as a result of vehicle use or refueling, could be bound to soil particles and then transported to surface water by erosion. These impacts are expected to be less than significant because spills would be addressed effectively through standard procedures, including training personnel in spill prevention and control techniques and requirements, maintaining appropriate spill control equipment in areas where refueling may occur, and complying with all hazardous materials management regulations.

*Impacts on surface water quality from use of dust control palliatives.* Applying calcium, magnesium chloride, calcium lignosulfonates, or other environmentally friendly materials to control dust could affect surface water quality, either by increasing the biological oxygen demand or by increasing total dissolved solids concentrations. These impacts are expected to be less than significant because the chemicals would be applied according to industry standards (Parametrix, undated).

*Impacts on surface water quality from new construction sites.* During ground preparation for new construction sites, grading, excavating, and trenching may expose erodible soils to stormwater runoff, with the potential for sediments to contaminate surface waters. Similarly, chemicals could spill during equipment refueling, by hydraulic lines on heavy equipment breaking, or by using chemical solvents, paints, and other chemicals in construction. These potential impacts would be reduced to less than significant levels by implementing standard construction BMPs, as required for compliance with construction and Phase 2 stormwater management regulations.

At a minimum, the following standard construction BMPs would be implemented:

- Dredging, filling, or grading in or adjacent to streams and riparian areas would be scheduled to occur during low-flow periods and would be in compliance with the Clean Water Act.

- No project-related materials (such as fill, revetment rock, and pipe) would be stockpiled in the water or in riparian areas.
- All project-related materials and equipment placed in the water would be cleaned prior to use to ensure that they are free of pollutants.
- Trash or debris would be collected and disposed of properly. Equipment and materials brought from outside KTA would be cleaned and inspected prior to transport to ensure that alien species are not introduced.
- Project vehicles and equipment would be fueled away from streams and riparian areas.
- Turbidity and siltation from project-related work would be minimized and contained to the site through the appropriate use of effective silt containment devices and the curtailment of work during adverse weather conditions.

*Impacts on surface water quality from potential spills on Drum Road*. A spill response plan and SOPs would be implemented to control any accidental spills that may occur. Preventative measures would include training personnel in spill avoidance and response, safe driving practices, and the proper way to transport hazardous materials in compliance with Army, state, and federal regulations. Some of the hazards of spills and accidents would be reduced compared to No Action because public roads, with their inherent risks of accidents involving civilian vehicles, would be avoided.

*Increased flood potential - Flooding and erosion of Drum Road.* Drum Road will be upgraded, including widening it, hardening the surface, installing new drainage systems, and improving stream crossings. (The environmental effects of the improvement project are evaluated in a separate document.) After construction, the assumption is that the potential for flooding would be reduced and that erosion impacts would be reduced, compared to existing conditions; however, impacts may occur due to failure of the new road with heavy use or because of unforeseen extreme natural conditions. Widening the road would likely require making additional slope cuts and fills, installing drainage conduits, and including other engineering features that would require monitoring and maintenance. Therefore, any potential impacts on surface water quality is expected to be reduced to less than significant levels through appropriate monitoring and timely implementation of repairs.

*No impact*

*Groundwater supply.* At KTA, water is trucked in and there is no draw on the local groundwater supply. The Proposed Action will not result in any new draw on the local ground water supply and would not contribute to groundwater contamination. The Proposed Action will have no impact on groundwater supply.

### Reduced Land Acquisition Alternative

The impacts associated with RLA are identical to those described for the Proposed Action.

### ***No Action***

*Significant Impacts Mitigable to Less than Significant*

*Impact 1: Impacts on surface water quality from soil erosion associated with training exercises.* Under No Action, the potential for eroding soils to affect surface water quality would continue to be potentially significant. ATTACC modeling results indicate that the current land condition has been moderately affected by training and that the current rates of soil erosion exceed the goal of long-term sustainability.

*Regulatory and Administrative Mitigation 1*. Mitigation measures would be the same as those described above for the Proposed Action.

*Less than Significant Impacts*

*Impacts on surface or groundwater quality from spills on public roads*. Heavy Army vehicles and slow-moving convoys using public roads can increase the potential for traffic accidents involving civilian vehicles. These accidents could result in releases of hazardous chemicals, with consequent impacts on surface water or groundwater quality. Adherence to standard Army operating procedures is expected to continue to result in a less than significant impact on water quality.

*No Impacts*

*Groundwater supply.* The groundwater issue is unchanged from the Proposed Action to the No Action alternative. The No Action Alternative is not expected to significantly increase local water demand.

# 7.9 GEOLOGY, SOILS, AND SEISMICITY

## 7.9.1 Affected Environment

### *Physiography*

The KTA ROI is on the northeastern part of the Ko'olau Mountains (including portions of KLOA), inland of the Kamehameha Highway, and does not extend to the shoreline. Elevations range from near sea level to about 1,860 feet (567 meters) msl. The topography varies from relatively flat on the coastal plains to nearly vertical bluffs on the cliffs to the east.

### *Geology*

KTA is on the northernmost exposure of the Northwest Rift Zone of the Ko'olau Volcano (see Figure 3-10). Most of the area is underlain by basalt flows from the Ko'olau Volcano that were deposited at the end of its eruptive cycle, 1.8 to 2.6 million years before present (Stearns and Vaksvik 1935; Oki 1998). The Northwest Rift Zone contains dense volcanic dike intrusions, most of which are aligned in the same direction as the rift zone, on a northwest trend. Thus, the dike orientation tends to parallel the direction of streams and gulches in the northern part of KTA, but it tends to be perpendicular to the surface drainage and erosion pattern on the east and west.

### *Soils*

Kahuku Training Area

Approximately the entire southern (upland) half of KTA is classified as Kapaa Silty Clay at 40 to 100 percent slopes (Figure 7-16). Kapaa soils occur on steep drainages, gulches, and ridgelines in mountainous areas with high rainfall. The soils developed in material weathered from volcanic rock, and on gentle slopes they are deep and well-drained and have fine to moderately fine subsoil (Foote et al. 1972). On steep slopes, runoff is very rapid and the erosion hazard is very severe. Most of the surface layer is removed by erosion.

In a broad band to the north of the Kapaa soils are found Paumalu-Badland Complex soils (Foote et al. 1972). Paumalu soils make up about 40 to 80 percent of the acreage in this complex. Runoff from Paumalu soils is medium to rapid and the erosion hazard is moderate to severe. Badland, which consists of nearly barren land that remains after the Paumalu soils are eroded away by wind or water, includes rocky and stony land. Runoff is rapid and the erosion hazard is very severe.

To the north of the band of Paumalū-Badland soils is another band dominated by Kemoo-Badland Complex soils but containing higher proportions of Kemoo silty clay at lower elevations with gentler slopes. Kemoo silty clay accounts for about 40 to 80 percent of the area covered by Kemoo-Badland Complex soils. Kemoo silty clay soils are well-drained red to dark reddish-brown blocky soils found on elevations between 300 and 1,200 feet (91 and 366 meters) where the rainfall ranges from 35 to 60 inches (89 to 152 centimeters). The

**Figure 7-16**
Soils Map Kahuku and Kawailoa Training Areas

erosion hazard depends on the slope. On steep slopes, runoff is medium to rapid, and the erosion hazard is moderate to severe. On gentle slopes (2 to 6 percent slopes) runoff is slow to medium and the erosion hazard is slight.

Preliminary ATTACC modeling results indicate that land condition at KTA is adversely affected by current training activities and that soil loss exceeds sustainable rates.

*Drum Road/Kawailoa Training Area*

As described in Section 7.8 for Water Resources, the ROI of the project for geologic resources within KLOA is contiguous with the ROI of the Drum Road portion of the project. Therefore, the discussion of the Affected Environment on the Drum Road route includes the portion of KLOA that would be influenced by the project. Figure 7-17 and 7-18 show the soils within a corridor of about 200 feet (61 meters) along Drum Road which runs through KLOA, between KTA and HMR. (Helemanō Trail, which continues from HMR to SBMR, is described in Section 5.9.)

Drum Road follows narrow ridges between watersheds along most of its route, occasionally crossing steep gulches to cross streams. From Kamehameha Highway to just east of Mount Kawela, the road is paved. A project is underway to improve the road, including paving or hardening the surface, widening the road, and making other improvements. The improved road will generally follow the existing alignment. The project would involve constructing tunnels in areas where sharp curves on steep slopes are otherwise unavoidable, using bridges and viaducts to widen the roadway in narrow areas, installing box culverts designed to accommodate a 10-year storm, and realigning the road to provide a maximum nine percent grade (slope). The road surface would be gravel, with compacted gravel shoulders. In some areas, it would be paved with asphalt to protect from erosion and formation of ruts.

From the end of the existing paved segment in the northern part of KTA, the road follows the ridgeline east of East ʻŌʻio Gulch and climbs from an elevation of about 900 feet (274 meters) to the crest of the range at an elevation of nearly 1,600 feet (488 meters). This ridge marks the boundary between the Koʻolau Loa and Waialua Districts and is the northern boundary of KLOA. The road follows the northern boundary of KLOA west to the head of Kaleleiki Stream. Along this six-mile-long segment the road passes initially over a small area of Paumalu silty clay (PeC), then crosses quickly into Paumalu-Badland complex (PZ). Above an elevation of about 1,000 feet (305 meters), it is in Kapaa silty clay on 40 to 100 percent slopes (KIG).

The Paumalu series soils are well-drained, gently rolling, silty clays developed in old alluvium and colluvium. As the slope increases, runoff and erosion hazard increases. The Paumalu-Badland complex occurs on 10 to 70 percent slopes and consists of 20 to 60 percent Badland, which is nearly barren land that remains after Paumalu soils are removed by wind and water erosion and consists largely of rock outcrops. The erosion hazard is very severe. The Kapaa silty clay soils have very rapid runoff and the erosion hazard is very severe. Most of the surface soil has been removed by erosion. In many ridge top areas, the surface has developed a thin subsurface ironstone sheet layer, about 10 to 18 inches (25 to 46 centimeters) below the surface, formed from precipitating iron minerals.

**Figure 7-17**
Soils Map Drum Road

**Figure 7-18**
Soils Map Drum Road and Helemanō Trail

As the road continues south along the western boundary of KLOA, it crosses Helemano silty clay soil on 30 to 90 percent slopes (HLMG), alternating with small amounts of Kapaa silty clay. The Helemano silty clay is developed on steep slopes on the sides of V-shaped gulches and includes areas of rock outcrops. The surface soil is dark reddish-brown, about 10 inches (25 centimeters) thick, and is underlain by about 50 inches (127 centimeters) of subsoil, with a blocky structure that is weathered in place from basalt rock. Permeability is moderately rapid, runoff is very rapid, and the erosion hazard is very severe.

The road continues south, following closely along the boundary of KLOA toward Pu‘ukapu, crossing from Helemanō silty clay soil to Rock Land (rRT). But after crossing the Kaiwiko’ele Stream, the road passes over some broader ridges underlain by Paaloa silty clay (PaC) on 3 to 12 percent slopes and Paaloa clay (PbC) on 2 to 12 percent slopes. The Paaloa soils are well-drained and on narrow upland areas bounded by steep gulches. The slopes are smooth. The surface layer is dark reddish-brown silty clay or clay and the substratum is subangular and blocky, developed in place in soft weathered basalt. Permeability is moderately rapid, runoff is slow to medium, and the erosion hazard is slight to moderate. These soils are used primarily for pasture and formerly for sugarcane.

As the road continues south it passes again across Rock Land, alternating with Helemano silty clay on 30 to 90 percent slopes. It also passes over a few narrow ridges underlain by Leilehua silty clay (LeB) on 2 to 6 percent slopes. The Leilehua soil is similar to the Paaloa soils in its occurrence on narrow ridges bounded by steep gulches, but it is developed on a more gravelly substratum. Runoff is slow, permeability is moderately rapid, and the erosion hazard is slight. The soil is used for pasture and formerly for sugarcane.

As the road continues south, it bends dramatically to avoid deep gulches and cultivated farmlands. As a result, the road follows along the rim of the gulches, crossing over steep slopes underlain by Helemano silty clay or Rock Land, alternating with gentler slopes on ridges underlain by Leilehua silty clay. It follows a course west along the north ridge of ‘Ōpae‘ula Stream and dips down from the rim elevation of about 1,200 feet (366 meters) into the stream gulch to cross the stream at an elevation of about 800 feet (244 meters). The gulch is underlain by Helemano silty clay. The remainder of the route to HMR traverses similar soils, alternating between Rock Land, Helemano silty clay in gulches, and either Leilehua silty clay soils or Paaloa soils on ridges.

### *Geologic Hazards*

*Kahuku Training Area*

The high rainfall and runoff from the Ko‘olau Mountains has created many deep nearly straight gulches separated by long narrow ridges that radiate from the Ko‘olau Mountains toward the sea. The slopes in some of these gulches are nearly vertical and prone to rock slides. Figure 7-19 shows how much of KTA contains slopes greater than 30 percent, but many of these slopes are much steeper. Soils do not accumulate on the upper slopes, but the rock itself becomes weakened by weathering and sloughs off. Landslides in this terrain can occur unexpectedly, with no discernable trigger other than the weakening of the supporting

**Figure 7-19**
Steep Slopes at Kahuku Training Area

rock matrix by weathering. Earthquakes or vibrations from sonic booms may also trigger these failures (Jibson and Baum 1999). The rock rubble from these failures accumulates on the floors of the gulches and is ultimately carried downstream by runoff. The probability of earthquakes is about the same in KTA as it is elsewhere on O'ahu because most earthquakes are centered in the active volcanic areas beneath the Island of Hawai'i. The intensity of ground shaking, which is influenced by the underlying geologic materials, would be lowest in rocky upland areas and would probably increase somewhat on the lower slopes, where the thickness of the alluvial deposits is greatest.

*Drum Road/Kawailoa Training Area*

The route of Drum Road is mainly along ridges within KTA and alternates between ridges and gulches along the western boundary of the KLOA. The potential for slope failure is probably high on slopes underlain by saprolite (deeply weathered basalt that retains the appearance of the original rock but that does not have the strength of the rock). The saprolite forms steep slopes in stream gulches, but the slopes may be weakened if undercut at the base or if overloaded on top.

### 7.9.2 Environmental Consequences

#### *Summary of Impacts*

Impacts on geology and soils from the Proposed Action and No Action are summarized in Table 7-19. Significant and unmitigable impacts would occur from erosion and soil compaction caused by off-road Stryker training and other ground-disturbing activities. Significant impacts mitigable to less than significant would occur from soil erosion caused by wildland fires. Less than significant impacts would occur from erosion and slope failure caused by use of Drum Road.

#### *Proposed Action (Preferred Alternative)*

*Significant Impacts*

*Impact 1: Soil loss from training activities*. In areas with steep slopes, the use of off-road vehicles and other ground-disturbing activities may reduce vegetative soil cover and alter drainage patterns, which could lead to gullying. Steep slopes occur on the margins of the CACTF. ATTACC modeling of the maneuver training areas suggests that the effects on land condition would be severe after the Proposed Action is implemented. As described in Chapter 5, Section 5.9, soil compaction may also affect vegetation recovery, and create preferred drainage pathways along which erosion may be enhanced. Compaction is likely to occur in moist soils containing clays. Together, these effects are expected to be significant. These impacts would occur in addition to the ongoing erosion stresses due to public access and unauthorized use of portions of KTA described for the No Action Alternative. The mitigation measures below will substantially reduce the impact but not to less than significant levels.

**Table 7-19**
**Summary of Potential Geologic Resources Impacts at KTA/KLOA**

| Impact Issues | Proposed Action | | Reduced Land Acquisition | | No Action | |
|---|---|---|---|---|---|---|
| | KTA | KLOA | KTA | KLOA | KTA | KLOA |
| Soil loss from training activities | ⊗ | ○ | ⊗ | ○ | ⊘ | ○ |
| Soil erosion and loss from wildland fires | ⊘ | ○ | ⊘ | ⊘ | ⊘ | ○ |
| Increased soil compaction | ⊙ | ○ | ⊙ | ○ | ○ | ○ |
| Exposure to contaminated soils | ⊙ | ○ | ⊙ | ○ | ○ | ○ |
| Slope failure | ⊙ | ⊙ | ⊙ | ⊙ | ○ | |
| Volcanic and seismic activity | ⊙ | ○ | ⊙ | ○ | ⊙ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact
N/A = Not applicable

*Regulatory and Administrative Mitigation 1*. The Army will develop and implement a DuSMMoP for the training area, which will address measures such as, but not limited to, restrictions on the timing or type of training during high risk conditions, vegetation monitoring, soil monitoring, and buffer zones to minimize dust emissions in populated areas. The plan will determine how training will occur in order to keep fugitive dust emissions below CAA standards for $PM_{10}$ and soil erosion and compaction to a minimum. The Army will monitor the impacts of training activities to ensure that emissions stay within the acceptable ranges as predicted and environmental problems do not result from excessive soil erosion or compaction. The plan will also define contingency measures to mitigate the impacts of training activities that exceed the acceptable ranges for dust emissions or soil compaction.

The Army will implement land management practices and procedures described in the ITAM annual work plan to reduce erosion impacts (US Army Hawai'i 2001a). Currently these measures include implementing a TRI program; implementing an ITAM program; implementing SRA program; developing and enforcing range regulations; implementing an Erosion and Sediment Control Management Plan; coordinating with other participants in the KMWP; and continuing to implement land rehabilitation projects, as needed, within the LRAM program. Examples of current LRAM activities at KTA include revegetation projects involving site preparation, liming, fertilization, seeding or hydroseeding, trees planting, irrigation, and mulching; a combat CTP; coordination through the TCCC on road maintenance projects; and development of mapping and GIS tools for identifying and tracking progress of mitigation measures.

### Significant Impacts Mitigable to Less than Significant

*Impact 2: Soil erosion and loss from wildland fires.* At each of the installations, wildland fires have the potential for removing vegetation that protects soil from erosion. Wildland fires can affect large areas of land, removing grasses and larger trees and shrubs that hold the soil. The magnitude of this impact is directly related to the size of the fire. Fires may be initiated by detonation of munitions, or potentially even by vehicle engines, smoking, use of welding torches, by downed power lines, and many other causes. Land management practices can increase or reduce the potential damage caused by fires, through management of the fuel supply (wood, brush, grasses). Although naturally-caused fires are not common in Hawai'i, fires may also be started naturally, by electrical storms. Wildland fires are considered to be a potentially significant impact of all alternatives because of the potential for increased soil erosion.

*Regulatory and Administrative Mitigation 2.* The IWFMP for Pōhakoloa and O'ahu Training Areas was updated in October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts from wildland fires. The plan is available upon request.

### Less than Significant Impacts

*Slope failure - use of Drum Road.* Use of Drum Road under the Proposed Action could result in slope failures due to vibration or loading, but the proposed improvements are expected to reduce these impacts compared to current conditions, and continued monitoring and maintenance of the new road would reduce any potential impacts from long-term use to less than significant levels.

*Increased soil compaction.* Soils in training areas, especially in areas that have not previously been used for maneuver training, are likely to become compacted by use of tracked or wheeled vehicles, potentially affecting the soils' ability to support vegetation and altering their permeability and moisture retention capacity. Widespread compaction could generally reduce recovery of vegetation cover. Preferred drainage pathways could develop along the compacted linear track left by off-road vehicles, creating increased erosion along the tracks. Drum Road will be used by the Proposed Action to transport vehicles and Soldiers to KTA. Portions of KTA are proposed as off-road maneuver areas under the Proposed Action. ATTACC modeling results suggest that a proportion of the land area in the maneuver areas could be affected. However, because KTA is currently used for current force training activities and is based on the level of predicted use by the Proposed Action, the modeling results predict a less than significant impact.

*Exposure to soil contaminants.* Since no live fire exercises would be conducted at KTA, no impacts from exposure to explosives or munitions-related chemical residues are expected.

### Reduced Land Acquisition Alternative

The impacts associated with Reduced Land Acquisition are identical to those described for the Proposed Action.

### *No Action Alternative*

*Impact 1: Continued erosion caused by public use activities*. Under the status quo of No Action, some of the existing erosion problems at KTA result from public access to portions of KTA and to unauthorized activities, such as off-road vehicle use and motocross riding on informal trails adjacent to the motocross raceway. Public use represents a source of potentially significant impacts on soil erosion that are comparable to military off-road impacts on soils. These impacts represent a potentially significant baseline impact on soil erosion.

*Regulatory and Administrative Mitigation 1*. The INRMP identifies management measures that could be implemented to reduce the impacts of public use, including better controlling access to sensitive areas, developing additional facilities, monitoring, and increasing enforcement of existing regulations.

# 7.10 BIOLOGICAL RESOURCES

## 7.10.1 Affected Environment

Biological resources include plant and animal species and the habitats or communities in which they occur. This section is divided into discussions of general wildlife, vegetation, and habitat types common to KTA and KLOA (Figure 7-20). A discussion of the sensitive wildlife, vegetation, and sensitive habitats known to occur or with the potential to occur in this area is also included. Federal, state, and locally regulated species are included in this report, along with rare species, identified by rapid population decline or whose habitat has markedly decreased in recent years. Figure 7-20 shows the KTA/KLOA ROI, which was based on the potential for fire damage and loss of land due to construction and trampling during SBCT training and the introduction of exotic species from Soldiers moving throughout the installation. The extent of these impacts was determined by the type of vegetation present, human-made and topographic barriers, and buffers in the areas around the proposed actions. The ROI includes SBCT actions occurring on KTA, KLOA, Drum Road, and a buffer area, the size of which depends on the type of training or proposed activities that would occur and the fire risk imposed by vegetation and topography.

In addition to defining the ROI by the firebreak potential, a smaller portion of the ROI is based on the extent of habitat degradation imposed by trampling and by the effect of introducing exotic species associated with human activities. This is because in some areas vegetation is very moist, making the risk to fire extremely low. The ROI does not include any marine habitat. While waters near KTA are part of the Hawaiian Islands Humpback Whale National Marine Sanctuary, no project actions occur in this area nor in the vicinity of the coastline, in the nearshore, in the offshore marine habitat, or upland from the nearshore marine habitat.

### *Recovery Plan*

There are 36 plant and 1 animal species with recovery plans that are known to occur or have the potential to occur within the ROI. These species are listed in Appendix I-1a.

### *Vegetation*

KTA, a total of 8,528 acres (hectares), is at the end of the Ko'olau Mountains, on the northern tip of O'ahu. Private, agricultural, and additional Army training lands border it. Botanical surveys to identify rare plants, communities, and potential threats to these resources have been conducted intermittently since 1977. HINHP surveys in 1989, 1993, and 1994 provided the foundation for much of the botanical information used in this EIS.

KLOA is to the north of SBER and to the south of KTA in the Ko'olau Mountains. It consists of 23,348 acres (9,449 hectares). KLOA was surveyed in 1976 and 1977 by the Environmental Impact Study Corporation and later by HINHP (1989 to 1993). Additional botanical and zoological information had been collected on KLOA and adjacent land. Kawailoa is an area of incredible biological richness, with areas of significance for protecting and managing these resources.

**Figure 7-20**
Kahuku/Kawailoa Training Areas Biological Region of Influence

The vegetation communities identified in the KTA/KLOA ROI are described below and are shown in Figure 7-21.

Portions of the KTA/KLOA ROI contain valuable native vegetation communities, but much of the lower lying vegetation is composed of introduced and invasive plants. Several of these widespread species create dense single-species stands (Christmas berry, ironwood, strawberry guava) that shade out understory species. Two of the plants recently discovered in the ROI that are potentially devastating to the native communities of KTA are manuka *(Leptospermum scoparium)* and moho *(Heliocarpus popayanensis)*. Disturbed moist forests are most at risk from these invasions, and efforts are needed to protect the native communities within these boundaries.

Native natural community types within the KTA/KLOA ROI fall into six general categories: montane wet, lowland wet, lowland forest, lowland moist, lowland dry, and intermittent aquatic natural communities, none of which contain known wetlands (USARHAW and 25th ID [L] 2001a).

Within the montane wet communities there are three community types. The mixed fern/shrub community is a fairly restricted community in the topmost reaches of the Ko'olau Mountains, and rainfall generally exceeds 150 inches (381 centimeters) (USARHAW and 25th ID [L] 2001a). Common fern species in the area include *Sadleria* spp., *Cibotium* spp., and *Dicranopteris* spp. Common shrub species include *Hedyotis* spp., 'ōhi'a (*Metrosideros polymorpha),* 'ōhelo *(Vaccinium* spp.*)* and kōpiko *(Psychotria* spp.*)*. Rare plants listed within this community are ha'iwale *(Cyrtandra viridiflora),* and kōlea *(Myrsine fosbergii)*, *(M. juddii)*. The 'ōhi'a mixed bog community is also restricted to the upper elevations (above 2,800 feet [853.4 meters]) of the Ko'olau Mountains. Annual rainfall exceeds 150 inches (381 centimeters), and the soils are poorly drained, acidic, and part clay. 'Ōhi'a is the dominant species, whether as dwarf form in open shrubland or as dense shrub thicket. The herbaceous understory is composed of sedges, grasses, and mosses, including *Oreobolus,* kuolohia *(Rhynchospora), Dichanthelium,* 'uki *(Machaerina),* and *Racomitrium*. This community is critically imperiled.

'Ōhi'a shrubland falls between 2,400 and 2,800 feet (731.5 and 853.4 meters). The steep windswept ridges have shallow soil, and rainfall is generally between 100 and 200 inches (254 and 508 centimeters) per year. Dwarfed native trees and shrubs thrive here. In addition to 'ōhi'a, this community frequently consists of manono *(Hedyotis terminalis),* 'alani *(Melicope* spp.*)*, kōlea *(Myrsine* spp.*),* and other plants. Common herbaceous species in this community include *Trematolobelia* spp. and *Clermontia* spp., and ferns are represented by *Cibotium* spp. and 'ama'u *(Sadleria* spp.*)*. Documented rare plants in this community include ha'iwale *(Cyrtandra viridifolia)*, wāwae'iole *(Phlegamriarus nutans)*, *Hesperomania arborescens,* kōlea *(Myrsine* spp.*),* heae*(Zanthoxylum oahuense),* and O'ahu violet *(Viola oahuense)*.

The lowland wet community type in KTA is 'ōhi'a shrubland. It is found between 1,640 and 2,000 feet (500 and 610 meters). The steep windswept ridges have shallow soil, and rainfall is generally between 100 and 200 inches (254 and 508 centimeters) per year. Dwarf native tree

**Figure 7-21**
Vegetation Communities in the Kahuku/Kawailoa Training Areas Biological Region of Influence

and shrub species thrive here. In addition to ʻōhiʻa, this community frequently consists of manono *(Hedyotis* spp.*)*, ʻalani *(Melicope* spp.*)*, and kōlea *(Myrsine* spp.*)*. Common herbaceous species in this community include *Trematolobelia* spp. and *Clermontia* spp., and ferns are represented by *Cibotium* spp. and ʻamaʻu *(Sadleria* spp.*)*. Documented rare plants in this community include hāhā *(Cyanea koolauensis)* and nāʻū *(Gardenia mannii)*.

Within the lowland forest zone is the native ʻōhiʻa forest. The general conditions are warm, moist to wet, and wind sheltered in this area below the Koʻolau summit (1,900 to 2,000 feet [579 to 610 meters]). In addition to the dominant ʻōhiʻa, other common tree species include manono *(Hedyotis terminalis)*, mehame *(Antidesma platyphyllum)*, and kōlea *(Myrsine* spp.*)*, as well as the possible codominant species olapa *(Cheirodendron* spp.*)*. Amau *(Cibotium* spp.*)* species are the dominant ferns. Herbaceous plants are māmaki *(Pipturus albidius)*, naupaka kuahiwi *(Scaevola* spp.*)*, and naʻenaʻe *(Dubautia* spp.*)*. The only rare plant documented in this area is nāʻū *(Gardenia mannii)*.

Also within the lowland forest zone is the uluhe shrubland, which is widespread on many of the Hawaiian Islands, usually in wet lowland areas below 2,200 feet (671 meters). The dominant plants in this community include two ferns, uluhe *(Dicranopteris linearis)* and uluhe lau nui *(Diplopterygium pinnatum)*. No rare plants were observed in this community.

The KTA/KLOA ROI contains two lowland moist communities. Koa/ʻŌhiʻa forest is below 2,100 feet (640 meters) and in leeward areas of good drainage; the annual rainfall is between 35 and 75 inches (84 and 191 centimeters). Besides the dominant koa *(Acacia koa)* and ʻōhiʻa, native trees in this community include kōpiko *(Psychotria* spp.*)*, mehame *(Antidesma platyphyllum)*, ʻōhiʻa hā *(Syzygium sandwicensis)*, ʻahakea *(Bobea elatior)*, and halapepe *(Pleomele halapepe)*. Uluhe (*Dicranopteris linearis)* is the dominant understory species, but naupaka kuahiwi *(Scaevola gaudichaudiana)*, alaheʻe *(Canthium odoratum)*, and ʻākia are common. Also documented are ferns, such as palaʻā *(Odontosoria chinensis, Elaphoglossum crassifolium,* and *Nephrolepis exalta)*, vines, such as maile *(Alyxia oliviformes)* and ʻieʻie *(Freycinetia arborea)*, and sedges *(Carex wahuensis, C. meyenii,* and *Gahnia beechyi)*. Rare plants in the KTA community are kaulu (*Pteralyxia macrocarpa)* and ʻoheʻohe *(Tetraplasandra gymnocarpa)*. Rare plants in the KLOA community are nāʻū *(Gardenia mannii)*, heau *(Exocarpus gaudichaudii)*, and ʻalani *(Melicope lydgatei)*.

ʻŌhiʻa lowland mesic forest is an additional community dominated by ʻōhiʻa. Annual rainfall averages about 75 inches (191 centimeters), and though ʻōhiʻa makes up about 70 percent of the canopy layer, many other native plants are included in the community. ʻAhakea *(Bobea elatior)*, halapepe *(Pleomele halapepe)*, kōlea *(Myrsine* spp.*)*, and lama *(Diaspyros sandwicensis)* are all represented. The rare plant in this community is nīoi (*Eugenia koolauensis)*.

Lama forest is the only lowland dry community type in the KTA/KLOA ROI. It is confined to cliffs and harsh ʻaʻā lava flows in the Hawaiian Islands, and threats from pigs and exotic plants are low. KTA has small stands of this community type between 600 and 900 feet (183 and 274 meters). The canopy is dominated by *Diaspyros sandwicensis,* though other native trees are common. The understory is commonly made of alaheʻe *(Canthium odoratum)*, ʻākia *(Wikstroemia* spp.*)*, pūkiawe (*Styphelia tameiameiae)*, and ʻakoko *(Chamaesyce multiformis)*. Native vines are maile and huehue *(Cocculus trilobus)*. Rare plant species in this community in KTA are nīoi (*Eugenia koolauensis)* and keahi (*Nesoluma polynesicum)*.

The intermittent streams and gulches that run through the KTA/KLOA ROI are Pākūlena Stream, Kālunawaika'ala Stream, Kalele'iki Stream, Paumalū Stream, Kaunala Stream, Elehāhā Stream, Kamananui Stream, Kaiwiko'ele Stream, Kawainui Stream, Kawai'iki Stream, 'Ōpae'ula Stream, Helemanō Stream, Poamoho Stream, North Fork Kaukonahua Stream, Waiale'e Gulch, 'Ō'io Stream, 'Ō'io Gulch, Kawela Stream, Pahipahi'ālua Gulch, Ho'olapa Gulch, Kalaeokahipa Gulch, 'Ōhi'a Gulch, Kea'aula Gulch, Lamaloa Gulch, and Hina Gulch.

Drum Road begins at HMR and continues through the Ko'olau Mountains to various sites in the KTA via KLOA. The trail generally follows the western border of KLOA. The vegetation alongside this trail is composed mainly of nonnative species in the lower elevations with the native plants ('ie'ie, 'ōhi'a, uluhe, koa) increasing in distribution toward the upper elevations. Rainfall and cloud cover is not uncommon along this trail. There are occasional cleared, flat grassy areas along the trail. These areas have been subjected to grazing pressure from cattle for many years and are either still in use or are maintained as helicopter landing zones.

The Army seeks to preserve and expand the populations of federally listed plants on lands under their management. The pest management and endangered species management programs overlap and reduce the negative impacts of introduced species on the landscape (USARHAW and 25th ID[L] 2001a). Control of noxious weeds is required by the State of Hawai'i Noxious Weed Rules (USDA, no date) and is supported by the AR 200-5 *Pest Management* (HQDA 1999).

Invasive and noxious weeds that are proposed for control in the KTA/KLOA ROI include *Acacia confusa,* hāmākua pāmakani *(Ageratina riparia), Aleurites moluccana,* broomsedge *(Andropogon virginicus),* Oriental vessel fern *(Angiopteris evecta),* shoebutton *(Ardisia elliptica),* pink fringe *(Arthrostema ciliatum),* daisy fleabane *(Erigeron karvinskianus),* Kāhili ginger *(Hedychium gardnerianum),* heirba del solado *(Melochia umbellata),* fountain grass *(Pennisetum setaceum),* and Chinese violet (*Asystasia gangetica)*. Widespread weed species would be controlled where they threaten native plants and communities. Current control methods have focused on palm grass *(Setaria palmifolia),* strawberry guava *(Psidium cattleianum),* princess flower *(Tibouchina urvilleana),* manuka, teatree *(Leptospermum flavescens), and* holly *(Ilex cassine)*.

Native plants are directly affected by populations of feral pigs *(Sus scrofa scrofa),* which contribute to numerous ecological problems (Juvik 1998). The effects of these wild pigs include trampled and grazed native plants and advanced erosion and landslides (USARHAW and 25th ID[L] 2001a; PCSU 1999, 2000, 2001). Water collects in the rutted ground, providing a perfect breeding place for mosquitoes, which can carry avian malaria (HINHP 1994). Browsing and otherwise destroying the native vegetation encourages nonnative plants to become established, which can severely alter the habitat for native plants (Atlas 1998).

A possible additional threat to *Melicope lydgatei* is the nonnative black twig borer *(Xylosandrus compactus)*. The pest burrows into branches and introduces a pathogenic fungus that often kills the host.

Introduced snails and slugs pose a threat to rare Hawaiian plants by preying on the seedlings, stems, and fruit, which reduces regeneration of the host. Rats *(Rattus rattus* and *R. exulans hawaiiensis)* also are known to eat the fruit of certain species of native plants, seriously affecting the reproduction of *Pritchardia* spp. and plants in the *Campanulaceae* and *Gesneriaceae* families (Atlas 1998).

Habitat in the KTA/KLOA ROI could be disturbed by military training activities, and trampling associated with training activities could affect populations of rare plants (R. M. Towill Corp. 1997b). Nonmilitary impacts on the area include cultivation of illegal plants along the KTA boundary, pig hunting, mountain biking, horseback riding, and motocross use. Schofield-Waikāne and Pūpūkea hiking trails are within the ROI, and hiking activities are monitored to reduce potential human impacts. Cigarette litter, campfires, arson, and vehicle activity are nonmilitary impacts that could affect the area.

Fire threat is high in KTA. Fire has been known to occur in the neighboring KLOA and is a threat to native plants and ecological communities. Areas along the lower boundary of the native plant zones are mostly highly flammable introduced species. Additionally the rugged terrain of the training area limits access for fire suppression and control. The Army has standard operating procedures meant to reduce the threat of fire in these remote areas.

One important component of Army resource management is ITAM and the individual projects that are assigned under that heading (see Chapter 2, Section 2.1.5 for an overview). The ITAM LCTA program has not been fully implemented at KLOA or KTA. KLOA is most often used for aviation training and is at a low priority for general monitoring. Vegetation surveys and erosion studies have been done on KTA. These data provided the LRAM program with priority areas for rehabilitation. KLOA also includes areas that are targeted by LRAM as needing improvement. TRI seeks to find the best most efficient uses of the training lands on KTA and KLOA, while being sensitive to the natural resources. Wildfire management plans are in production for KTA and KLOA.

### Wildlife

Most of the wildlife inhabiting the landscape that makes up the KTA/KLOA ROI are nonnative. The Army has been conducting regular zoological field surveys on KTA and KLOA that have focused on special status invertebrates, mammals, and birds. There have been no specific reptile or amphibian surveys on KTA due to the absence of native terrestrial reptiles and amphibians on the Hawaiian Islands. Surveys conducted by the University of Hawai'i, Bishop Museum Hawaiian Heritage Program, and the HINHP (1994) are cited in the following section. These natural resource surveys have been used for the resource assessments in the *Biological Inventory and Management Assessment at KTA for USARHAW* (HINHP 1994), *Biological Inventory and Management Assessment at KLOA for USARHAW* (HINHP 1994), *Endangered Species Management Plan Report, O'ahu Training Areas* (R. M. Towill Corp. 1997b), as well as the more recent *O'ahu Training Areas INRMP* (USARHAW and 25th

ID[L] 2001a). Zoological information on Drum Road is less extensive because there are few known surveys focused on wildlife in these areas. Information on this section was gathered in association with the environmental assessment for improvements to Drum Road, and a site visit by a Tetra Tech biologist on January 30, 2003. The following sections describe the general presence of species within the invertebrate, mammal, bird, and fish species. Sensitive species are listed in Tables 7-20 and 7-21.

### Invertebrates

The following are native snails observed in the ROI: O‘ahu tree snails (*Achatinella curta, A. dimorpha, A. sowerbyana,* and *A. livida),* achatinellid land snails (*Auriculella perpusilla, A. pulchra,* and *Tornatellides* spp.*),* and the subulinid land snail *(Lamellidea* spp.*)* (R. M. Towill Corp. 1997b). Other native invertebrates known to KTA include springtails *(Entomobyra* spp. and *Seira* spp.*),* flies *(Camsicnemus ornatus, Drosophilia suzukii* group spp., *Forcipomyia hardyi, F. kaneohe, Limonia hawaiiensis, L. jacoba, L. perkinsi, L. stygipennis, Orthocladius* spp., and *Scaptomyza* spp.*)*, and three species of true bugs *(Hyalopeplus pellucidus, Microvelia vagans*, and *Nabis kerasphoros)* (USARHAW and 25th ID[L] 2001a). Also observed on KTA have been four native species of butterflies and moths *(Hyposmocoma* spp. undetermined, *Mestolobes minuscula, Schrankia* spp., and *Scotorythra rara),* native planthoppers *(Trioza* spp.*),* bees, wasps, and ants *(Enicospilus* spp.*),* and an undetermined member of the *Eucoilidae* family. There are three native species of dragonflies and damselflies found on KTA *(Anax strenuus, Megalgrion koelense,* and *Neogonia blackburni)*. The common stream shrimp *(Atyoida bisulcata)* and freshwater sponge *(Heteromyenia baileyi)* are native aquatic invertebrates that occur on KTA (R. M. Towill Corp. 1997b; USARHAW and 25th ID[L] 2001a). Additional native invertebrate species known to KLOA include the O‘ahu tree snails *A. livida* and *A. pulcherima.*

Zoological surveys of KTA have detected the following nonnative invertebrates: cannibal snail *(Euglandina rosea),* beetles *(Diomus notescens* and *Orcas australasiae),* springtail *(Salina celebensis),* and flies *(Allograpta exotica, Atrichopogon jacobsoni,* and *Letoera* spp.*)*. There are also nonnative planthoppers *(Heterpsylla mimosae),* bees *(Diadegma* spp.*),* grasshoppers *(Elimaea punctifera),* and the two-spotted leafhopper *(Sophonia rufofascia)* (R. M. Towill Corp. 1997b; USARHAW and 25th ID[L] 2001a). Flatworms, amphipods, isopods, and thairid snails were found in Paumalū Stream (USARHAW and 25th ID[L] 2001a). Humans have purposely or accidentally introduced these species to O‘ahu. They now threaten the native invertebrate species through competition for resources, predation, and the spread of disease. The cannibal snail is especially destructive to the native snail population that it preys on.

### Amphibians

There are no native terrestrial amphibians on the Hawaiian Islands.

Nonnative amphibians found on O‘ahu and potentially on KTA are the bullfrog *(Rana catesbeiana),* wrinkled frog *(R. rugosa),* giant toad *(Bufo marinus),* coqui frog *(Eleutherdactylus coqui),* Cuban tree frog *(Osteopilus septentrionalis),* and green and black dart-poison frogs *(Dendrobates auratus)*. These species were introduced into O‘ahu from other countries and have inhabited areas where adequate aquatic habitat and surrounding vegetation exists.

*Reptiles*
There are no native terrestrial reptiles on the Hawaiian Islands.

Nonnative reptiles found on O'ahu include the green anole *(Anolis carolinenesis),* mourning gecko *(Lepidodactylus lugubris),* stump-toed gecko *(Gehyra mutilata),* tree gecko *(Hemiphyllodactylus typus),* Indo-Pacific gecko *(Hemidactylus garnotii),* house gecko *(H. frenatus),* metallic skink *(Lampropholis delicata),* and gold dust day gecko *(Phelsuma laticauda laticauda)*. There is only one known terrestrial snake occurring on the Hawaiian Islands, the island blind snake *(Ramphotyphlops braminus)*.

*Terrestrial Mammals*
The Hawaiian hoary bat *(Lasiurus cinereus semotus)* has the potential to occur on KTA (USARHAW and 25th ID[L] 2001a). It is the only native terrestrial mammal on the Hawaiian Islands.

The following nonnative species may occur on KTA: feral pig *(Sus scrofa scrofa),* Indian mongoose *(Herpestes auropunctatus),* feral dog *(Canis familiaris),* Norway rat *(Rattus norvegicus),* black rats *(R. rattus),* Polynesian rat *(R. exulans hawaiiensis)*, and house mouse *(Mus musculus)*.

*Birds*
The following indigenous forest bird species have been recorded on KTA: O'ahu 'elepaio *(Chasiempis sandwichensis ibidis),* O'ahu 'amakihi *(Loxops virens chloris),* great frigatebird *(Fregata minor palmerstoni),* Pacific golden-plover *(Pluvialis fulva),* and the Hawaiian short-eared owl *(Asio flammeus sandwichensis)*.

Nonnative bird species known to occur in KTA include the red-billed leiothrix *(Leiothrix lutea),* white-rumped shama *(Copsychus malabaricus),* Japanese bush warbler *(Cettia diphone),* spotted dove *(Streptopelia chinensis),* zebra dove *(Geopelia striata),* common myna *(Acridotheres tristis),* red-vented bulbul *(Pycnonotus cafer),* and the Japanese white-eye *(Zosterops japonicus)*. Introduced species on KTA are nutmeg manikin *(Lonchura punctulatua),* red-crested cardinal *(Paroaria coronata),* common waxbill *(Estrilda astrild),* house finch *(Carpodactus mexicanus),* white cockatoo *(Cacatua galerita),* barn owl *(Tyto alba),* ring-necked pheasant *(Phasianus colchicus),* and northern cardinal *(Cardinalis cardinalis)*.

*Fish*
The aquatic natural communities in the KTA/KLOA ROI are mostly intermittent streams. Mālaekahana Stream is not intermittent, but it goes underground before reaching the ocean. HINHP conducted biological assessments of selected streams in 1997, and the USGS collects data from stream gages at 'Ōpae'ula and Kamananui streams. Fish identified as part of the Anahulu River, Waimea River, and Paukauila Stream survey include endemic gobies (*Awaous guamensis, Lentipes concolor,* and *Stenogobius hawaiiensis*), Sandwich Island sleeper *(Eleotris sandwichensis)*, Hawaiian flagtail *(Kuhlia sandvicensi)* and 'o'opu nōpili *(Sicyopterus stimpsoni)* (AECOS 2002; USARHAW and 25th ID[L] 2001a).

One introduced fish, *Geotomus,* was observed at Paumalū Stream (USARHAW and 25th ID[L] 2001a).

### *Sensitive Species*

Potential sensitive species in the KTA/KLOA ROI were identified by USFWS, the State of Hawai'i DLNR (2002a), USARHAW biologists and surveys, and the HINHP (1994).

A current list of all sensitive vegetation and wildlife and any critical habitat in the region is found in Tables 7-20 and 7-21. An assessment of the likelihood of a species occurring on KTA was made based on the habitat requirements and geographic distribution of the species, existing on-site habitat quality, and the results of biological surveys. Natural history descriptions of sensitive species with the potential to occur in the ROI, and specific locations if known, can be found in Appendix I-1 (Recovery Plans 1-1a; Plants: I-1b; Wildlife I-2c; Critical Habitat I-1d).

#### *Sensitive Plant Species in the KTA/KLOA ROI*

KTA and KLOA have twenty species of endangered plants, six species of concern and ten candidate species for federal listing. Sensitive plants listed as occurring within the training area include *Chamaesyce rockii, Cyanea acuminata, C. crispa, C. humboldtiana, C. koolauensis, C. lanceolata, C. st-johnii, Cyrtandra dentate, C. viridiflora, Doodia lyonii, Eugenia koolauensis, Exocarpus gaudichaudii, Hedyotis fluviatilis, Hesperomannia arborescens, Hibiscus koikio* ssp. *kokio, Joinvillea ascendens* ssp. *ascendens, Lobelia gaudichaudii* ssp. *koolauensis, L. hypoleuca, Melicope hiiakae, M. lydgatei, Myrsine fosbergii, Nesoluma polynesicum, Phlegmariarus nutans, Phyllostegia hirsute, Platydesma cornuta* var. *cornuta, Psychotria hexandra* ssp. *oahuensis, Pteris lydgatei, Sanicula purpurea, Stenogyne kaakae* ssp. *sherfii, Tetraplasandra gymnocarpa, Thelypteris boydiae, Pteralyxia macrocarpa, Myrsine juddii, Viola oahuensis, Gardenia mannii,* and *Zanthoxylum oahuense*.

Although the native vegetation on O'ahu's central plateau has been almost completely replaced by agriculture, the KTA/KLOA ROI hosts a very important cache of endangered species and natural communities. The terrain is characterized by deep gulches and high cliffs covered with dense vegetation. Sensitive plants and their likelihood of occurrence in the KTA/KLOA ROI are shown in Table 7-20; documented occurrences of sensitive plant species in the KTA/KLOA ROI are shown in Figure 7-22.

#### *Sensitive Wildlife Species*

The following discussion includes a profile of only those sensitive wildlife species that are considered likely to be found in the project area. This information is based heavily on information from the O'ahu INRMP (USARHAW and 25th ID[L] 2001a), ESMPR (R.M. Towill Corp. 1997b), and the biological inventories of KTA and KLOA (HINHP 1994). HINHP biologists and qualified individuals conducted surveys of KTA in 1993 and 1994. Shallenberger conducted special status species surveys of O'ahu training areas, including KTA, in 1977. The latest USFWS and survey information on species and habitat in the SBCT ROI has been incorporated into this evaluation of biological resources. Sensitive terrestrial wildlife and their likelihood of occurrence at the KTA/KLOA ROI are listed in Table 7-21. Figure 7-23 shows the locations of documented sensitive terrestrial wildlife identified in the KTA/KLOA ROI. Sensitive species outlined in the table below are most likely to occur in the higher elevations in the Ko'olau Mountains and are unlikely to occur in the disturbed lowland areas that make up a large portion of the ROI.

**Table 7-20**
**Sensitive Plant Species Occurring or Potentially Occurring in the KTA and KLOA ROI**

| Scientific Name | Hawaiian Name/Common Name | Federal Status[1] | State[2]/Global Status[3] | Habitat | Date Last Observed or Confirmed[4] | Likelihood of Occurrence |
|---|---|---|---|---|---|---|
| *Chamaesyce rockii* | ʻakoko, koko, kōkōmālei/- | E | -/G1 | Cloud-swept summit and deep wet gulches | 2000 | C |
| *Cyanea acuminata* | ʻōhā, hāhā, ʻōhāwai/- | E | -/G1 | Moist to wet forest | 2000 | C |
| *C. crispa* | ʻōhā, hāhā, ʻōhāwai/- | E | -/G1 | Moist to wet forest | 2000 | C |
| *C. humboldtiana* | ʻōhā, hāhā, ʻōhāwai/- | E | -/- | Moist to wet forest | 2000 | C |
| *C. koolauensis* | ʻōhā, hāhā, ʻōhāwai/- | E, CH | -/G1 | Moist to wet forest | 2000 | C |
| *C. lanceolata* | ʻōhā, hāhā, ʻōhāwai | C | -/G1 | Moist to wet forest | 2000 | C |
| *C. st.-johnii* | ʻōhā, hāhā, ʻōhāwai/- | E, CH | -/G1 | Cloud-swept ridges | 2000 | C |
| *Cyrtandra dentata* | haʻiwale/- | E, CH | -/G1 | Moist forest slopes | 2000 | C |
| *C. viridiflora* | NCN | E | -/- | Windy wet ridge tops | 2000 | C |
| *Delissea subcordata* | NCN | E, CH | -/G1 | Moist to wet forest | 2000 | C |
| *Doodia lyonii* | NCN | SOC | -/G1 | Moist to wet forest floors, streambanks | 2004 | C |
| *Eugenia koolauensis* | nīoi/- | E | -/G1 | Dry gulches and slopes | 2002 | C |
| *Exocarpus gaudichaudii* | heau/whiskbroom sandalwood | SOC | -/G1 | Moist ridges and shrublands, wet forests, usually associated with ʻōhiʻa | 2000 | C |
| *Gardenia mannii* | nānū, nāʻū | E, CH | -/G1 | Moist to wet forests | 2000 | C |
| *Hedyotis fluviatilis* | NCN | C | -/G1 | Moist to wet forests | 2000 | C |
| *Hesperomannia arborescens* | NCN | E, CH | -/- | Moist to wet forest slopes and ridges | 2000 | C |
| *Hibiscus kokio* ssp. *kokio* | Kokio ula | SOC | -/- | Dry to wet forest | 2004 | C |
| *Joinvillea ascendens* ssp. *ascendens* | ohe | C | -/G5 | Wet forest and intermittent streams | 2004 | C |
| *Lobelia gaudichaudii* ssp. *koolauensis* | NCN | E | -/G4 | Cloudswept wet forest | 2004 | C |
| *L. hypoleuca* | NCN | SOC | -/G3 | Moist to wet forest | 2004 | C |
| *Melicope hiiakae* | NCN | C | -/- | Native-dominated moist forest | 2000 | C |
| *M. lydgatei* | NCN | E | -/-G1 | Native-dominated moist forest | 2000 | C |
| *Myrsine fosbergii* | NCN | C | -/-G2 | High elevation Koʻolau forests | 2000 | C |
| *M. juddii* | Kolea | E | -/G1 | Cloudswept wet forest | 2004 | C |
| *Nesoluma polynesicum* | keahi | SOC | -/G2 | Native-dominated moist forest | 2000 | C |

**Table 7-20**
**Sensitive Plant Species Occurring or Potentially Occurring in the KTA and KLOA ROI** *(continued)*

| Scientific Name | Hawaiian Name/Common Name | Federal Status[1] | State[2]/Global Status[3] | Habitat | Date Last Observed or Confirmed[4] | Likelihood of Occurrence |
|---|---|---|---|---|---|---|
| *Phlegmariarus nutans (Lycopodium nutans)* | wāwae'iole/ | E, CH | -/- | Wet forests | 2000 | C |
| *Phyllostegia hirsuta* | NCN | E, CH | -/G1 | Steep, shaded, moist to wet slopes | 2000 | C |
| *Platydesma cornuta* var. *cornuta* | pilo kea/- | C | -/G2 | Moist forests | 2001 | C |
| *Psychotria hexandra* ssp. *oahuensis* | NCN | C | -/G4 | Moist to wet forests | 2000 | C |
| *Pteris lidgatei* | NCN | E, CH | -/-G1 | Steep banks in wet forest | 2000 | C |
| *Pteralyxia macrocarpa* | kaulu | C | -/G1 | Native-dominated moist forest | 2000 | C |
| *Sanicula purpurea* | NCN | E, CH | -/-G1 | Mossy slopes and open bogs | 2000 | C |
| *Stenogyne kaakae* spp. *sherfii* | NCN | SOC | -/- | Mesic forest | 2000 | U |
| *Tetraplasandra gymnocarpa* | 'ohe'ohe/- | E | -/G1 | Summit forests | 2000 | C |
| *Thelypteris boydiae* | NCN | C | -/G1 | Moist forest slopes | 2000 | C |
| *V. oahuensis* | olopu | E, CH | -/G1 | Cloud-swept summits | 2000 | C |
| *Zanthoxylum oahuense* | ae | C | -/G2 | Mesic forest | 2000 | C |

Sources: USFWS 2002a; USARHAW and 25th ID(L) 2001a and b

Notes:
NCN = No common name

Status:

**[1]Federal:**
E = Endangered
SOC = Species of concern
C = Candidate species for listing
CH = Critical habitat designated or proposed for designation

**[3]Heritage Global Rank:**
G1 = Species critically imperiled globally (typically 1-5 current occurrences)
G2 = Species imperiled globally (typically 6-10 current occurrences)
/-/ = No Status

**[2]State**
/-/= No Status

[4]Date last observed and recorded in one of the above references, or confirmed by USFWS in comment letter dated Jan 5, 2003 and provided to the preparers in Jan 2004.

**Likelihood of occurrence on the project site**
C = Confirmed
P = Potentially may occur
U = Unlikely

**Table 7-21**
**Sensitive Terrestrial Wildlife Species Occurring or Potentially Occurring on KTA/KLOA ROI**

| Scientific Name | Hawaiian Name/ Common Name | Federal Status[1] | State[2]/Global Status[3] | Habitat | Date last observed | Likelihood of Occurrence |
|---|---|---|---|---|---|---|
| **Invertebrates** | | | | | | |
| *Achatinella aperplexa* | pūpū kuahiwi, pūpū kanioe, kāhuli/O'ahu tree snail | E | E/G1 | Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 meters) | 2001 | C |
| *A. byronii/decipiens* | pūpū kuahiwi, pūpū kanioe, kāhuli/O'ahu tree snail | E | E/G1 | Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 meters) | 2001 | C |
| *A. curta* | pūpū kuahiwi, pūpū kanioe, kāhuli/O'ahu tree snail | E | E/G1 | Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 meters) | 1986 | C |
| *A. lila* | pūpū kuahiwi, pūpū kanioe, kāhuli/O'ahu tree snail | E | E/G1 | Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 meters) | 2001 | C |
| *A. livida* | pūpū kuahiwi, pūpū kanioe, kāhuli/O'ahu tree snail | E | E/GH | Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 meters) | 2001 | C |
| *A. pulcherima* | pūpū kuahiwi, pūpū kanioe, kāhuli/O'ahu tree snail | E | E/G1 | Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 meters) | 1974 | P |
| *A. sowerbyana* | pūpū kuahiwi, pūpū kanioe, kāhuli/O'ahu tree snail | E | E/G1 | Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 meters) | 2000 | P |
| **Birds** | | | | | | |
| *Asio flammeus sandwichensis* | pueo/Hawaiian short-eared owl | SOC+ | E*/G5T3 | Pastures, grasslands, dry and wet forests that are dominated by either native or nonnative vegetation. Sea level to 7,900 | 1985 | C |
| *Chasiempis sandwichensis ibidis* | O'ahu 'elepaio/- | E, CH | E/G4T1 | Native Hawaiian forest | 1977 | P |
| *Himatione sanguinea sanguinea* | 'apapane/- | + | -/G4 | Hardwood forest, primarily native 'o'hia and 'o'hia-koa and mixed native-exotic forest at high elevations. | 1993 | C |
| *Paroreomyza maculata* | 'alauahio/O'ahu creeper | E | E/G1 | Native Hawaiian shrublands, forests, and bogs | 1985 | C |
| *Vestiaria coccinea* | 'i'iwi/Hawaiian honeycreeper | + | E*/G4 | Native forests, especially 'o'hia forest | 2000 | C |

**Table 7-21**
**Sensitive Terrestrial Wildlife Species Occurring or Potentially Occurring on KTA/KLOA ROI** *(continued)*

| Scientific Name | Hawaiian Name/ Common Name | Federal[1] Status | State[2]/Global[3] Status | Habitat | Date Last Observed | Likelihood of Occurrence |
|---|---|---|---|---|---|---|
| **Mammals** | | | | | | |
| *Lasiurus cinereus semotus* | -/Hawaiian hoary bat | E | E/G5T2 | Bare rock, cliff, hardwood forest, grassland/herbaceous, hardwood woodland, and riparian habitats | 1976 | P |
| **Fish** | | | | | | |
| *Lentipes concolor* | ‘o‘opu ‘alamo‘o /- | - | -/G3 | Freshwater, brackish, and marine habitats, depending on life stage | 2000? | C |

Sources: USARHAW and 25th ID(L) 2001a; HDLNR 2002a; HINHP 1994; R. M. Towill Corp. 1997; NatureServe 2001; Virginia Tech 1998
Notes:
NCN = No common name
*The state endangered listing refers only to the populations on O‘ahu, Lana‘i, and Moloka‘i

Status:
/-/ = No Status

[1]**Federal:**
E = Endangered
SOC = Species of concern
CH = Critical habitat designated or proposed for designation
\+ = Birds of Conservation Concern

[3]**Heritage Global Rank:**
G1 = Species critically imperiled globally (typically 1-5 current occurrences)
G3 = Species rare with restricted range (typically 21-100 current occurrences)
G4 = Species apparently globally secure
G5 = Species demonstrably globally secure
GH = Species known only from historical occurrences
T1 = Subspecies critically imperiled globally (typically 1-5 current occurrences)
T2 = Subspecies imperiled globally (typically 6-10 occurrences)

[2]**State**
E = Listed as endangered

**Likelihood of occurrence on the project site**
C = Confirmed
P = Potentially may occur
U = Unlikely to occur

**Figure 7-22**
Sensitive Plant Species in the Kahuku/Kawailoa Training Areas Biological Region of Influence

**Figure 7-23**
Sensitive Wildlife Species in the Kahuku/Kawailoa Training Areas Biological Region of Influence

Nine federally listed endangered species and five species globally or locally threatened have been recorded in KTA or its vicinity (R.M. Towill Corp. 1997b). These species are listed on Table 7-21 and are described further below. This includes eight invertebrates, five birds, and an endangered terrestrial mammal (USARHAW and 25th ID[L] 2001a).

### Sensitive Habitats

*Critical Habitat*

There are 681 acres of designated plant critical habitat within the KTA/KLOA ROI but there is no designated critical habitat on the Army installations. The plants for which critical habitat has been designated on KTA are listed in Appendix I-1d and are shown in Figure 7-24. There are 4,812 acres of critical habitat for the ‘elepaio in the KTA/KLOA ROI (see Figure 7-25).

*Ecologically Sensitive Areas*

There are two areas on KTA that have been determined by elevation, topography, and prevailing ecological conditions to be ecologically sensitive. They contain vegetation communities that are considered rare or threatened.

The wet summit crest zone is considered sensitive and exists in areas above 1,640 feet (500 meters), along the northern Ko‘olau summit. The relatively gentle ridges are cut by steep-sided gulches in this cool, wet cloud-swept region. The vegetation community in this part of the ROI is almost exclusively ‘ōhi‘a lowland wet shrubland; this community is not considered rare and has a Global Heritage ranking of G3. Loulu hiwa lowland wet forest had been labeled a rare natural community (Global Heritage ranking of G1) and occurs in one steep-sided drainage area within the ROI. An additional rare natural community known in this area is ‘ōhi‘a mixed montane bog, which has a Global Heritage ranking of G1.

The second sensitive area is the lowland forest zone. It exists from ridge tops to gulch bottoms at elevations of 590 to 2,200 feet (180 to 671 meters). This area is generally less windy, with conditions being warmer, and moisture ranging from moist to wet as rainfall diminishes increasingly with distance from the summit. ‘Ōhi‘a lowland wet forests are present in higher elevations, with gradation to koa/‘ōhi‘a lowland moist forest. Adjacent areas are generally a mosaic of moist forest types, with somewhat diverse canopy constituents, though they are generally dominated by ‘ōhi‘a. The drier zones are moist to dry shrublands dominated by *Dodonea viscosa* (‘a‘ali‘i). The steeper slopes at this elevation are dominated by uluhe *(Dicranopteris)* lowland wet shrubland. These natural communities represent relatively widespread vegetation types that occur on most of the main islands; none are considered rare (Global Heritage rankings of G3 and G4).

There is one aquatic natural community (Mālaekahana Stream) on KTA with a vegetation community rank of G4.

**Figure 7-24**
Federally Designated Plant Critical Habitat in the Kahuku/Kawailoa Training Areas Biological Region of Influence

**Figure 7-25**
Federally Designated Critical Habitat for the O'ahu 'Elepaio at the Kahuku/Kawailoa Training Areas Biological Region of Influence

*Biologically Significant Areas*

The Hawai'i Natural Heritage Program has defined three types of BSAs for managing important natural communities. All are found in the KTA/KLOA ROI and are shown in Figure 7-26.

BSA1: Contains a high density of federally listed endangered, proposed endangered, or candidate species.

Approximately 1,000 acres (405 hectares) of the KTA/KLOA ROI in KLOA are designated as BSA1. This includes much of the wet summit crest ecological zone and the two rare natural communities. Twenty-six of the 28 endangered plant species at KLOA are in this area.

BSA2 contains all or some of the following: lower densities of current occurrences of federally listed endangered or proposed endangered species, current occurrences of candidate species or other species of concern that are expected to be upgraded to federal protected status within the next few years, and areas judged likely to contain high densities of federally listed species based on habitat assessment, despite the lack of any record of such occurrence to date.

There are five BSA2 areas in KTA, three of which are in the northern portion of the training area and contain populations of *Eugenia koolauensis*. At the southern tip of KTA is a BSA2 that includes in its vegetative community populations of the federally listed as endangered *Gardenia mannii, Cyanea koolauensis,* and *Hesperomannia arborescens*. In the northwest of KTA is an additional BSA2 that harbors the endangered tree *Tetraplasandra gymnocarpa,* as well as *Gardenia mannii*. An additional BSA2 zone within the ROI is composed mostly of potential habitat for the endangered land snail, *Achatinella*. This area covers all the remaining wet summit crest zone that was not included in BSA1. These endangered plant species are known to occur in this region: *Eugenia koolauensis, Cyanea longiflora, Delissea subcordata, Gardenia mannii, Phlegmariarus nutans, Melicope lydgatei, Myrsine juddii, Phyllostegia hirsute,* and *Viola oahuensis*.

BSA3 is stands of intact native vegetation with few or no known occurrences of rare elements.

KTA's BSA3 area is large and continuous and adjoins all but one of the BSA2 areas. The dominant vegetation types are 'ōhi'a lowland wet forest and uluhe lowland wet shrubland, which are potential habitats for endangered tree snails and native forest birds. As of 1997, seven plants in the BSA3 region were upgraded to federal status, and it is possible that boundary areas have been revised. Although there are no rare communities in the BSA3, the forests in these locations are native dominated and provide potential habitat for species reintroduction.

**Figure 7-26**
Biologically Significant Areas in the Kahuku/Kawailoa Training Areas Biological Region of Influence

Also found within the ROI is sensitive snail habitat. Although this habitat has not been federally designated or proposed as critical habitat, it has been identified as containing the habitat requirements necessary for supporting the federally listed and snail species of concern on O'ahu. This area is shown with the BSAs in Figure 7-26.

### 7.10.2 Environmental Consequences

In response to the agency and public comments received during the Draft EIS comment period we reevaluated our analysis of the biological resources. As a result of considering these comments and a reanalysis of the available information, we recognize that the impact on biological resources from fire could not be mitigated to the less than significant level. However, these impacts will be substantially reduced as a result of mitigation.

#### *Summary of Impacts*

Biological resources that have been considered include vegetation communities, wildlife, sensitive species, and sensitive habitats. Significant impacts include impacts from fire on sensitive species and habitat at KTA but these impacts are mitigable at KLOA, Construction of facilities and training activities including the use of the Drum Road and the impacts from nonnative species will have a significant but mitigable to less than significant impact on sensitive species and sensitive in the ROI. Less than significant impacts are expected on general habitat and wildlife from construction and training, on migratory birds from construction of FTI antennas and UAV use, and on wildlife from noise and visual impacts of project activities.

All biological resources have been assessed for potential impacts from project activities. For a full description of the impact methodology used to determine impact to a resource please refer to Section 4.10. Only the resources potentially affected are included in this chapter. If a resource was determined not to be impacted, it has not been included for discussion. A summary of impacts is provided in Table 7-22.

#### *Proposed Action (Preferred Alternative)*

##### Significant Impacts

*Impact 1: Impacts from fire on sensitive species and sensitive habitat*. SBCT activities within the KTA/KLOA ROI would increase the likelihood of wildland fire. This impact would be significant at KTA and significant and mitigable to less than significant at KLOA. At KTA, training would include use of certain pyrotechnics and SRTA ammunition, which is technically classified as live-fire ammunition and carries an increased threat of fire. There is less of a potential for fire at KLOA as training is limited to nonlive fire and consists mostly of dismounted maneuvers. There are direct and indirect ways in which fires would adversely affect sensitive species and habitat.

Sources of fire include cigarettes, vehicles, pyrotechnics, and nonlive fire training. Cigarettes discarded during mounted and dismounted training would be a risk with the increase in Soldiers and training at KTA and KLOA. Use of the roads by military vehicles would increase with the proposed renovation and construction. An increase in the traffic flow from Drum Road would increase the potential for fire that could affect sensitive species.

Specifically, the proposed Drum Road alignment traverses lowland wet and lowland moist forests and shrublands in KTA. Lastly, the increase in intensity in training, including the proposed SRTA live-fire training at KTA, would increase the probability that fire could originate in the ROI. The increased likelihood of wildfires and the potential SBCT risk factors are discussed in more detail in Section 7.12.2.

**Table 7-22**
**Summary of Potential Biological Impacts at KTA/KLOA**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Impacts from fire on sensitive species and sensitive habitat | ⊗/⦸ | ⊗/⦸ | ⊗/⦸ |
| Impacts from construction and training activities on sensitive species and sensitive habitat. | ⦸ | ⦸ | ⦸ |
| Impacts from the spread of nonnative species on sensitive species and sensitive habitat. | ⦸ | ⦸ | ⦸ |
| Impacts from construction and training on general vegetation, wildlife, and habitat. | ⊙ | ⊙ | ⊙ |
| Threat to migratory birds | ⊙ | ⊙ | ⊙ |
| Noise and visual impacts. | ⊙ | ⊙ | ⊙ |
| Runoff impacts on marine wildlife and coral ecosystems. | ○ | ○ | N/A |

LEGEND:

| | | | | | |
|---|---|---|---|---|---|
| ⊗ | = | Significant | + | = | Beneficial impact |
| ⦸ | = | Significant but mitigable to less than significant | N/A | = | Not applicable |
| ⊙ | = | Less than significant | | | |
| ○ | = | No impact | | | |

Because natural sources of fire ignition are relatively rare in Hawai'i, many native Hawaiian plants are not adapted to fire and are adversely affected by it. Nonnative species, particularly nonnative grasses and shrubs, typically invade areas after they have burned. This inhibits the regeneration of native plants. The removal of native species and the spread of nonnative species are potential impacts associated with wildland fires and is discussed under Impact 3. In general, most fires in Hawai'i are caused by humans and are fueled primarily by nonindigenous grasses. If native species withstand an initial fire, they are often destroyed by later fires influenced by the invasion of highly flammable grasses. The potential spread of nonnative species resulting from wildfires is considered a significant impact because nonnative species often out-compete native species and destroy native communities. Wildfires that burn into native communities or sensitive habitats could take listed animal species and destroy listed plant species and sensitive habitats. There is no assurance that fires or other threats associated with the Proposed Action would not reach or otherwise threaten populations of listed species on KTA.

Vegetation communities within the ROI include the following:

- Nonnative vegetation communities (approximately 7,534 acres [3,049 hectares]);
- Lowland mesic forest and shrubland (approximately 379 acres [153 hectares]); and
- Lowland wet forest and shrubland (approximately 1,496 acres [605 hectares]).

The rare plants found in these communities are *Chamaesyce rockii, Cyanea acuminate, C. crispa, C. humboldtiana, C. koolauensis, C. lanceolata, C. st.-johnii, Cyrtandra dentata, C. viridiflora, Doodia lyonii, Eugenia koolauensis, Exocarpus gaudichaudii, Gardenia mannii, Hedyotis fluviatilis, Hesperomannia arborescens, Hibiscus kokio* ssp. *kokio, Joinvillea ascendens* ssp. *ascendens, Lobelia gaudichaudii* ssp. *koolauensis, L. hypoleuca, Melicope hiiakae, M. lydgatei, Myrsine fosbergii, M. juddii, Nesoluma polynesicum, Phlegmariarus nutans, Phyllostegia hirsute, Platydesma cornuta* var. *cornuta, Psychotria hexandra* ssp. *oahuensis, Pteralyxia macrocarpa, Pteris lidgatei, Sanicula purpurea, Stenogyne kaakae* ssp. *sherfii, Tertaplasandra gymnocarpa, Thelypteris boydiae, Viola oahuensis, and Zanthoxylum oahuensis.* There are areas of highly flammable nonnative plants (such as *Andropogon virginicus*) along the lower boundaries of areas dominated by native plants (R. M. Towill Corp. 1997b, 6-27; USARHAW and 25th ID[L] 2001a, 290). BSAs that occur within the ROI and that could be affected by a wildfire are BSA2, at 214 acres (87 hectares), and BSA3, at 2,747 acres (1,112 hectares). The rugged terrain can limit the suppression and control of fires, and they can easily spread unchecked into areas that contain sensitive species.

Fires started as a result of any of these SBCT-proposed actions could adversely affect sensitive wildlife by killing them directly or indirectly by destroying their habitat. The sensitive wildlife species listed in Table 7-22 as potential or confirmed in the ROI could be affected by a wildfire, depending on its extent and duration.

In conclusion, sensitive species and habitat occurring within the ROI would be significantly affected by the likely increase in fires that would result from the Proposed Action. Although most sensitive species and sensitive habitats found on KTA and KLOA occur at high elevations, where fire vulnerability is relatively low because of higher levels of rainfall and less fire-prone vegetation, these areas are still considered at risk from fire. The outbreak of fire in portions of the ROI where sensitive species and habitat exist would be a significant impact that would be substantially lessened by regulatory and administrative mitigation, but would still be considered significant.

*Regulatory and Administrative Mitigation 1.* The effects of the Proposed Action on listed species in the ROI have been evaluated in the ESA Section 7 Consultation with USFWS. The Army will implement all the terms and conditions defined in the Biological Opinions issued by USFWS for current force and SBCT Proposed Actions on O'ahu and Hawai'i. The terms and conditions that implement the reasonable and prudent measures determined during this consultation will be incorporated into the Proposed Action. These measures will help avoid effects and compensate for impacts on listed species that would result directly and indirectly from implementing the Proposed Action. The Biological Opinions are available upon request.

The IWFMP for Pōhakoloa and Oʻahu Training Areas was updated in October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts from wildland fires. The plan is available upon request.

*Additional Mitigation 1.* No additional mitigation has been identified for this impact.

### *Significant but Mitigable to Less than Significant Impacts*

*Impact 2: Impacts from construction and training activities on sensitive species and sensitive habitat.* Loss and degradation of sensitive species and sensitive habitat would result from project activities and construction in the KTA/KLOA ROI, specifically in the KTA portion. The use of Drum Road as part of SBCT actions would adversely affect the environment by increasing the amount and intensity of traffic in the KTA/KLOA ROI. Though much of the area surrounding Drum Road is already dominated by nonnative plants, the roads bring humans closer to biologically sensitive areas that exist in the ROI (Section 7.10.1, Figure 7-26). Sections of Drum Road cross biologically sensitive areas, with stands of intact native vegetation. Part of the reason that these communities still exist is due to their remoteness. Opening this area up to the more direct effects of humans threatens these communities and their diversity. Hawaiian plant communities evolved without the environmental pressures that are prevalent on major land masses and thus have no defense mechanisms to cope with these stresses. By fragmenting these sensitive communities, corridors for natural species dispersal are interrupted, nonnative plants are encouraged to spread, and the potential for native species to be reintroduced to areas dominated by nonnative species is limited. Troop and other foot traffic in or adjacent to native forest areas could harm rare natural communities, plants, and snails (R. M. Towill Corp. 1997b). Dozens of federally listed and sensitive species are known to occur or have the potential to occur within the KTA/KLOA ROI (Figures 7-22 and 7-23). This includes thirty-six plants, Oʻahu creeper, Hawaiian hoary bat, and Oʻahu tree snails (Tables 7-20 and 7-21). There is also plant critical habitat and ʻelepaio critical habitat within the KTA/KLOA ROI (Figures 7-24 and 7-25), which could be negatively affected by training. *Tetraplasandra gymnocarpa*, a federally listed plant species was identified approximately 492 feet (150 meters) down a slope from Drum Road. This individual is unlikely to be affected directly by use of Drum Road but would be threatened by trampling if people were allowed to move off the proposed road or if a fire started as a result of vehicle use or a discarded cigarette. Because the slope is very steep, the likelihood of dismounted maneuver occurring along this portion of Drum Road is extremely small.

Increased use of Drum Road would result in direct and indirect impacts to sensitive species and habitat. The present trail is a rutted dirt road that sees little activity. The use of an upgraded Drum Road would fragment habitat for general and sensitive wildlife, ultimately reducing the quantity and quality of habitable lands. The presence of large loud vehicles would limit wildlife migration and would interrupt corridors for natural dispersal of species among these areas. Dust, soil erosion, and runoff would continue to adversely affect the areas that surround the road, including valuable freshwater resources. The loss in habitat value occurs primarily in those areas surrounding the trail, which are exposed to increased noise, car fumes, general activity, and invasive species, and areas downstream that are subject to runoff and erosion problems.

Dismounted and mounted training would occur on approximately 621 acres, (251 hectares) in multiple areas at KTA. Mounted training would occur and would almost double the present vehicular usage (7,211 MIMS currently, 13,772 MIMS predicted). Mounted maneuver proposed in portions of northern KTA (Figure 2-5) would destroy vegetation, possibly federally listed plants and would disturb wildlife, including federally and state listed species. The increased dismounted training proposed for KTA and along Drum Road would result in trampling and habitat degradation in sensitive areas. Dismounted training would involve a greater area at KLOA, expanding the present 0 acres to 5,064 (2,049 hectares) as part of the Proposed Action. Impacts would be significant and mitigable to less than significant by following mitigation procedures:

*Regulatory and Administrative Mitigation 2.* The Army will implement all the terms and conditions defined in the Biological Opinions issued by USFWS for current force and SBCT Proposed Actions on O'ahu and Hawai'i. The terms and conditions that implement the reasonable and prudent measures determined during this consultation will be incorporated into the Proposed Action and will help avoid effects and compensate for impacts on listed species that would result directly and indirectly from implementing the Proposed Action. The Biological Opinions are available upon request.

The Army will implement land management practices and procedures described in the ITAM annual work plan to reduce erosion impacts (US Army Hawai'i 2001a). Currently these measures include implementing a TRI program; implementing an ITAM program; implementing an SRA program; developing and enforcing range regulations; implementing an Erosion and Sediment Control Management Plan; coordinating with other participants in the KMWP; and continuing to implement land rehabilitation projects, as needed, within the LRAM program. Examples of current LRAM activities at KTA include revegetation projects involving site preparation, liming, fertilization, seeding or hydroseeding, trees planting, irrigation, and mulching; a CTP; coordination through the TCCC on road maintenance projects; and development of mapping and GIS tools for identifying and tracking progress of mitigation measures.

Regulatory and Administrative Mitigation measures identified as part of Chapter 7, Section 7.8, Water Resources, and Section 7.9, Geology, will also lessen this impact on sensitive species and habitat.

*Impact 3: Impacts from the spread of nonnative species on sensitive species and sensitive habitat.* In general, both plant and animal nonnative species pose a threat to Hawaiian native ecosystems. The proposed actions on KTA could affect the introduction and spread of nonnative species in the following ways:

- Troops and equipment moving into Hawai'i from other countries, states, or islands and between subinstallations within Hawai'i increase the likelihood of nonnative plant/animal introductions.
- Construction could introduce nonnative species and other weeds through the use of sand and gravel that potentially contains nonnative plant seeds.

The use of Drum Road would introduce more invasive species to the area, which would have both a short-term and long-term impact on sensitive plants and wildlife.

A long-term increase in the use of Drum Road is associated with the Proposed Action. This includes increasing Stryker and conventional truck traffic (trucks and HMMWVs) on the proposed road. There would be 275 vehicles, 114 of which would be Strykers, that would travel on either trails or roads, from SBMR to KTA 12 times per year. Most of the travel would be on trails, but Drum Road would carry ten percent of all Stryker travel and 40 percent of all trucks between these two bases. There would be a net increase of 195 vehicles traveling on roads and trails between SBMR and KTA, four times per year, and 235 vehicles eight times per year. Transformation-related increases in the number of vehicles that would traverse Drum Road increase the likelihood that nonnative plants would be introduced or spread. The Proposed Action would increase the likelihood of a fire in the ROI, as discussed in Impact 1. Nonnative species often benefit from fires, due to their ability to colonize areas following a burn. Also the presence of nonnative species often provides fuel for wildfires, makes fires larger, and facilitates its spread. Nonnative plants pose a tremendous threat to sensitive plants and native vegetation communities.

Although most of the plant species in and around the proposed Drum Road are nonnative, the area could be further disturbed than it already is and would adversely affect the recovery of sensitive species. Sensitive plant species and sensitive wildlife species are likely to occur within the KTA/KLOA ROI.

Satinleaf *(Chrysophyllum oliviforme)*, manuka, and melochia *(Melochia umbellata)* are nonnative plants that have not yet established within the KTA/KLOA ROI. The habitat degradation associated with the construction projects could lead to these very aggressive species becoming established throughout the project area. They can spread rapidly in a disturbed habitat, which could alter the original habitat and its associated ecosystem, adversely affecting native wildlife. Altering vegetative type and cover can devastate species that have evolved alongside another specialized species or cover type. Changes in vegetation can also adversely affect wildlife at sensitive times of their lifecycles by altering elements that they depend on, such as shelter.

When it arrives in Hawai‘i, all Army cargo is thoroughly checked for nonnative species, such as the brown tree snake. It is unlikely that use of Drum Road and the vehicle tactical wash would introduce nonnative vertebrate animal species into the area. Discrete quantities of sensitive native plant species that are especially threatened by nonnative species' invasion include the following:

- Ninety-five percent of the remaining nīoi *(Eugenia koolauensis)* plants exist within the KTA/KLOA ROI. There is a high threat to these plants from nonnative species invasions associated with the proposed activities.
- Twelve individuals of the native gardenia nānū *(Gardenia mannii)* exist in the KTA/KLOA ROI. There is a moderate threat to these plants from nonnative species invasions associated with the proposed activities.

- Two to five percent of the remaining ʻoheʻohe plants *(Tetrapalasandra gymnopcarpa)* exist in the KTA/KLOA ROI. There is a low to moderate threat to these plants from nonnative species invasions associated with the proposed activities.
- There are several sensitive wildlife species occurring within that ROI that could be affected by the spread of nonnative species: *Achatinella curta, A. livida, A. pulcherrima, A. sowerbyana, Aurculella pulchra,* Oʻahu ʻelepaio, and the ʻiʻiwi (Figure 7-23). These species would be adversely affected by the introduction or increase in the spread of nonnative species within the KTA/KLOA ROI.

*Regulatory and Administrative Mitigation 3.* As required in the terms and conditions of the Biological Opinions, the Army will implement the following:

- Educate soldiers and others potentially using the facilities and roads in the importance of cleaning vehicles, equipment, and field gear;
- Educate contractors and their employees about the need to wear weed-free clothes and to maintain weed-free vehicles when coming onto the construction site and to avoid introducing nonnative species to the project site;
- Prepare a one-page insert to construction contract bids informing potential bidders of the requirement; and
- Inspect and wash all military vehicles at wash rack facilities prior to leaving SBMR, KTA, or PTA to minimize the spread of weeds, such as fountain grass, and animal (invertebrate) relocations.

USARHAW will follow HQDA guidance developed in consultation with the Invasive Species Council and compliance with Executive Order 13112, which determines federal agency duties to prevent and compensate for invasive species impacts. USARHAW will agree to all feasible and prudent measures recommended by the Invasive Species Council that would be taken in conjunction with SBCT action to minimize the risk of harm. Implementing an Environmental Management System will further improve the identification and reduction of environmental risks inherent in mission activities.

In accordance with its regulations and requirements, the USDA will inspect and certify cargo originating outside of Hawaiʻi to ensure it is not carrying the brown tree snake or other reptiles before the cargo is transported to training ranges.

*Additional Mitigation 3:* The Army proposes to use native plants in any new landscaping or planting efforts where practicable. When practicable, natural habitats would remain intact or adjacent areas would be restored as habitat.

### *Less than Significant Impacts*

*Impacts from construction and training activities on general habitat and wildlife.* The Proposed Action is expected to have a less than significant impact on general habitat and wildlife at KTA and

KLOA. The slopes at KTA and KLOA are steep and training activities are generally limited by the topography to dismounted maneuvers and vehicle travel on established roads. Vegetative regrowth in the ROI is fairly rapid. The majority of the training area is nonnative vegetation and common native plants, primarily grasses and shrubs, which typically colonize denuded areas quickly and thoroughly. The proposed CACTF would be constructed at KTA in previously disturbed areas containing primarily nonnative vegetation, and approximately 187 acres (76 hectares) of vegetation would be removed.

Approximately 621 acres (251 hectares) on KTA would be used for off-road maneuvers under the Proposed Action. Off-road vehicle maneuvers would be allowed in areas of less than 30 percent slope and would be expected to result in adverse impacts on biological resources.

Operation of the ranges would likely displace various wildlife species, such as birds and mammals by displaying an increased human presence in the area and by elevating noise levels. Animal species in the project areas would be expected to vacate during construction, off-road maneuver activities, and in areas immediately adjacent to the ranges while the ranges are in use. The most likely species to be affected by these activities are ground-nesting birds or small mammals.

The UAV would be flown over portions of KTA/KLOA already allowing aircraft and would follow AR 95-1, Aviation Flight Regulations, which restrict elevation of UAVs about Noise Sensitive Areas to minimum of 2,000 feet, unless mission essential. This would limit the effect of UAVs on sensitive biological resources during normal operation. Due to the nature of the UAV, accidents would be possible and could cause wildfires. The impact of potential wildfires within the ROI is discussed above as Impact 1.

*Regulatory and Administrative Mitigation:* Programs to benefit sensitive species and habitats listed under mitigation for Impact 2, including the actions outlined in the BO, would enhance general vegetation and wildlife communities as well. Regulatory and administrative mitigation measures identified in Section 7.8, Water Resources, and Section 7.9, Geology, would lessen this impact on general vegetation, wildlife, and habitat.

*Threat to migratory birds.* The presence of the FTI antennas could significantly affect migratory bird species known to occur in the KTA/KLOA ROI, especially those that migrate at night (USFWS 2000). Although the exact number of bird fatalities from tower collisions in Hawai'i is not known, birds are killed in large numbers worldwide by antenna support structures each year (USFWS 2000). This is a violation of the MBTA (16 USC 703-712), which prohibits taking or killing migratory birds. Tower size is also considered a factor, with towers taller than 200 feet (61 meters) responsible for the greatest number of bird fatalities (Manville 2000). Less than significant impacts are expected because monopole antennas will be under 100 feet (33 meters) and, where possible, will be sited on buildings or towers, and no guy wires will be used. A full description and a map of proposed locations of the FTI antennas are in Appendix D.

UAVs would fly over the training area, as discussed Section 7.4. The UAV activity is not anticipated to threaten migrating birds.

*Noise and visual impacts.* No threatened or endangered species are known to occur within the immediate areas of the proposed CACTF. Sensitive species are primarily located at higher elevations, in areas where training generally does not occur. Maneuvers would not take place in areas known to contain sensitive species or sensitive habitats.

Dismounted (on foot) training includes walking in formations on roads or trails or in a dispersed fashion overland. Dismounted training on existing roads and trails would have no impact on biological resources, while those maneuvers that do not follow roads or trails could affect biological resources, particularly in the southern portion of the ROI where native species and natural communities are located_. Most training would occur in the disturbed flatlands of KTA, which are dominated by nonnative and invasive species. The impact on general vegetation and wildlife is therefore considered less than significant.

*No Impacts*

*Runoff impacts on marine wildlife and coral ecosystems.* SBCT activities at KTA/KLOA are not expected to result in runoff impacts on marine wildlife and coral ecosystems due to limited activities that would occur there.

### Reduced Land Acquisition Alternative

The impacts associated with RLA are identical to those described for the Proposed Action.

### No Action Alternative

No Action would result in no new impacts on biological resources but would involve a continuation of existing impacts. An in-depth analysis of current force training impacts on KTA and KLOA biological resources can be found in the *O'ahu Training Areas INRMP* (USARHAW and 25th ID[L] 2001a) and the *Endangered Species Management Plan Report (ESMPR) for O'ahu Training Areas* (R. M. Towill Corp. 1997b). All conservation measures detailed in the 2003 BO for Routine Military Training and Transformation of the 2nd Brigade 25th ID(L) at US Army Installations on O'ahu (USFWS 2003d) will be enacted under this alternative as well. A synopsis of No Action Alternative impacts is given below.

*Significant Impacts*

*Impact 1: Impacts from fire on sensitive species and sensitive habitat.* Under the status quo of No Action, current training threatens native habitat and sensitive species in the KTA/KLOA ROI. New measures of mitigation for wildland fires will be the same as those listed in the 2003 BO for O'ahu Army Installations and described for this impact under the Proposed Action. In addition, the following current force fire avoidance and mitigation would be continued:

- Reevaluating and revising KTA and KLOA's current fire control plan and program for inclusion in the O'ahu general fire management plan;

- Regularly updating Incident Command System (ICS) contact personnel and reviewing fire control protocols;
- Posting signs about the Army's regulations concerning ignition sources;
- Addressing fire control in an island-wide fire management plan;
- Improving fire education and awareness by preparing educational materials on fire hazards and preventative measures; and
- Maintaining fire access roads and fire breaks.

### *Significant but Mitigable to Less than Significant Impacts*

*Impact 2. Impacts from construction and training activities on sensitive species and sensitive habitat*. There have been and would continue to be impacts on the listed plants and wildlife. Vehicle and dismounted maneuvers along with live-fire and nonlive fire training at KTA and KLOA occurs primarily on disturbed portions of the ROI that are of low value to Hawai'i's listed species. However, the effects of fire, spread of nonnative species, noise pollution, and visual presence of humans in or nearby designated and sensitive habitats negatively affects listed species that use or would potentially use this area.

The Army has completed ESA Section 7 Consultation for the impacts on federally listed species and their designated critical habitat from current force and proposed SBCT training at KTA/KLOA. The designation of plant critical habitat is part of the consultation. The terms and conditions of the BO will be incorporated into this alternative, as well as the Proposed Action. Ongoing programs that would lessen the impact on listed species and their designated critical habitat include the ecosystem management plan, endangered species management plan, and INRMP (USARHAW and 25th ID[L] 2001a; R. M. Towill Corp. 1997b). These measures would help avoid effects and would compensate for impacts on listed species that would result directly and indirectly from implementing the No Action Alternative.

*Impact 3: Impact from the spread of nonnative species on sensitive species and sensitive habitat.* Under the status quo of No Action, current force training would continue use of an upgraded Drum Road. Nonnative plants and animals, some of which could be invasive, have likely been and would continue to be introduced and spread into natural areas on KTA and KLOA. There would be no increase in the number of vehicles or Soldiers, but the impact of vehicle traffic on the road would continue to be considered significant. Troop transport and vehicle entry into the KTA/KLOA ROI could spread invasive species via clothing and vehicles. Invasive species can spread rapidly in a habitat disturbed by human activities, such as troop maneuvers or construction. In compliance with EO 13112 on invasive species, the Army would continue to undertake all feasible and prudent measures to minimize risk of harm caused by invasive species. Army environmental management programs (described in Chapter 2, Section 2.2.4 of this document), including research, monitoring, stabilization projects, and measures outlined in the 2003 BO for O'ahu Army Installations, would reduce these impacts to the less than significant level.

### *Less than Significant Impacts*

*Impacts from construction and training activities general habitat and wildlife.* Under the status quo of No Action current force training would result in the same impacts as those described for the Proposed Action. Construction would be undertaken on a case-by-case basis in support of current training. Non-Stryker tactical vehicle use would continue, though MIMS would not increase. Continued use of Drum Road would have similar impacts as that described in the Proposed Action. Army environmental management programs (Section 2.2.4 of this document), including research, monitoring, stabilization projects, and measures outlined in the 2003 BO for O'ahu Army Installations, would reduce the intensity and extent of these impacts.

*Threat to migratory birds.* Current force activities would continue to have a less than significant impact on migratory birds. Status quo activities in the ROI may incidentally affect migratory birds but are unlikely to severely disturb birds, considering the disturbed nature of the present training area.

*Noise and visual impacts.* Noise would continue to be produced as a result of current force activities. Noise would adversely affect animals in the area but would not significantly affect their behavior and would not lead to a population level decline.

## 7.11 CULTURAL RESOURCES

### 7.11.1 Affected Environment

#### *Region of Influence*

The ROI for this project area is most of KTA because much of it would be affected by the proposed projects, including road construction, demolition and reuse of older buildings, construction of new buildings for the CACTF and vehicle wash, and use of the ranges for military training. The ROI for projects discussed in this section also includes KLOA and Drum Road.

#### *Native Hawaiian History and Tradition*

The Kahuku area is on the northernmost point of the Koʻolauloa District. One of the legends most closely associated with the area is the belief that "Kahuku, ʻāina lewa" (the unstable land) was once a separate island. The story takes several forms. One involves the demigod Maui, who is said to have hooked the two land masses together (this time more successfully than his attempt to reel in Kauaʻi). A feature story in a 1922 newspaper referred to "the first Kahuku" as "one of Maui's land" and reported that relics or images of Maui remained in a secret cave in the hills.

Other versions state that Kahuku floated in from the sea and was inhabited by Menehune (mythical beings said to be of small stature). The Menehune had come to Oʻahu to get freshwater, until one day their island was captured using whalebone hooks strung on olonā fiber. Kahuku and Oʻahu, then two islands, were ruled by siblings who eventually linked hands and pulled the land together. The story of Lāʻiekawai and her twin sister, Lāʻielohelohe, forms another important part of Kahuku's legendary past. The twins' mother, Mālaekahana, was married to Kahauokapaka, king of both the Koʻolau districts. Legend has it that his desire for a son was so intense that he had sworn to kill any girl children born to him, and, indeed, he had already killed four daughters before Mālaekahana became pregnant with the twins. To save her babies, Mālaekahana sent her husband off for fish and gave birth in his absence, sending the newborns into hiding. Lāʻiekawai and her sister went to their grandmother, Waka, who kept them safe in a secret cave that could be entered only by diving through a pool called Waiapuka. The old women guardians of legendary princess Lāʻiekawai were also reported to be the ones who hooked the floating island and tied it to Oʻahu.

The Kahuku peninsula, and the Koʻolauloa district in general, are the setting for other legends. One legend describes the *ulua* fish that followed the gods Kāne and Kanaloa upriver to Kaipapaʻu, while another relates the story of the tapa anvil that disappeared from Kahuku and traveled along an underground waterway to resurface in Waipahu.

KTA and KLOA lie in the uplands of the eastern portion of Waialua District and the western portion of Koʻolauloa District. Numerous ahupuaʻa run inland from the North Shore coastline into the upland areas of KTA and KLOA, each generally associated with one major stream drainage. Within these stream drainages, scattered among the remains of irrigated taro terraces, sweet potato cultivation features, and other agricultural features are several stone platforms that may have been used for rituals.

While the general Kahuku area plays an important role in Hawaiian legends, most places specifically mentioned are off-shore islands and coastal areas. Research to date has not identified places close to SBCT project areas that are associated with traditional legends. Anderson researched all the Land Commission Awards (LCAs) and grants awarded in the four ahupuaʻa that extend into KTA (Anderson 1998). Most of these lands are along the coastal plain and none appear to lie within KTA. Three LCAs are within KLOA, and three others are recorded on the KLOA boundary (Dega and McGerty 1998, 16). The LCAs generally consist of watercourses for irrigation and land to cultivate orange trees, sweet potatoes, and kalo and to trap fish (Dega and McGerty 1998, 16). Sites of importance to Native Hawaiians (ATIs) have been identified at KTA, of which three are heiau. Two heiau, Pahipahiʻālua Heiau and Hanakaoe Platform, consist primarily of rock platforms with a few associated features. Hanakoae Platform is listed on the NRHP. The third, Pūʻula Heiau, was documented by McAllister (1933) but listed as destroyed. A recent survey has identified a cluster of features (Site 4930) near where the Pūʻula Heiau was reported to have stood that may be remnants of the original site (Williams and Patolo 1998). The presence of the sacred Waikane Stone, associated with Native Hawaiian legends, was also documented by McAllister (1933) although it has not been identified in any archaeological surveys. It is possible that the stone was destroyed or relocated or that it is outside the boundaries of KTA. A terrace that may have been used for religious ceremonies was identified as part of a house complex found by Davis (1981), but it may have been destroyed by the construction of a windfarm turbine. There are known burials at KTA as well (Drolet 2000).

Within KLOA, previous surveys have been conducted directly within the training area (Dega and McGerty 1998). Identified sites represent wetland and dryland agriculture, temporary and permanent habitation, two burial loci, trails, and possible ceremonial structures (Dega and McGerty 1998). One habitation site and one set of agricultural features in KLOA have structures associated with them that may have been used in rituals. The Koʻolau Summit Trial that follows the Koʻolau Ridge and the Kawailoa Trail that connects the Summit Trail with the lower valleys near Pūpūkea may be historic (Dega and McGerty 1998).

Ongoing Army consultation efforts with Native Hawaiians, Army cultural resources staff field checks, and archival research have not resulted in identifying any additional ATIs or sacred sites on these installations.

### *Historic Overview*

KTA was occupied at least seasonally from the 14th century on and was used for agriculture from the 15th century on. Evidence of occupation prior to European contact includes rock shelters, burial sites, irrigation complexes, and habitation sites (Tomonari-Tuggle 2002).

The earliest settlements were established along the coastal plain, with a heavy concentration around Waialua Bay, and these areas were to remain the most populous throughout prehistory. Regular use of the upper stream valleys seems to have begun only in the 14th century and to have involved low intensity exploitation of forest products and native birds, with temporary use of rock shelters.

Late in the 17th century a shift occurred to more intensive uses of the upper valley, with permanent habitations established, long-term use of rock shelters, raising of pigs and dogs, and probably cultivation of upland crops. At this same time irrigated taro fields were constructed in the alluvial flats along some of the upland streams, such as Kawai Iki, and Kawai Nui (Dega and Kirch 2002). The archaeological evidence from KLOA suggests that this area was abandoned after the time of contact with the West, perhaps as a result of population decrease following the introduction of new diseases.

Outside of KLOA, in the Anahulu Valley downstream of KLOA, the area was repopulated early in the 19th century. Irrigated terrace fields were developed and expanded under pressure first from Kamehameha I to grow food to support his military expeditions and later from the high chiefs to produce surplus food to support their schemes to increase their prestige. However, there is no evidence of the use of the fields in KLOA during this period. By the time of the Great Mahele (discussed in Section 3.11), with the population continuing to decline, the upland areas were largely abandoned, and almost all of the kuleana claims (claims by native tenants as opposed to rulers) were for lands along the coastal plain (Kirch and Sahlins 1992).

Kahuku appears to have been a lush and prosperous region in the precontact era, but a series of observations made by foreigners illustrates rapid changes on the peninsula after European contact. An officer on Cook's last voyage described O'ahu's northern coast this way: "Nothing can exceed the verdure of the hills, the variety of wood and lawn, and the rich cultivated valleys which the whole face of the country displayed." Captain Charles Clerke, on HMS Resolution in 1779, called Kahuku "exceeding fine and fertile" and observed a large village with, he thought, a temple. But by 1797, Captain George Vancouver remarked that "the country did not appear in so flourishing a state, nor to be so numerously inhabited." By the mid-1830s a visitor observed that "much taro land now lies waste because the diminished population … does not require [it]." A century later, archaeologist Gilbert McAllister called the area "rather desolate" and found it hard to imagine a thriving agricultural community there.

John Papa 'I'i described a delightful visit around 1810 to the ahupua'a of Waiale'e, on the western side of Kahuku. "There was a pond there," Ii recalled, "surrounded by taro patches, and there were good fishing places inside the reef . . . . Chiefs and commoners crowded together at Pūehuehu to go diving, or board surfing at 'Ulakua."(Ii 1983, 24, 63). A generation later, however, the missionary John Emerson, who had watched with indignation as livestock from upland ranchers wreaked havoc on coastal communities in his home district of Waialua, described an even grimmer process taking place in Kahuku where the owner of one huge ranch took over the district.

Ranching in Ko'olauloa began in the 1850s with the formation of Kahuku and Mālaekahana Ranches, with ranchers raising both cattle and sheep. Eventually Herman Widemann bought both ranches and combined them, and in 1876 James Campbell purchased the combined ranch, which gave him ownership of 15 ahupua'a, including all the lands within KTA. His purchase included 3,000 head of cattle, 90 horses, and 1,700 sheep.

In 1890 Campbell, along with James Castle and Benjamin Dillingham formed the Kahuku Plantation Company. Sugarcane began to replace pasture in Kahuku, a sugar mill was established at Kahuku, and Dillingham's OR&L Railroad reached the mill in 1899, allowing easy transport of the milled sugar to Honolulu. Sugarcane was supplemented by small-scale pineapple cultivation by individual growers, who leased small parcels of land from Kahuku Plantation beginning in 1916. The leases were later acquired by the California Packing Company. Many of these former pineapple fields, along with former plantation camp sites, are found on KTA lands (Drolet 2000).

KTA was operated as a sugar plantation until the 1930s, when it was used to establish an airfield and to host a radar installation on the coast outside of KTA. After the war, additional lands were purchased to support the establishment of the training area proper, and in 1959 a Nike Hercules missile battery was constructed.

KLOA was not used as much as KTA in historic times, primarily due to its steep and heavily vegetated topography. KLOA military history is linked to the history of SBMR, and in 1930, KLOA was established as a military training area. During the 1930s and 1940s, a railroad site was constructed, as were gun mounts for 240mm guns, cement towers and numerous fox holes, helicopter pads, razor wire fences, and other training aids were constructed for use in jungle warfare training.

### Previous Consultations and Reports

#### Traditional Cultural Properties Surveys

Anderson (1998) collected and reviewed archival information concerning traditional cultural places in and around KTA. USARHAW has begun a TCP and ATI survey of KTA and KLOA, as they are defined in Section 3.11.2, but it is not yet available for review.

#### Archaeological Surveys

##### Kahuku Training Area

Archaeological investigations at KTA include those of Anderson and Williams (1996, 1998), Davis (1981), Drolet (2000), McAllister (1933), Rosendahl (1977), Williams and Patolo (1998), and GANDA (2003). SCS (2003) completed a Phase I survey of all areas that have been determined as "Go" areas within Kahuku (SCS 2003kta). The results of these surveys are discussed below.

McAllister (1933) reported two sites, although one had been destroyed and the other could not be located. Rosendahl (1977) conducted a reconnaissance of about 10 percent of KTA, including some aerial survey, and compiled information from earlier sources. He identified nine sites: three were listed as having been destroyed, one previously identified site could not be located, and five new sites were found during the survey. Davis (1981) added three sites and one historic plantation period site, and more recent survey work has revealed additional sites in the area.

Williams and Patolo surveyed 10 areas totaling 341 acres (138 hectares), roughly eight percent of KTA. They employed a fairly intensive survey strategy systematically traversing survey areas that included a range of topographic variables: sections of the cliff and bluff edge north (seaward) of the KTA, portions of large interior valleys, small gulches, and steep, rugged interior areas and found 14 new archaeological sites (Williams and Patolo 1998). Farrell and Cleghorn surveyed KTA for historic buildings in 1995 (Farrell and Cleghorn 1995) and conducted investigations at the Punamano Communication Station recording the presence of one site consisting of primarily post-World War II structures, features, and artifacts from the Communication Station. In August 2002, field work and historical research was undertaken for the former Nike missile site at KTA (IARII 2003).

Drolet (2000) intensively surveyed the northwestern area (Area A1) at the mouth and lower portions of Kaunala and Pahipahiʻālua gulches and found an additional 13 sites, including pre- and post-European Contact Hawaiian sites and military sites.

GANDA (2003c) recorded Sites 50-80-02-6535, -6536, -6537, and -4884 at the CATCF sites in Kahuku. Site 50-80-02-4884 consists of an isolated earth oven (imu). Site 50-80-02-6535 is a historic building foundation, and 50-80-02-6537 is a poured concrete building pad associated possibly with a pineapple camp. Site 50-80-02-6535 is a linear, single course rock alignment that forms a roughly defined square enclosure.

In 2003 SCS completed the Phase I pedestrian survey of all areas at KTA that have been determined as "Go" areas (SCS 2003). SCS concentrated its survey in seven general zones, identified as A1, A2, B1, B2, C1, C2, and D1, and identified fifty-nine sites. Forty sites consisted of a single feature, while nineteen sites were composed of two or more features. Twenty-two sites were military-related structures, twenty-one were historic period sites, possibly related to plantation work, and sixteen sites were either prehistoric or historic. Seventy-three percent of the sites were historic (see Table 7-24).

#### *Drum Road*

Pacific Legacy has undertaken a survey of the proposed alignment for the construction and upgrade of Drum Road (Pacific Legacy 2002). It identified 23 sites within 15 meters of Drum Road, between KTA and HMR.

#### *Kawailoa Training Area*

At KLOA, the Bishop Museum conducted a reconnaissance survey of a few of the valleys of the tributary streams that flow into the Anahulu River and identified five sites (Rosendahl 1977). During the intensive investigations of the Anahulu River valley, the Bishop Museum identified seven sites within the boundaries of KLOA, as well as 33 additional sites in the Anahulu Valley, downstream from KLOA, with several near the KLOA boundary (Kirch and Sahlins 1992). Dega and McGerty conducted field work at KLOA, focusing on stream valleys and gulches, including several of the gulches traversed by the proposed road construction. They recorded 48 sites, 44 of them within the boundaries of KLOA (Dega and McGerty 1998, 2002).

### *Known Prehistoric and Historic Resources*

*Kahuku Training Area*

Table 7-23 provides an overview of prehistoric and historic resources identified with the ROI and their NRHP status if known. One hundred archaeological sites have been identified at KTA, including prehistoric, historic, and military era sites. These include a heiau listed on the NRHP and a hearth, dwelling, and agricultural sites. Historic sites include a house, irrigation features, and bunkers. The ʻŌpana Mobile Radar Station is a National Historic Landmark listed in the NRHP. Only the heiau and the radar station have been evaluated for eligibility. Table 7-24 lists currently identified archaeological sites at KTA.

**Table 7-23**
**Summary of Known Cultural Resources at KTA**

| | Total Archaeological Sites | Sites Listed, Eligible for Listing, or Needing DE | Area Surveyed for Archaeological Sites | Cold War Era Buildings | Buildings Listed, Eligible for Listing, or Needing DE |
|---|---|---|---|---|---|
| KTA | 100 | 36 (34 DE) | 33% | 22 | 22 |
| Drum Road | 23 | 23 | 27 miles[1] (43.5 kilometers) | 0 | 0 |

Sources: IARII 2003; Pacific Legacy 2002; GANDA 2003c; SCS 2003.
[1]Fifteen meters on each side of 27 miles (43.5 kilometers) of road
DE – Determination of Eligibility.

Cold War-era buildings or structures at KTA are listed in Table 7-25. These sites are composed of the former Nike missile security facility and launch sites. The missile site at KTA was one of four Nike missile sites in Hawaiʻi and was active from January 1961 to March 1970. The buildings and structures are intact and are generally unaltered. The launcher area, administration area, and the control area all retain not only the original structures, but also many of the site features, such as security fencing, sidewalks, exterior stairs with metal railings, streets and curbing, flagpoles, bicycle wash/storage area, and electrical and plumbing equipment. The setting appears to be unaltered, other than the change in landscaping due to the abandonment of the site. Preserving this site was a stipulation of the Section 106 consultation on the demolition of the Nike site at DMR.

The Nike site is significant as an intact example of a Cold War Nike missile site and reflects an important development in the history of American civil air defense and as part of the Hawaiʻi Nike missile program. The site is eligible for the National Register under criterion A, having been associated with events that have made a significant contribution to the broad patterns of our history, and under criterion C, as it is a relatively unaltered and intact example of Nike missile site construction (IARII 2002a).

**Table 7-24**
**Archaeological Sites at KTA**

| Site Number | Site Type | Site Description |
|---|---|---|
| 50-80-02-0259 | Spring | Waikane Stone |
| 50-80-02-0260 | Heiau | Puʻuala Heiau (4,930 terrace facing) |
| 50-80-02-0599 | Bunkers | Three bunkers at Punamanō Communication Station |
| 50-80-02-1043 | Complex | Kawela agricultural terraces |
| 50-80-02-2357 | Wall | Plantation era stone wall remnant |
| 50-80-02-2358 | Single feature | House site 13m x 10m |
| 50-80-02-2359 | Two adjacent terraces | Terraces 22.5m x 6m |
| 50-80-02-2360 | Single feature | Terrace 20m x 10m |
| 50-80-02-2501 | Heiau | Hanakaoe platform 4m x 7m |
| 50-80-02-4882 | Bunker | Military bunker 8.7m x 4.5m |
| 50-80-02-4883 | Historic house site | Plantation era house site |
| 50-80-02-4884 | Imu | Imu site 3m |
| 50-80-02-4885 | Heiau | PahipahiʻāluaHeiau 17m x 12m |
| 50-80-02-4886 | Bunker | Pentagonal military bunker 3.5m x 3m |
| 50-80-02-4887 | Terrace complex | Habitation complex with related agricultural features 24m x 14m |
| 50-80-02-4888 | Wall/depressions | Agricultural earthen depressions/rock alignment 20m? |
| 50-80-02-4930 | Linear mound | Linear rock mound (remnants Site 260?) 7m x 2m |
| 50-80-02-5534 | Rock shelter | Temporary shelter 5m x 2.5m |
| 50-80-02-5536 | Rock shelter | Temporary shelter? 15m x 3m |
| 50-80-02-5537 | Enclosure | Enclosure (pre-Contact) 62m x 40m |
| 50-80-02-5538 | Wall | Wall (pre-Contact) 15m x 1m |

**Table 7-24**
**Archaeological Sites at KTA** *(continued)*

| Site Number | Site Type | Site Description |
|---|---|---|
| 50-80-02-5539 | Terraces | Retaining wall and stone concentration 40m x 20m |
| 50-80-02-5540 | Terraces | Terraces 15m x 15m |
| 50-80-02-5684 | Enclosure | Enclosure 50m x 25m |
| 50-80-02-5685 | Rock shelter | Temporary shelter 9m x 5m |
| 50-80-02-5686 | Ahupuaʻa boundary | Wall 4m x 1m |
| 50-80-02-5688 | Roadway | Historic roadway 30m x 6m |
| 50-80-02-5689 | Bunker | Underground bunker 3m x 2m |
| 50-80-02-5690 | Enclosure | Bunker 4m x 3m |
| 50-80-02-9506 | Historic irrigation | Keaʻaulu Ditch (hist. stone faced irr. ditch) |
| 50-80-02-9507 | Historic (?) terrace | ʻOʻio Stream terrace (ag. terrace) |
| 50-80-02-9508 | Platform | East ʻOʻio Gulch platform (stepped stone platform) |
| 50-80-02-9509 | Complex | ʻOʻio Gulch complex (agricultural terraces) |
| 50-80-02-9517 | Terraces | Kāneali‘i agricultural terraces (possible remnants) |
| 50-80-02-9745 | Landmark | ʻOpana Mobile Radar Site |
| SCS Temp# 1 | Military | Fox holes |
| SCS Temp# 2 | Military | Fox holes with rock wall |
| SCS Temp# 3 | Military | Leveled area behind outcrop |
| SCS Temp# 16 | Military | Rock terrace |
| SCS Temp# 19 | Military | Concrete structure |
| SCS Temp# 30 | Military | Bunker |
| SCS Temp# 36 | Military | Concrete slab |
| SCS Temp# 38 | Military | Concrete slab |
| SCS Temp# 39 | Military | Concrete blocks |
| SCS Temp# 40 | Military | Concrete slabs |
| SCS Temp# 41 | Military | Concrete slab |
| SCS Temp# 42 | Military training | Fire pit with trash |
| SCS Temp# 43 | Military | Concrete slabs |
| SCS Temp# 44 | Military | Concrete Slab with metal tank |
| SCS Temp# 45 | Military | Concrete slab |
| SCS Temp# 47 | Military | Concrete slabs |
| SCS Temp# 48 | Military | Foundations with bottle glass |
| SCS Temp# 49 | Military | Concrete drainage |
| SCS Temp# 53 | Military training | Collapsed concrete box |
| SCS Temp# 54 | Military training | Intact concrete box |
| SCS Temp# 56 | Military training | Fire pit with metal fragments and other trash |
| SCS Temp# 60 | Military | Two fire pits with trash |

**Table 7-24**
**Archaeological Sites at KTA** *(continued)*

| Site Number | Site Type | Site Description |
|---|---|---|
| SCS Temp# 4 | Plantation/Agriculture possible | Boulder concentration |
| SCS Temp# 10 | Unknown | Rectangular boulder platform |
| SCS Temp# 11 | Unknown/stabilization | Terrace down slope of a level area |
| SCS Temp# 12 | Pre-military | Multiple features, including mounds and fox holes |
| SCS Temp# 13 | Historic | Linear terrace |
| SCS Temp# 20 | Historic | Terrace and a road |
| SCS Temp# 21 | Historic | Rock mound |
| SCS Temp# 22 | Historic | Rock mound |
| SCS Temp# 24 | Historic | Boulder concentration |
| SCS Temp# 25 | Historic | Tow linear boulder concentrations |
| SCS Temp# 26 | Historic | Rock mound |
| SCS Temp# 32 | Historic | Cobble and boulder terrace |
| SCS Temp# 33 | Historic | Rock mound |
| SCS Temp# 50 | Historic | Linear boulder concentration |
| SCS Temp# 52 | Historic | Boulder and cobble piles |
| SCS Temp# 55 | Historic | Linear boulder concentration |
| SCS Temp# 57 | Historic | Boulder mound and terrace |
| SCS Temp# 61 | Historic | Rock mound and depression |
| SCS Temp# 63 | Historic | Rock mound |
| SCS Temp# 64 | Historic | Multiple rock mounds |
| SCS Temp# 5 | Undetermined | Paved terrace and rock mounds |
| SCS Temp# 6 | Undetermined | Terrace |
| SCS Temp# 7 | Prehistoric | Enclosure and mounds |
| SCS Temp# 8 | Undetermined | Mounds with glass bottles |
| SCS Temp# 9 | Undetermined | Enclosure with entryway |
| SCS Temp# 14 | Prehistoric | Rock mound |
| SCS Temp# 15 | Prehistoric/Historic | Rock concentration |
| SCS Temp# 17 | Undetermined | Modified outcrop, rock mounds |
| SCS Temp# 18 | Agriculture/undetermined | Linear rock mound |
| SCS Temp# 29 | Traditional | Tow fire pits |
| SCS Temp# 34 | Undetermined | Wall with sub-features |
| SCS Temp# 46 | Undetermined | Large retaining terrace |
| SCS Temp# 51 | Undetermined | Terraces and rock mounds |
| SCS Temp# 58 | Prehistoric | Lithic scatter |
| SCS Temp# 59 | Prehistoric | Rock mound, possible trail marker |
| SCS Temp# 65 | Traditional | Fire pit |

Source: IARII 2003 ; GANDA 2003c; SCS 2003.

**Table 7-25**
**Historic Military Buildings at KTA**

| Facility No. | Description (original use) | Year Built | Historical Period |
|---|---|---|---|
| 0001 | Administrative building | 1961 | Cold War |
| 0003 | Flagpole (gone) | 1961 | Cold War |
| 0004 | Pump house (water supply/treatment building) | 1961 | Cold War |
| 0005 | Barracks and mess hall | 1961 | Cold War |
| 0008 | Water storage tank | 1961 | Cold War |
| 0009 | Water supply/treatment building; pump house | 1961 | Cold War |
| 0013 | Control station; air/fallout shelter | 1961 | Cold War |
| 0014 | Control station; air/fallout shelter | 1961 | Cold War |
| 0018 | Control station; air/fallout shelter | 1961 | Cold War |
| 00020 | Sentry box | 1961 | Cold War |
| 0022 | Protective barrier | 1961 | Cold War |
| 0023 | Protective barrier | 1961 | Cold War |
| 0026 | Protective barrier | 1961 | Cold War |
| 0027 | Protective barrier | 1961 | Cold War |
| 0028 | Sentry control station | 1961 | Cold War |
| 0030 | Protective barrier | 1961 | Cold War |
| 0036 | Protective barrier | 1961 | Cold War |
| 0037 | Warhead building | 1961 | Cold War |
| 0045 | Missile assembly and test building | 1961 | Cold War |
| 0047 | Generator building | 1961 | Cold War |
| 0048 | Transformer building | 1955 | Cold War |
| 0060 | Sentry box | 1961 | Cold War |
| 0061 | ACQ tower (gone) | | Cold War |
| 0063 | Administration building | 1961 | Cold War |
| 0064 | Flagpole | 1961 | Cold War |
| 0067 | Barracks and mess hall | 1961 | Cold War |
| 0070 | Generator building | 1961, 1963 | Cold War |
| 0071 | Transformer pad | 1963 | Cold War |
| 0075 | MTR & TTR pad | 1963 | Cold War |
| 0078 | MTR & TTR pad | 1963 | Cold War |
| 0079 | MTR & TTR pad | 1963 | Cold War |
| 0080 | Interconnecting corridor | 1961 | Cold War |
| 0081 | Pad for control vans | 1961 | Cold War |
| 0082 | Pad for control vans | 1961 | Cold War |
| 0083 | Pad for control vans | 1961 | Cold War |
| 0087 | HIPAR tower (gone) | 1961 | Cold War |
| 0089 | Water tank | 1961 | Cold War |
| 0090 | Bore site mast (gone) | 1961 | Cold War |
| T-150 | Guard tower | c. 1961 | Cold War |
| T-151 | Guard tower | c. 1961 | Cold War |

Source: IARII 2003

*Kawailoa Training Area*

Archaeological surveys have been conducted of selected areas within KLOA, primarily in the gulches in the west portion of the project area, and 55 archaeological sites have been identified. All sites have been recommended as eligible for listing on the NRHP, and several also might be considered ATIs. Table 7-26 lists the currently identified sites within KLOA that are recommended as eligible for the NRHP.

*Drum Road*

Pacific Legacy has surveyed the proposed alignment for the construction and upgrade of Drum Road and found 23 archaeological sites within or near the area of impact of the Drum Road upgrade in KTA (Pacific Legacy 2002).

Drum Road starts from the northwest area of HMR. Fankhauser recorded three historic sites in Helemanō Gulch just north of HMR (Fankhauser 1987).

### *Potential for Unknown Resources*

*Kahuku Training Area*

The site probability model presented by Williams and Patolo (1998, 77-81; see also Williams and Patolo 1998, 79, Figure 23) offers a low probability for archaeological sites in low elevation areas because they have been subjected to extensive land-altering disturbances from sugarcane and pineapple farming and military use. Areas in the rugged interior of KTA, above the 800-foot (244-meter) elevation, which have seen no modern land use alterations and which Native Hawaiians could have used for resource exploitation (e.g., farming), have no surface visibility. Areas of medium site location probability include narrow gulches and the lower elevations between 600 and 800 feet (183 and 244 meters). These areas have had less modern land use alterations and are closer to the populated coastal flatland bordering KTA. Areas of high site location probability include bluff slopes and edges and the mouths of narrow gullies because these areas have suffered less modern land disturbances and they border the coastal flatlands. Through archival research, Williams and Patolo (1998, 81) discovered that bordering coastal flatlands were the primary settlement areas in the past.

The proposed sites for constructing the CACTF at KTA lie in areas designated as sensitive for archaeological resources (IARII 2003; Davis 1981). Figures 7-27 and 7-28 show areas of archaeological sensitivity at KTA and KLOA.

*Kawailoa Training Area*

Some of KLOA has not been surveyed for cultural resources due to the difficulty of access. The very rugged steeply sloped terrain has a low site location probability. Unsurveyed areas with similar topography as those areas known to contain archaeological sites, however, have a high probability of unrecorded sites. Because the type of use or use areas are not going to change, there is a low probability for unrecorded cultural resources to be disturbed.

**Table 7-26**
**Archaeological Sites at KLOA**

| State Site No. | Site Type | Description |
|---|---|---|
| 50-80-04-5634 | Wall complex | Three retaining walls/ one align |
| 50-80-04-5635 | Single lava tube | Lava tube |
| 50-80-04-5637 | Single trail | Kawailoa Trail |
| 50-80-04-5638 | Single trail | Koʻolau Summit Trail |
| 50-80-05-5605 | Path, terraces | Historic path, dryland agriculture |
| 50-80-05-5606 | Multiuse complex | Agriculture/habitation/ceremonial complex |
| 50-80-05-5607 | Terrace complex | Four alignments/auwai |
| 50-80-05-5608 | Two align | alignments |
| 50-80-05-5609 | Terrace/loʻi fields | Alignments/earth berms/loʻi fields |
| 50-80-05-5610 | Terrace/loʻi fields | Three alignments/loʻi fields |
| 50-80-05-5611 | Terrace complex | "Island" ag site in Kawainui Stream |
| 50-80-05-5612 | Terrace complex | |
| 50-80-05-5613 | Terrace/platform complex | Two temporary habitations, platforms/align/planting areas |
| 50-80-05-5614 | Terrace complex | Align/platform |
| 50-80-05-5615 | Terrace complex | |
| 50-80-05-5616 | Terrace complex | |
| 50-80-05-5617 | Terrace system | Good species indicators |
| 50-80-05-5618 | Wall | 15m wall |
| 50-80-05-5619 | Terrace system | Wall and three terraces |
| 50-80-05-5620 | Terrace complex | four terraces/planting areas |
| 50-80-05-5621 | Terrace complex | Three terraces/one long mound |
| 50-80-05-5622 | Terrace complex | Large loʻi system |
| 50-80-05-5623 | Terrace complex | Large loʻi system |
| 50-80-05-5624 | Single imu | Imu |
| 50-80-05-5625 | Terrace complex | Terrace walls/mounds/ʻauwai |
| 50-80-05-5626 | Terrace complex | |
| 50-80-05-5627 | Terrace complex | |
| 50-80-05-5628 | Terrace complex | |
| 50-80-05-5629 | single platform | Possible burial |
| 50-80-05-5630 | Terrace complex | Nine+ walls/two enclosures/several clearing mounds |
| 50-80-05-5631 | Single rock shelter | Rock shelter: possible burial |
| 50-80-05-5632 | Terrace complex | Small alignments |
| 50-80-05-5633 | Terrace complex | Small terrace walls |
| 50-80-05-9510 | Platform | Kawainui Platform |
| 50-80-05-9511 | Terraces | Kawaiiki Agricultural Complex |
| 50-80-05-9512 | Complex | Kawailoa Complex |
| 50-80-05-9513 | Enclosure | Kawainui Enclosure |
| 50-80-05-9514 | Platforms | Kawaiiki Platform |
| 50-80-04-5717 | Alignment, planting areas | Dryland agriculture |
| 50-80-04-5718 | Terrace remnant | Irrigated agriculture |
| 50-80-04-5719 | Pumping station | Sugarcane industry |

**Table 7-26**
**Archaeological Sites at KLOA** *(continued)*

| State Site No. | Site Type | Description |
|---|---|---|
| 50-80-04-5720 | Terrace remnants, ahu | Dryland agriculture, marker |
| 50-80-04-5721 | Walls, trail | Dryland agriculture, animal pen, transportation |
| 50-80-04-5722 | Concrete slab, terrace | Gauging station |
| 50-80-04-5723 | Road facing, road | Transportation |
| 50-80-04-5724 | Alignment | Dryland agriculture |
| 50-80-04-5725 | Stacked wall, modified slope | Pool; unknown |
| 50-80-04-5730 | Alignment | Retaining wall |
| D6-32 | Terraces | |
| D6-33 | Terrace | |
| D6-34 | Complex | Kainiki's house (LCA) |
| D6-40 | House site | Mailou's house (LCA) |
| D6-41 | Irrigation complex | pondfield system |
| D6-42 | Small pondfield system | ʻIli Koilau System |
| D6-43 | Irrigation pondfield system | ʻIli Pulepule System |

Source: IARII 2003

*Drum Road*

There is a high probability that archaeological sites will be discovered during road construction of the segment traversing KLOA.

### 7.11.2 Environmental Consequences

***Summary of Impacts***

Cultural resources impacts related to the Proposed Action at KTA vary, depending on the location and the nature of the project. Significant impacts are likely for historic buildings from construction and demolition. Significant impacts mitigable to less than significant involve impacts on archaeological resources from range and facility construction (Table 7-27). As explained in the mitigation sections below, these impacts could be mitigated by compliance with the PA the Army has developed in consultation with the Hawaiʻi SHPO, the ACHP, Native Hawaiians, and other parties. The PA is provided in Appendix J. The three less than significant impacts identified are the risk to archaeological resources from training activities, the risk to unidentified ATIs, and impacts on archaeological resources from road use. These impacts will be mitigated by compliance with the PA and the IDP and monitoring by installation personnel.

**Figure 7-27**
Archaeological Sensitivity Areas, Kahuku Training Area

**Figure 7-28**
Archaeological Sensitivity Areas, Kawailoa Training Area

**Table 7-27**
**Summary of Potential Cultural Resources Impacts at KTA/KLOA**

| Impact Issues | Proposed Action | | Reduced Land Acquisition | | No Action | |
|---|---|---|---|---|---|---|
| | **KTA** | **KLOA** | **KTA** | **KLOA** | **KTA** | **KLOA** |
| Impacts on historic buildings | ⊗ | ○ | ⊗ | ○ | ○ | ○ |
| Impacts on archaeological resources from range and facility construction | ⦸ | ○ | ⦸ | ○ | ○ | ○ |
| Impacts on archaeological resources from training activities | ⊙ | ○ | ⊙ | ○ | ⊙ | ○ |
| Impacts from FTI tower construction | ○ | ○ | ○ | ○ | ○ | ○ |
| Impacts to ATIs | ⊙ | ○ | ⊙ | ○ | ○ | ○ |
| Impacts to archaeological sites from road use | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant

⦸ = Significant but mitigable to less than significant

⊙ = Less than significant

○ = No impact

\+ = Beneficial impact

N/A = Not applicable

### *Proposed Action (Preferred Alternative)*

#### Significant Impacts

*Impact 1: Impacts on historic buildings.* Constructing the CACTF could have significant impacts on historic buildings at KTA. This project would involve renovating ten buildings in three sites and demolishing buildings S150 and S151. Among the properties to be renovated are the recommended eligible Nike Missile Site and other buildings that may be eligible for the NRHP as Cold War-era properties.

*Regulatory and Administrative Mitigation 1.* The Army will consult with SHPO, ACHP, and interested parties, in accordance with Section 106 of the NHPA, on the Nike Missile Site complex. The Army will manage the complex and will renovate it in compliance with the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.

#### Significant Impacts Mitigable to Less than Significant

*Impact 2: Impacts on archaeological resources from range or facility construction.* The tactical vehicle wash and the CACTF either overlay or are adjacent to identified archaeological resources.

All of the CACTF has been surveyed and three sites were located. Site 50-80-02-4884, approximately 984 feet (300 meters) northwest of Site 1, was fully excavated in the 1990s and was identified as a cooking feature used during tree cutting activities. The tactical vehicle wash has been surveyed, and the project area contains no identified cultural resources.

However a stepped stone platform (site 50-80-02-9508) is in the gulch immediately northeast of the project area, and a heiau (site 50-80-02-2501) is only a short distance to the northwest.

Facility construction involves grubbing vegetation, grading site surfaces, excavating the subsurface, and moving heavy construction equipment. All of these activities could result in direct destruction of or damage to archaeological resources or indirect damage by contributing to soil erosion. Sites 9508 and 2501 could be indirectly affected by runoff and erosion during construction of the tactical vehicle wash. USARHAW will conduct the mitigations described below, which will reduce impacts to less than significant.

*Regulatory and Administrative Mitigation 2.* Before construction, the Army will complete evaluating any archaeological sites within areas subject to range and facility construction. Sites determined to be eligible for the NRHP will be flagged for avoidance. The projects will be designed to avoid all eligible and unevaluated archaeological sites, to the full extent practicable. GIS and GPS information will be given to project designers and range control to ensure that sites are considered in project design. If it is not possible to avoid archaeological sites, the Army will consult in accordance with the PA to determine the appropriate mitigation for the damage to the sites, such as data recovery or other mitigation measures. To address the accidental discovery of archaeological sites, human remains, or cultural items, the Army has developed an inadvertent discovery plan as part of the PA.

### *Less than Significant Impacts*

*Impacts on archaeological resources from training activities.* There are not likely to be significant increased impacts on archaeological resources on the KTA training areas from off-road tactical vehicle maneuvers and other military training activities. Known archaeological sites have a buffer area delineated as a no use area. Possible impacts would include accidental discoveries of unknown archaeological resources and damage to them as a result of training activities on the range. Additionally, as discussed under geological resources, Strykers exert a greater amount of force on the ground than do vehicles previously used on training areas. Off road mounted maneuvers with Strykers could result in greater indirect impacts through contribution to erosion.

These impacts will be mitigated by regular monitoring by cultural resources personnel, and compliance with the IDP developed as part of the PA, as described above. If sites were discovered as a result of erosion or training exercises, the PA provides for compliance with the provisions of NAGPRA and ARPA in case of accidental discovery of human remains, cultural items, or archaeological materials. All known sites will be evaluated for eligibility to the NRHP and flagged for avoidance.

*Impacts on Areas of Traditional Importance.* The ATIs that have been identified at KTA are outside the boundaries of the project areas for the construction and use of the CACTF and tactical vehicle wash. However, further oral historical and archival research might result in the identification of ATIs that could be affected by these projects. Any identified ATIs will be avoided where feasible. Construction or training area uses will be designed to avoid identified traditional places and to minimize visual impacts on traditional cultural landscapes by site location, design, and orientation, where feasible.

If identified ATIs cannot be avoided because of interference with the military mission or risk to public safety, USARHAW will consult to identify impacts and to develop appropriate mitigation measures. Such mitigation will be developed in consultation with the SHPO and Native Hawaiians, in accordance with the provisions of the PA.

The Army has identified Native Hawaiian burial sites in the Proposed Action's ROI. The Army completed notification and consultation for these burial sites in accordance with NAGPRA and left these human remains in place. If impacts are identified that may affect any burial sites, or if there is an inadvertent discovery of Native Hawaiian human remains or funerary objects, the Army will abide by all notification and consultation requirements, as outlined in NAGPRA.

*Impacts from road use.* Archaeological sites have been identified within the area of impact of the Drum Road upgrade in KTA (Pacific Legacy 2002). Construction impacts on Drum Road sites will be covered by the EA addressing that construction project. Impacts to sites along Drum Road and Helemanō Trail from use of these roads under the Proposed Action could include erosion and possible vandalism or human access. These impacts are likely to be less than significant and will be mitigated by regular monitoring by installation cultural resources personnel.

*No Impacts*

*Impacts from FTI tower construction.* The FTI project at KTA would involve constructing four antennas, which would require a 20-foot (6.1-meter) by 25-foot (7.6 -meter) concrete pad supporting an equipment tower and shed. The towers would be erected on disturbed sites in the middle of the KTA training area, which is identified as having moderate sensitivity for archaeological resources. Construction would not require any additional ground disturbance and is therefore unlikely to have any impact on archaeological resources.

### Reduced Land Acquisition Alternative

The RLA Alternative would produce the same impacts as those under the Proposed Action.

### No Action Alternative

*Less than Significant Impacts*

*Impacts to archaeological resources from training activities.* Current force training activities would continue at current levels under No Action. This would result in ongoing impacts on cultural resources from training activities, particularly ground troop activities, off-road vehicle movement, and subsurface excavations. Certain archaeological resources on the training areas are monitored following exercises to document adverse effects on the sites. Under No Action, current training would continue, and there would be no additional impacts on cultural resources or changes in cultural resources management policies. USARHAW will continue efforts to inventory eligible historic properties, in compliance with Section 110 of the NHPA, and project planning will comply with Section 106 and its implementing regulations. Impacts to cultural resources would be mitigated, in compliance with these regulatory requirements.

## 7.12 HUMAN HEALTH AND SAFETY HAZARDS

### 7.12.1 Affected Environment

The following section describes the affected environment pertaining to human health and safety hazards as a result of current military actions on KTA.

#### *Hazardous Materials and Waste Management*

Hazardous materials and wastes that are used and generated at KTA are regulated by the same federal, state, and Army regulations as at SBMR. The regulations include implementing the current Army hazardous waste standard operating procedures and the Army spill contingency plan. Any hazardous waste that is produced during training exercises at KTA is managed at hazardous waste storage points until the DRMO picks up the waste and ships it directly off-island for proper disposal (Akasaki 2002b).

#### *Specific Health and Safety Hazards*

The following sections address specific hazardous materials and wastes that may be used, stored, or transported within KTA, as well as wildfire issues. Hazardous material and wastes consistently affect the environment and often have specific regulations that govern their use, storage, and disposal.

*Ammunition*

KTA is the second largest training area on O'ahu. This area can support larger scale maneuver exercises (Nakata Planning Group, LLC 2002b, 3). Although remnants of past live-fire training have been found on KTA, no live-fire activities currently take place there. KTA provides the space for infantry and associated support units to maneuver. No live bullets are fired during maneuvers, and blanks are used in rifles and machine guns, along with MILES equipment, provided to allow units to maneuver against the enemy, to engage the enemy, and to receive incoming fire (Garo 2002a).

*Installation Restoration Program*

There are no IRP sites under investigation on KTA.

*Lead*

The properties of and regulations for lead are described in detail in Chapter 3, Section 3.12 of this document. No lead surveys have been conducted at KTA, but any future lead survey information will be available on the DPW lead and asbestos database.

*Asbestos*

The properties of and regulations for asbestos are described in detail in Chapter 3, Section 3.12 of this document. Current asbestos survey information for KTA is maintained on the DPW lead and asbestos database.

To date, the DPW has surveyed for ACM at three structures on KTA, all of which contained nonfriable but no friable ACM, and one of which was set for demolition (USARHAW 2002d).

*Polychlorinated Biphenyls*

The KTA former transformer site, used in conjunction with the former missile launch facility, consists of two transformer pads at the abandoned generator building on a former Nike missile launch facility within the training area. The site is fairly remote and is accessible only over a rough road that is controlled by a guard shack and gate.

The missile launch facility generator structure consisted of a concrete block building that housed the emergency power generators and two fenced enclosures for the power distribution transformers. The transformers used at this site were of the type that typically contained PCBs in cooling oil.

The US Army, Engineering Services Division, sampled the site on September 12, 1994. Samples of the water and sludge in one of the transformers and the oil in the remaining three transformers were tested for PCB Aroclor congeners or constituents. PCBs were detected in the transformer oil samples and a water/sludge sample. Soil samples were also obtained near the concrete transformer pad, but PCBs were not detected in those samples. Under current site uses, the former transformer site does not appear to pose a significant threat to human health and the environment. However, if hazardous material or waste contamination is present in the surface soil, changes in use could create new and more immediate targets and associated risks.

There are ongoing efforts to assess and remediate possible PCB contamination sources throughout the Proposed Action project area, including KTA. Devices containing regulated levels of PCBs that are on-line are to be replaced with non-PCB devices or refilled and reclassified to non-PCB status, in accordance with requirements outlined in 40 CFR Part 761.30(a)(2)(v). Devices containing regulated levels of PCBs that are off-line are to be removed from the installation and disposed of (PRC 1995, 4).

Between February 4 and 28, 1991, Power Systems Analysis, Inc., conducted a survey to determine the concentration of PCBs in the electrical distribution equipment in Hawai'i military installations. The survey phase of this project included collecting dielectric fluid and recording pertinent data from approximately 1,500 pieces of electrical equipment (USAEHA 1993a, C-5-8). Of the seven samples collected from KTA during this study, none contained PCBs.

Based on historical and ongoing sampling and analysis, devices that are found to contain regulated levels of PCBs are either upgraded to non-PCB devices or are refilled or removed, drained, packaged, and disposed of in accordance with 40 CFR Part 761 (PRC 1995, 4).

*Electromagnetic Fields*

There is one RAWS on KTA. RAWS require personnel to be on-site only for maintenance and not for operations, and they are typically located in remote wildland areas. The general public typically is not allowed in areas that could contain EMF hazards from Army equipment, minimizing exposure to potential sources of EMF. The standard Army communications equipment at KTA is operated by qualified personnel in accordance with regulatory requirements.

## Petroleum, Oils, and Lubricants

### *Underground Storage Tanks*

Only one UST remains in use on KTA, identified as tank KTA-4. Two other USTs, both containing diesel fuel, were removed in 1994 and 1998, in compliance with USEPA regulations.

Appendix K-4 lists all current and permanently decommissioned USTs and LUSTs on KTA. Additionally, Appendix K-4 provides location, responsible party, construction, and content information of all USTs and inspection and remediation status information for all LUSTs. There was one LUST site on KTA; it was remediated and was issued a clean closure status in 1999.

All industrial fueling is conducted from the "super station" at SBMR. Fuels, oils, or other hazardous materials needed for training exercises are brought with the unit to KTA and staged in a temporary storage point. Unused materials are either brought back to SMBR with the unit or are properly stored for pickup and disposal by DRMO-HI.

### *Aboveground Storage Tanks*

There is one 288-gallon AST on KTA, in Building 67, and it is used to store liquid petroleum gas, also known as propane, for hot water heaters. Information on this tank is included in Appendix K-4.

### *Oil/Water Separators, Wash Racks, and Grease Traps*

There are reportedly no oil/water separators, wash racks, or grease traps on KTA, and all maintenance is conducted at SBMR.

## Pesticides/Herbicides

The Natural Resources Department is the only pesticide/herbicide user on KTA, where there are no pesticides/herbicides stored. Pest management is covered under the USAG-HI installation pest management plan (Yamamoto 2002).

## Wildfires

There is a high risk of wildfires at KTA because rugged terrain in this area limits accessibility for suppression and increases the risk of fires spreading to sensitive native habitat (USARHAW and 25th ID[L] 2001a, 176 and 223-224). Highly flammable fuels adjacent to native plants further increase the risk of fire damage. Fires may start in adjacent areas, such as ridge top subdivisions or at sites within KTA that are accessible to the public. However, fires are typically started by unauthorized use of pyrotechnics, such as hand flares and smoke grenades. KTA is not a live-fire training area, and smoke grenades and other pyrotechnics are permitted in only designated areas. Blank ammunition, SRTA, and pyrotechnics are the only types of ammunition used. KTA depends on the closest responding forces, such as the City and County of Honolulu Fire Department, for first response and immediate Federal Fire Department/Range Control response. There is one RAWS on KTA to aid in determining weather conditions and the threat of wildfires.

Records indicate that there have been 16 fires at KTA since 1996 (USARHAW and 25th ID[L] 2003, 7-22). These fires burned less than 300 acres (121 hectares) total. A single fire of 250 acres (101 hectares) in the late 1990s in training area C-2 accounted for 85 percent of the recorded acreage burned. About half of the fires were started in August, but there is no clear pattern to the time of ignition. A number of different pyrotechnic devices, including smoke grenades, simulators, and star clusters, as well as blanks, started the fires.

Two wildfire areas have been designated based on the location of the most commonly used training areas and roads (USARHAW and 25th ID[L] 2003, 7-23 and 7-25). Each area was assigned an ignition potential, fuels hazard, and habitat value based on the best available information. The western half of KTA has high and very high wildfire prevention priorities. Most of the eastern half of KTA has a low-to-moderate wildfire prevention priority, and it also has an area of moderate wildfire prevention priority.

Figure 7-29 shows the location of fire management facilities. Fire protection in the fire management area includes firebreaks and fuels modification (USARHAW and 25th ID[L] 2003, 7-24). According to the IWFMP, there are no firebreaks at KTA, though there are a number of roads that will serve as fire control lines during fire suppression. These roads will not be kept at firebreak standards and will be maintained only to the extent necessary for vehicle traffic. There are no plans for fuels modifications at KTA.

Schofield Barracks Range Control is responsible for retrieving weather data from the KLOA RAWS (USARHAW and 25th ID[L] 2003, KTA-6). The burn index, as determined by the National Fire Danger Rating System, will be used to rank fire danger based on known ignition sources. Based on this system, green and red characterize fire conditions at KTA.

KLOA is not a live-fire training area. It depends on the closest responding forces, such as the City and County of Honolulu Fire Department, for first response and immediate Federal Fire Department/Range Control response (USARHAW and 25th ID[L] 2001a, 339). There are no RAWS on KLOA to aid in determining weather conditions and the threat of wildfires.

Only one fire has been recorded at KLOA. It burned 310 acres (125 hectares) in September 2000 (USARHAW and 25th ID[L] 2003, 7-13). The reported ignition source was hot brass/muzzle flash and must have been caused by blank fire because no other munitions are allowed at KLOA. Despite the size of this fire, blanks represent a very low fire ignition threat, based on the number of fires they have caused throughout the USARHAW fire history. No analysis for fire trends is possible at KLOA with such limited data.

A wildfire prevention analysis requires that a parcel of land be divided by significant barriers to fire, either human-made or natural, in order to create units that are then given a prevention priority (USARHAW and 25th ID[L] 2003, 7-15). Because there are no readily definable barriers within KLOA, it is not possible to carry out a wildfire prevention analysis. However, generally speaking, areas at low elevation are dominated by flammable alien species, while higher elevations are less fire prone. Conversely, low elevations harbor few

**Figure 7-29**
Fire Management Facilities at Kahuku and Kawailoa Training Areas

federally listed species, while high elevations contain many. For these reasons, fire prevention dollars would be better spent in low elevation areas concentrated around heavily used training locations.

Figure 7-29 shows the location of fire management facilities. Fire protection in the fire management area includes firebreaks and fuels modification (USARHAW and 25th ID[L] 2003, 7-16). A new RAWS will be purchased and placed at Pu'u Kapu in fiscal year 2004 to facilitate fire danger rating at KLOA. There are no firebreaks at KLOA, though Drum Road can serve as a control line during fire suppression. It will not be kept at firebreak standards and will be maintained only for vehicle access. There are no plans for any firebreaks to be built in KLOA. Several other roads throughout the installation will provide access for fire fighting vehicles. There are no plans for any fuels management at KLOA at this time, except for Drum Road. Should this road be built, unmanaged fuels will be cut and herbicide will be applied. Fine fuels will be kept to less than a foot high or less than 20 percent crown cover, which the Army will monitor once annually. It is unlikely that much if any fuels management will be required along this route, most of which passes through heavily managed agricultural fields.

Schofield Barracks Range Control is responsible for retrieving weather data from the KLOA RAWS (USARHAW and 25th ID[L] 2003, KLOA-6 and KLOA-20). The burn index, as determined by the National Fire Danger Rating System, will be used to rank fire danger based on known ignition sources. Based on this system, green and red characterize fire conditions at KLOA.

Drum Road is expected to have wildfire characteristics similar to the KTA and KLOA because of its proximity to these areas. Thus the rugged topography of Drum Road constrains fire suppression efforts (USARHAW and 25th ID[L] 2001a, 339). Highly flammable plants adjacent to native plants increase the risk of fire damage. Fires may start in adjacent areas, such as ridge top subdivisions or at sites within KLOA that are accessible to the public.

### 7.12.2 Environmental Consequences

#### *Summary of Impacts*

This section is a discussion of potential impacts of implementing the Proposed Action and alternatives at KTA and at KLOA, located just south of KTA. Three significant impacts were discovered under the Proposed Action or the RLA Alternative, and all could be mitigated to be less than significant, as follows:

- Construction and demolition at KTA could expose workers to lead-based paint or lead-containing construction materials, creating a significant health and safety risk.

- Construction and demolition at KTA could expose workers to asbestos-containing materials, which could be a significant health and safety risk.

- The proposed CACTF is on a location that formerly contained PCB-contaminated soils. Moving these soils could create a significant impact by releasing the PCBs into the air and exposing construction workers, Army personnel, and the environment.

Each of these impacts could be reduced to less than significant through mitigation. All other human health and safety issues were identified as being either less than significant or as having no impact. There are no human health and safety hazard impacts associated with KLOA under the Proposed Action or the RLA Alternative.

Impacts and methodology and significance thresholds are discussed in Chapter 4, Section 4.12.1. Table 7-28 summarizes the potential human health and safety hazards for KTA that have been identified in this analysis.

**Table 7-28**
**Summary of Potential Human Health and Safety Hazard Impacts at KTA/KLOA**

| | Proposed Action | | Reduced Land Acquisition | | No Action | |
|---|---|---|---|---|---|---|
| **Impact Issues** | **KTA** | **KLOA** | **KTA** | **KLOA** | **KTA** | **KLOA** |
| Hazardous materials management | ⊙ | ○ | ⊙ | ○ | ⊙ | ⊙ |
| Hazardous waste management | ⊙ | ○ | ⊙ | ○ | ⊙ | ⊙ |
| Ammunition | ⊙ | ○ | ⊙ | ○ | ○ | ○ |
| Unexploded ordnance | ○ | ○ | ○ | ○ | ○ | ○ |
| General training | ⊙ | ○ | ⊙ | ○ | ○ | ○ |
| Installation restoration program sites | ○ | ○ | ○ | ○ | ○ | ○ |
| Lead | ⦸ | ○ | ⦸ | ○ | ○ | ○ |
| Asbestos | ⦸ | ○ | ⦸ | ○ | ○ | ○ |
| Polychlorinated biphenyls | ⊙ | ○ | ⊙ | ○ | ○ | ○ |
| Electromagnetic fields | ⊙ | ○ | ⊙ | ○ | ⊙ | ⊙ |
| Petroleum, oils, and lubricants | ⊙ | ○ | ⊙ | ○ | ⊙ | ⊙ |
| Pesticides/herbicides | ○ | ○ | ○ | ○ | ○ | ○ |
| Biomedical waste | ○ | ○ | ○ | ○ | ○ | ○ |
| Radon | ○ | ○ | ○ | ○ | ○ | ○ |
| Wildfires | ⦸ | ⦸ | ⦸ | ⦸ | ⊙ | ⊙ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⦸ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact
N/A = Not applicable

#### *Proposed Action (Preferred Alternative)*

##### *Significant Impacts Mitigable to Less than Significant*

*Impact 1: Ammunition*. Blank ammunition, SRTA, and pyrotechnics are the only types of ammunition planned for training at KTA. Because SRTA is technically considered live-fire ammunition and would be conducted at the training area in conjunction with the Proposed Action, this impact is considered significant but mitigable. There would be no live-fire training conducted on KLOA under the Proposed Action.

SRTA is considered to be live-fire, and does produce some of the safety risks related to true live-fire training. However, SRTA would not likely produce a significant wildland fire threat because the ammunition has a plastic tip and does not include the use of tracer rounds. Additionally, the ammunition does not contain lead and would not contaminate the soil. As discussed in Section 7.2, the Army will restrict access at KTA when training with SRTA ammunition occurs. The mitigation measures below will reduce the impact to less than significant.

*Regulatory and Administrative Mitigation 1.* All government personnel or government contractors accessing impact areas will continue to follow OSHA and Army standards and guidelines to minimize health and safety impacts from exposure to any contaminants or ordnance. The general public will be allowed in or near impact areas only at times and in group sizes approved by USARHAW Command. Army trained and certified personnel would escort the general public at all times. Access is limited to only those areas deemed safe by USARHAW Range Control.

The Army will undertake additional risk-based investigations as appropriate in the event any active range is closed and transferred out of DoD control. Based on the results of this health risk-based analysis, all remediation necessary to mitigate an imminent threat to human health and the environment would be undertaken at such time.

When the CACTF is active, the Army will establish all prudent measures to prevent unauthorized access within the SDZs for SRTA, which are up to 2,300 feet (700 meters) during training operations. This would help ensure public safety during training.

*Additional Mitigation 1.* No additional mitigations have been proposed.

*Impact 1: Lead*. Construction and demolition activities associated with the Proposed Action could expose workers to airborne lead particulates at the proposed project sites within KTA. The workers could be exposed to LBP and pipes during demolition or soil excavation and grading at specific project sites. Buildings S150 and S151 are proposed for demolition in conjunction with the CACTF, and neither building has been surveyed for the presence of lead. The mitigation measures below will reduce the impact to less than significant.

*Regulatory and Administrative Mitigation 1.* The Army will expand existing programs for LBP to any SBCT-related activities that would affect older structures where LBP could have bee used. Lead is managed in place for existing structures. In the event of demolition or renovation projects affecting such structures, a survey is required prior to demolition/renovation and appropriate actions must be taken to prevent the release of LBP into the environment. Construction workers must be properly trained/certified to handle these materials, and any debris must be tested by TCLP and disposed of according to the results.

*Additional Mitigation 1.* No additional mitigations have been proposed.

*Impact 2: Asbestos.* Construction and demolition activities associated with the Proposed Action could expose workers to asbestos during demolition or grading at specific project sites. Buildings S150 and S151, proposed for demolition as part of the CACTF construction, have not been surveyed for the presence of ACM. The mitigation measures below will reduce the impact to less than significant.

*Regulatory and Administrative Mitigation 2.* . The Army will expand existing programs for asbestos to any SBCT-related activities that would affect older structures where asbestos could have been used. Asbestos is managed in place for existing structures. In the event of demolition or renovation projects affecting such structures, a survey is required prior to demolition/renovation and appropriate actions must be taken to prevent the release of asbestos into the environment. Construction workers must be properly trained/certified to handle asbestos-containing materials, and any debris must be tested by TCLP and disposed of according to the results.

*Additional Mitigation 2.* No additional mitigations have been proposed.

*Impact 4: Wildfires.* There is a high risk of wildfires at KTA. The one training area that would be constructed at KTA under the Proposed Action, the CACTF, would support nonlive-fire training using blank ammunition and live-fire training using only SRTA and no ball or tracer ammunition. Nonlive-fire and live-fire training using SRTA, which still has the potential to ignite wildfires, would increase but would not likely produce a significant wildfire risk because the ammunition has a plastic tip.

Following the construction/upgrade of Drum Road, units would transport materials and equipment via military vehicles. Transportation of personnel and flammable or combustible materials, such as fuel or weaponry, could increase the potential for starting a wildfire, especially in areas not previously used frequently, such as Drum Road, which is at both KTA and KLOA. The Army's use of the road would increase potential sources of wildfire ignition from training in areas that do not have established fire management actions. Unlike training activities conducted on installations, the road would not always be near an installation where access to Army fire suppression resources would be readily available. A wildfire could damage animal and plant communities, could damage cultural resources, and could contribute to soil erosion by removing vegetation. The mitigation measures below will reduce the impact to less than significant.

*Regulatory and Administrative Mitigation 4.* The IWFMP for Pōhakuloa and Oʻahu Training Areas was updated on October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts associated with wildland fires. Public and firefighter safety is the first priority in every fire management activity. The plan considers the potential need for firebreaks and/or fuel breaks at each installation, along with other safety concerns. The plan is available upon request.

### *Less than Significant Impacts*

*Hazardous materials management*. The Proposed Action would not significantly increase hazardous materials usage at KTA. Short-term impacts would be associated with construction activities at the proposed project sites. Construction-related activities would require the use of hazardous materials in excess of existing quantities. Construction activities of the 3-acre (1.2-hectare) CACTF would consist of demolishing approximately 280 square feet (164 square meters) of facilities, including tactical movement trails, simulated firing points, obstacles, targets, and other infrastructure. Project construction would involve earth movement, grading, and other typical construction activities. Construction of a tactical vehicle wash would involve similar construction activities to provide six wash stations, each to support a 60-foot (18-meter) long by 12-foot (4-meter) wide vehicle. Contract specifications control the use of hazardous materials and require compliance with federal, state, and local requirements and with installation policy on hazardous materials. The US Army follows strict SOPs for storing and using hazardous materials, so no new procedures would need to be implemented to store or use the construction-related hazardous materials. Excess quantities of unused hazardous materials would be removed after construction. Construction issues would not likely result in any significant impacts.

Hazardous materials would be handled in accordance with existing regulations and base-wide hazardous materials management and standard operating procedures. The new facilities would continue to use the existing HMCC facility on SBER. The USAG-HI also conducts routine compliance inspections of all facilities containing hazardous materials to ensure their proper handling, use, and storage. The proposed activities would not introduce a significant impact, and no mitigation would be necessary.

*Hazardous waste management*. Activities related to the Proposed Action would not significantly affect hazardous waste management. Construction could generate small amounts of hazardous waste. Operational activities associated with the Proposed Action would not significantly affect hazardous waste management. As mentioned in Chapter 5, Section 5.12, the US Army follows strict regulations and SOPs for the temporary storage and disposal of hazardous waste. The SBCT would be required to manage and dispose of hazardous waste generated by operations through DRMO-HI, in accordance with existing regulations and base-wide protocol regarding storage, use, and disposal. Hazardous waste associated with construction activities would cease to be generated at the completion of construction.

The additional hazardous waste generated by the Proposed Action would not result in a significant increase to the total amount of hazardous waste managed and disposed of from the base; therefore, there would be no significant construction-related or operational impacts, and no mitigation would be required.

*Ammunition*. Blank ammunition, SRTA, and pyrotechnics are the only types of ammunition planned for training at KTA. SRTA is technically considered live-fire ammunition and would be used at the training area in conjunction with the Proposed Action. For this reason, through existing Army protocols and regulatory requirements, the Army would continue to manage SRTA to prevent hazards, to ensure security precautions, and otherwise to maintain environmental stewardship. The Army would produce a site-specific training management plan, which would establish best management practices during training and would identify preventative measures to reduce the impact to less than significant. In addition, the Army would reconfigure and upgrade SDZs on the KTA ranges, using SRTA as needed, to support this pseudo-live-fire training in accordance with Army Pamphlet 385-64, *Ammunition and Explosive Safety Standards,* in order to protect the public from accidents. Because these measures would be conducted in conjunction with the Proposed Action, the use of SRTA at KTA is not considered a significant impact. There would be no live-fire training conducted on KLOA under the Proposed Action.

SRTA would not likely produce a significant wildfire threat because the ammunition has a plastic tip and does not include the use of tracer rounds. Additionally, the ammunition does not contain lead and would not contaminate the soil. Although the ammunition would leave a shell casing, units would remove all target equipment and shell casings following training and would make every effort to restore the facility to its previous condition. Aside from these cleanup measures following training, no new mitigations would be necessary with regard to potential wastes generated by the SRTA because the new munition is not expected to contaminate the land. *Polychlorinated biphenyls*. In the Draft EIS, the Army believed that the impacts from PCBs would be significant with the construction proposed at KTA. Upon further evaluation of the KTA project area, the Army determined that the PCB levels in soil in the proposed construction area are below federally designated health risk standards. The proposed CACTF lies adjacent to the former missile launch facility at KTA, which previously housed the emergency power generator and power distribution transformers. Although the former site has the potential to be preserved as historic, activities around this site and connected to the construction and operation of the new range would have the potential to move soil and release imbedded PCBs to the air and environment. Because the PCBs exist below federally designated health risk standards, if soils were suspended into the air and personnel, the community, or the environment were exposed to these soils, the impact would be less than significant.

*General training.* In conjunction with the proposed CACTF, up to 200 vehicles, including Strykers, HMMWVs, and trucks would be used per exercise at KTA. Collective training exercises would be conducted generally between 90 and 180 days a year. Training activities could expose additional areas to potential leaks, spills, or drips from military training equipment. USARHAW would, during any on-site operational activities within a specific project area, implement SOPs to minimize the potential for spills or other harm to the environment. Targets and security devices would be funded by OPA. UXO cleanup is not required because KTA has supported only nonlive-fire training in the past. As further explained in Chapter 4, Section 4.12 of this document, in order to protect the public during range training exercises, SDZs have been included in the range design, in accordance with Army Pamphlet 385-64, *Ammunition and Explosive Safety Standards*. Additionally, in order to protect Army personnel during range training events, Soldiers and officers are given safety manuals, operation-specific field manuals, and range-specific briefings prior to the training exercise, with a complete discussion of safety procedures while training. There would be no significant impacts, and no mitigation would be required.

*Electromagnetic fields.* Two FTI sites would be constructed at KTA. The general public is typically not allowed in areas that could contain EMF hazards from Army equipment and, therefore, would not be inadvertently exposed to EMF produced by FTI towers or RAWS. The FTI sites would be appropriately fenced to prevent trespassing and exposure to any harmful EMF. Warning signs would be posted around the perimeter of all potentially harmful EMF sources. DOD Instruction 6055.11 and Army Pamphlet 385-64, as well as other Army regulations pertaining to EMF, would be followed in the new facilities. Only trained personnel would work with equipment emitting EMF. There would be no significant impact to the public from exposure to EMF, and no mitigation would be necessary.

*Petroleum, oils, and lubricants.* A tactical vehicle wash would be constructed at KTA as a part of the Proposed Action. As described in Appendix D, the water from the proposed wash systems would flow through a water sediment basin, equalization basin, and secondary treatment. Treatment would include oil, grease, and grit removal and organic control. Additionally, OWSs would be provided to treat any residual water that had not gone through the main system. Oils would be skimmed regularly from the surface of the OWSs, as is the current practice for facilities using OWSs. DRMO-HI would dispose of the waste oil in accordance with federal and Army regulations.

There are no storage tanks within the project areas, and no new storage tanks would be installed as a result of the Proposed Action. Stryker wheeled vehicles would be used on KTA under the Proposed Action, but they would be maintained at SBMR. Construction activities could expose additional areas to potential construction equipment leaks, spills, or drips. During construction within a specific project area, USARHAW would implement the SOPs stated in Chapter 5, Section 5.12 of this document.

Best management practices would be used and construction and operation would follow USEPA and USAG-HI protocol for using and handling hazardous materials, such as petroleum, oils, and lubricants. Each facility maintains strict SOPs and spill contingency plans for hazardous materials and waste, identifying specific operating responsibilities and procedures. The Proposed Action would not pose any significant impacts from POLs, and no mitigation would be required.

### *No Impacts*

*Unexploded ordnance.* Only blank ammunition and SRTA are permitted for use at KTA. SRTA does not produce explosives projectiles and therefore does not have the potential to introduce UXO on KTA. UXO cleanup is not required because KTA has only supported nonlive-fire training in the past. No UXO clearance would be necessary in the future, so UXO would not pose a threat, and no mitigation would be necessary.

*Installation restoration program sites*. There are no IRP sites under investigation on KTA, so there would be no impacts, and no mitigation would be required.

*Pesticides/Herbicides*. Activities associated with the Proposed Action would not affect pesticide management on KTA because this action would not increase the amount of pesticides used on the installation; therefore, there would be no impact, and no mitigation would be required.

### Reduced Land Acquisition Alternative

The impacts associated with RLA are identical to those described for the Proposed Action.

### No Action Alternative

The current baseline of existing conditions at KTA would continue under the No Action Alternative. Impacts would continue at their current levels with no increase in hazardous material use or waste generation. Hazardous materials and waste management, EMF issues, POLs, and wildfires would continue under existing conditions and therefore would continue to present less than significant impacts. Federal, state, and Army protocol would continue to be followed when managing, handling, and storing hazardous materials and wastes at KTA, including isolating and signing potential EMF sources on the site. Additionally, as non live-fire training would continue at KTA, SRTA would not be used under No Action. Wheeled vehicles would continue to be used, excluding Strykers, and the threat of wildfires would persist. Army activities would continue to be guided by the 25th ID(L) and USARHAW Wildfire Management Program. There would be no significant hazardous materials and waste impacts introduced to KTA or KLOA under the No Action Alternative.

# 7.13 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

## 7.13.1 Affected Environment

This section describes the socioeconomic resources of the KTA project area. A discussion of Native Hawaiian TCPs and ATIs and the impact of the proposed project on these resources can be found in Section 7.11, Cultural Resources. KTA is within the Koʻolauloa CCD. The population of the Koʻolauloa CCD represented approximately 2.2 percent of the population of Honolulu County in 2000. Between 1990 and 2000 the population of the Koʻolauloa CCD area grew from 18,443 to 18,899, an increase of 2.5 percent (US Census Bureau 1990a, 2000a). Approximately 49.7 percent of the housing in this district was owner-occupied, and 16.6 percent was vacant in 2000 (US Census Bureau 1990a, 2000b). Approximately 7.0 percent of the population of Koʻolauloa CCD was of Hispanic origin, and 68.0 percent of the population was made up of minority ethnic groups, the largest percentage of which was Asian/Pacific Islander (38.9 percent of the population) (US Census Bureau 1990a, 2000a). The population of Koʻolauloa CCD under the age of 18 increased 2.9 percent between 1990 and 2000. Approximately 32.3 percent of the population was within this age group in 2000 (US Census Bureau 1990a, 2000c).

KTA is a training area for company-sized units and smaller. Throughout the training area are unimproved dirt roads, hiking trails, and several designated helicopter landing zones (GlobalSecurity.org, 2001b). No military or civilian personnel are permanently stationed or residing within KTA.

ROI (i.e., Honolulu County) employment, unemployment, major industries, and income are addressed in Chapter 5, Section 5.13.1.

**Table 7-29**
**Koʻolauloa CCD Population Percentage by Race/Ethnicity**

| | Percent of Total Population 1990 | Percent of Total Population 2000 | Percent Change in Actual Population 1990-2000 |
|---|---|---|---|
| White | 38.5 | 31.0 | -17.5 |
| Black or African American | 0.8 | 0.5 | -43.1 |
| Native American, Eskimo, Aleut | .8 | 0.3 | -59.9 |
| Asian and Pacific Islander | 58.4 | 38.9 | -31.8 |
| Other and Two or More Races | 1,4 | 28.4 | 1,913.1 |
| Hispanic[1] | 7.8 | 7.0 | -7.8 |
| Minority[2] | 61.5 | 68.1 | 13.5 |

Source: US Census Bureau 1990a, 2000a
[1]Persons of Hispanic origin may be of any race.
[2]Minority includes Black or African American; Native American, Eskimo, and Aleut; Asian and Pacific Islander; and Other and Two or More Races.

### 7.13.2 Environmental Consequences

#### *Summary of Impacts*

The Proposed Action would have temporary beneficial effects on employment, income, and business volume in Honolulu County and the Koʻolauloa CCD. This would result from construction and the increased expenditures from projects associated with KTA that would stimulate the economy within the ROI. Less than significant adverse effects on employment, income, and the economy would occur as a result of the Proposed Action because the changes to these factors would be within the capacity of society and the economy to absorb. Chapter 4, Section 4.13, contains a discussion of the EIFS model results. Only the results pertaining to Honolulu County are applicable to KTA. The Proposed Action also would have less than significant impacts on the protection of children because, while the Army would continue to implement safety procedures, some risks to nearby populations (particularly children) are inherent to increased construction and training activities. There would be no impacts on population, schools, or housing because no new staff would be added at KTA. No disproportionate impacts on low-income or minority populations are expected as a result of the Proposed Action. No Action would have no impacts on socioeconomic or environmental justice factors or on the protection of children.

**Table 7-30**
**Summary of Potential Socioeconomic and Environmental Justice Impacts at KTA**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Population | ○ | ○ | ○ |
| Employment | ⊙+ | ⊙+ | ○ |
| Income | ⊙+ | ⊙+ | ○ |
| Economy (business volume) | ⊙+ | ⊙+ | ○ |
| Housing | ○ | ○ | ○ |
| Environmental justice | ⊙ | ⊙ | ○ |
| Protection of children | ⊙ | ⊙ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | |
|---|---|---|---|
| ⊗ = | Significant | + = | Beneficial impact |
| ⦸ = | Significant but mitigable to less than significant | N/A = | Not applicable |
| ⊙ = | Less than significant | | |
| ○ = | No impact | | |

#### *Proposed Action (Preferred Alternative)*

Less than Significant Impacts

Short- and long-term direct and indirect minor beneficial effects on employment, income, and business volume in Honolulu County and the Koʻolauloa CCD are expected as a result of construction at KTA and training associated with the Proposed Action. The expenditures and employment associated with construction would increase ROI sales volume, income, and employment, as determined from EIFS model results for Honolulu County (see Chapter 4, Table 4-14). The EIFS model, its inputs, outputs, and significance measures are discussed in more detail in Appendix L. The economic benefits would last only for the duration of construction. These changes in the specific economic parameters (sales, income, employment, and population) at all SBCT installations in Honolulu County would fall within historical fluctuations and are considered to be minor (see Chapter 4, Table 4-14); therefore, the proportion of these increases at KTA is not considered significant.

*Employment*. Implementing the Proposed Action would have a less than significant impact on employment. Employment associated with construction would result in a temporary increase in employment. Subsequent indirect increases in employment are produced by the multiplier effect, resulting from increased spending by construction employees. Increased construction employment at all SBCT installations in Honolulu County would fall within historical fluctuations and is considered minor (see Chapter 4, Table 4-15); therefore, the proportion of these increases at KTA is not considered significant, and no mitigation would be required.

*Income*. Implementing the Proposed Action would have a less than significant impact on income. Changes in income represent the wage and salary payments made to construction workers. Any change resulting from the Proposed Action at all SBCT installations in Honolulu County would fall within historical fluctuations and are considered minor (see Chapter 4, Table 4-14); therefore, the proportion of these increases at KTA are not considered significant, and no mitigation would be required.

*Economy (business volume)*. Implementing the Proposed Action would have a less than significant impact on business volume. Changes in local business activity resulting from the Proposed Action include the change in the dollar value of construction and procurement expenditures. Business volume related to the Proposed Action construction at all SBCT installations in Honolulu County would fall within historical fluctuations and would be considered minor (see Chapter 4, Table 4-14); therefore, the proportion of these increases at KTA is not considered significant, and no mitigation would be required.

*Economic impacts to environmental justice.* Short-term and long-term indirect minor adverse effects on environmental justice populations could occur. Approximately 78.7 percent of Honolulu County and 69.0 percent of the Ko'olauloa CCD was made up of minority ethnic populations (US Census Bureau 2000a), and 9.7 percent of Honolulu County had income levels below the poverty line (US Census Bureau 2001). There are no military or civilian personnel permanently stationed at KTA. However, increased military traffic on public roads between KTA and SBMR would accompany the Proposed Action. Military vehicles could travel through predominantly minority residential neighborhoods. When military actions are conducted in areas accessible to the public, such as public roadways, the risk associated with the operations could extend to civilians. Noise from vehicle maneuvers could also disturb nearby residents. Risks to the public and military personnel inherent in training and day-to-day operations would be minimized or avoided through adherence to existing Army-wide, unit and installation, and other applicable safety regulations and procedures.

<u>*Protection of children.*</u> Implementing the Proposed Action would have a less than significant indirect impact on the health and safety of children. The Proposed Action would not directly involve children. There are no military or civilian personnel permanently stationed at KTA, and there are no nearby schools or day care centers. Construction activities would take place in areas that are off-limits to the general public. Restricted areas would continue to be posted with signs, enclosed by fences, or stationed with guards. Risks to children and to the general public would be minimized by strictly adhering to applicable safety regulations and procedures.

However, increased military traffic on public roads between KTA and SBMR would accompany the Proposed Action. Military vehicles could travel through residential areas or by schools. When military actions are conducted in areas accessible to the public, such as public roadways, the risk associated with the operations could extend to civilians. Risks to the public and military personnel inherent in training and day-to-day operations would be minimized or avoided through adherence to Army-wide, unit and installation, and other applicable safety regulations and procedures.

<u>*No Impacts*</u>

<u>*Population*</u>. Implementing the Proposed Action would have no impacts on population and would not increase the population at KTA.

<u>*Housing*</u>. Implementing the Proposed Action would have no impact on housing. There would be no increased military population at KTA, and, therefore, no increase in the demand for housing.

### *Reduced Land Acquisition Alternative*

The impacts associated with Reduced Land Acquisition are identical to those described for the Proposed Action.

### *No Action Alternative*

<u>*No Impacts*</u>

The existing baseline for socioeconomics and environmental justice would continue under the No Action Alternative. Implementing No Action would not change the local economy or population, and no impacts on population, employment, income or the economy are anticipated. Under the status quo of No Action, no effects on housing are expected because the number of people requiring housing on- or off-base would not change. No Action would not alter the existing health and safety, housing, or economic conditions of minority or low-income populations in Ko‘olauloa CCD or Honolulu County, so no effects on environmental justice are expected. No effects on children are expected because No Action would not present any change in the public health or safety risk that could affect children. There are no schools or day care centers near the KTA. The Army would continue to protect the safety of children, using fencing, limiting access to certain areas, and providing adult supervision.

## 7.14 PUBLIC SERVICES AND UTILITIES

### 7.14.1 Affected Environment

#### *Police, Fire, and Emergency Medical Services*

Military police from Schofield Barracks respond to emergency military situations. Response times are approximately 15 minutes. Civilian police emergencies are covered by the Honolulu Police Department in Kahuku. City and county fire departments respond to fire emergencies at KTA and KLOA. Responses are coordinated among these agencies and the federal fire station at SBMR cantonment. There are no standing medical facilities at KTA or KLOA; units that come to train at KTA/KLOA bring their own “combat lifesavers”, who are medical technicians. In cases of medical emergency, Soldiers can be airlifted to Triplet Medical Center, which is only ten minutes by air from KTA/ KLOA (Garo 2002b).

#### *Water Distribution*

Water used to be supplied to KTA through a system of wells, pumps, and pipelines; however, use of this system was discontinued in the mid-1990s after it was condemned. Water is now trucked in for training exercises, and range staff working at KTA/ KLOA use bottled water (Garo 2003).

#### *Wastewater and Stormwater*

The storm water system at KTA is shown on a general storm drainage map dated December 1985. The system is relatively simple. Nearly all storm water runoff is conveyed via natural slopes and drainages. Runoff from hill slopes above roadways is directed under the roadways via corrugated metal pipes. Stream crossings of roadways are via concrete culverts or corrugated metal pipe.

According to the most recent map of the sanitary sewer system at KTA, dated December 1985, there are four separate sanitary wastewater systems at KTA, including two at the Control Area, one at the Administrative Area, and one at the former Launcher Area (now abandoned). Each of these systems is similar, being comprised of a collection system with 6-inch (15.2-centimeter) pipelines that discharges via a distribution box to one or more open ponds (cesspools). The Control Area and the Administrative Area both include a mess hall, and each of the associated wastewater systems includes a grease interceptor. The generator building at the Control Area has a separate cesspool from the administration building, mess hall and barracks in the Control Area. Due to a revision in USEPA regulations, cesspools serving more than 20 people per day must be closed by April 5, 2005 (C. H. Guernsey & Company 2001).

#### *Solid Waste Management*

Based on the waste and recycling streams generated during the third quarter of 2002, an estimated four tons of industrial solid waste is generated by KTA annually, which represents about 0.1 percent of the total estimated annual industrial waste stream generated by Army installations in Hawai‘i (USARHAW 2002a). KTA has no recycling services (Ching 2002a).

#### *Communications*

Verizon Hawai'i provides commercial telephone service to the housing areas, mainly from direct buried lines, which are deteriorated and have virtually no useful life remaining. ATT-HITS provides official phone service to the Army in duct lines. The Army is responsible for repairing and maintaining the official lines and for providing underground ducts for the commercial phone lines (C. H. Guernsey & Company 2001).

#### *Electricity and Natural Gas*

A 12.47-kV distribution circuit receives power from HECO and distributes it to KTA via 0.4 mile (0.64 kilometer) of overhead primary distribution lines. Approximately eight electrical service connections and six 100-kVA pole-mounted transformers are within the KTA service area; three of the transformers feed Army loads. The condition of the overhead line has been classified as marginal to fair, with 20 to 40 percent of its useful life remaining. The condition of the six Army pole transformers was rated as good to very good, with 60 to 80 percent of their useful life remaining (C. H. Guernsey & Company 2001).

### 7.14.2 Environmental Consequences

#### *Summary of Impacts*

Less than significant long-term adverse effects are expected from the Proposed Action. The additional building space and facilities to be constructed, as well as any increases in training at new and existing facilities, would increase demand on utilities and services. Additional utilities would be provided for the projects that would require increased capacity; otherwise the existing systems would be expected to have adequate capacity to provide for these changes. The Proposed Action could have beneficial effects on the telecommunications and electrical systems at KTA because it would provide telecommunications and electrical infrastructure. No substantial increase in demand on these systems is expected at KTA because no new staff would be added.

No Action is expected to have no impacts on most public utilities and less than significant impacts on stormwater systems. No changes to the provision of police, fire, and emergency services would occur. The demand for water, wastewater collection and treatment, solid waste collection and disposal, telephone systems, and electricity would not change because no additional training would occur and no new personnel would be added. The potential public services impacts at KTA are summarized in Table 7-31.

#### *Proposed Action (Preferred Alternative)*

##### Less Than Significant Impacts

*Police, fire, and emergency medical services.* Minor long-term adverse effects on law enforcement, fire protection, and emergency medical services are expected. The increase in training activities could increase the demand for these services, but the current services should be adequate to accommodate such an increase. There would be no change in jurisdiction for any law enforcement agencies or fire departments.

**Table 7-31**
**Summary of Potential Public Services Impacts at KTA**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Impacts on police, fire, and emergency medical services | ⊙ | ⊙ | ○ |
| Impacts on water distribution | ⊙ | ⊙ | ○ |
| Wastewater and stormwater impacts | ⊙ | ⊙ | ○ |
| Solid waste management | ⊙ | ⊙ | ○ |
| Impacts on communications | ○ | ○ | ○ |
| Impacts on electricity and natural gas | ⊙+ | ⊙+ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | | | |
|---|---|---|---|---|---|
| ⊗ | = | Significant | + | = | Beneficial impact |
| ⃠ | = | Significant but mitigable to less than significant | N/A | = | Not applicable |
| ⊙ | = | Less than significant | | | |
| ○ | = | No impact | | | |

*Water distribution*. Less than significant long-term adverse effects are expected from the Proposed Action because no new staff would be added. Training exercises at the new CACTF would require minimal water use, all of which would be trucked to the site. Increased training maneuvers could increase the demand for potable water at KTA, but water at the new training facilities would be trucked in. The tactical vehicle wash would have a wash station using reclaimed water to minimize overall water usage, and the station would recycle water.

*Wastewater and stormwater.* Minor long-term adverse effects are expected from the Proposed Action. The new CACTF would create impervious surfaces covered by buildings and paving. Drainage from these surfaces would be controlled using curbs and gutters and other standard construction practices to minimize stormwater pollution and runoff. All sewage on the site would be collected in the aerated vault latrine that would be constructed on the CACTF site. Sewage would be removed by pumper truck, and no new sewage lines or septic field would be required. The tactical vehicle wash would have a wash station using reclaimed water to minimize overall water usage, and the station would recycle water to minimize wastewater disposal. Concrete curbing and a trench drain would control the flow of wastewater. The facility would be covered to limit rain infiltration and disposal of excess wastewater.

*Solid waste management.* Minor long-term adverse effects are expected from the Proposed Action. The building space and facilities to be constructed would generate construction and demolition waste that could reduce the useful life of the landfill, but this reduction should be negligible; this waste stream would be minimized by recycling. A minimal increase in solid waste is expected as a result of increases in training at new and existing facilities. These changes should be within the capacity of the existing waste collection and disposal system.

Electricity. The Proposed Action would have beneficial effects on the electrical system and minor long-term adverse effects at KTA. A new 12.47-kV, three-phase primary line would be constructed to bring electrical power to the CACTF and would replace the power at the old Nike Command Site. At the CACTF, primary power would extend underground to two transformers that would bring the 120- or 240-volt secondary power underground to the appropriate CACTF buildings. Minimal increases in the demand for electrical service would result from the construction and operation of the tactical vehicle wash.

*No Impacts*

Communications. No adverse effects on telephone service are expected as a result of the Proposed Action at KTA. Telephone service would be provided as part of the CACTF by connecting to existing service within 3.7 miles (5.95 kilometers) of the site and extending to the CACTF site through overhead lines. Underground cables would extend telephone service between buildings. No changes to telephone service would result from the construction and operation of the tactical vehicle wash.

In an electromagnetic compatibility study for the Proposed Action, Army staff considered over 65,500 frequency records from the civil sector and other federal government agencies. The results indicate no significant interference problems should be encountered on O'ahu or the island of Hawai'i from the operation of the FTI system (US Army Development Test Command 2003).

### Reduced Land Acquisition Alternative

The impacts associated with Reduced Land Acquisition are identical to those described for the Proposed Action.

### No Action Alternative

*No Impacts*

The existing baseline for utilities would continue under the No Action Alternative. Under the status quo of No Action, no changes would occur to the jurisdiction for any law enforcement agencies or fire departments, nor would there be increased demands on existing services. The demand for water, wastewater collection and treatment, solid waste collection and disposal, communications systems, and electricity would not change because no new facilities would be constructed, no additional training would occur, and no new personnel would be added.

# CHAPTER 8

# PŌHAKULOA TRAINING AREA

# CHAPTER 8
# PŌHAKULOA TRAINING AREA

## 8.1 INTRODUCTION

The proposed action at PTA would require constructing various training and support facilities, acquiring additional land, and changing training activities and locations. The following text provides a description of these proposed activities; for detailed construction information, see Appendix D, Construction Details. Potential environmental impacts associated with these proposed activities are discussed in detail throughout the remainder of this chapter.

### 8.1.1 Proposed Action

#### *Construction*

*Construction of Anti-Armor Live Fire Training Range*

The proposal includes the construction of a modified AALFTR at PTA on the island of Hawai‘i. The project would be constructed on Ranges 3, 8, and 10 and would include 21 Stationary Armor Targets (SAT) and 8 Armor Moving Targets (AMT). All targets would be fully automated, and the event specific-target scenario would be computer-driven and scored from the control towers. Other range features would include baseline firing positions, primary and secondary power and data distribution systems, and heated and illuminated limit markers. The AALFTR would allow anti-armor forces to simulate enfilading fire (sweeping gunfire) as they move along the flank of an opposing force before joining the larger force at the programmed BAX, much as they would in an actual battle. Range 8 would be developed as a complete Range Operations Control Area (ROCA); minimal ROCA facilities would be developed at Ranges 3 and 10.

*Construction of Battle Area Complex*

A BAX would be constructed at PTA for company gunnery training and qualification requirements of the weapons systems included as part of the proposed SBCT. This range would also support mounted and dismounted infantry platoon tactical live-fire operations, either independently of, or simultaneously with, supporting vehicles. The training assets at

Range 12 would be demolished so that the new layout could be overlain and accommodated. The primary features of the range would include four course roads with crossover capability, 30 reconfigurable SATs, 6 MATs, 174 reconfigurable stationary infantry targets (SITs), 14 moving infantry targets (MITs), 17 machine gun/observation bunkers, 2 gunnery/breaching obstacles, 3 landing zones, 18 mortar simulation devices (MSDs), 16 hulldown defilades, vehicle firing positions, grenade/breach facades/trench complexes, and military vehicle trails and service roads. Other range operation facilities would include an observation tower, a range control center, an after-action review facility, an operations/storage building, an ammunition breakdown building, an ammunition loading dock, a latrine, a bleacher enclosure, a covered mess facility, and site improvements.

### Construction of Military Vehicle Trail

The PTA Trail would replace a seldom used military vehicle trail that parallels Saddle Road. The current military vehicle trail passes through grazing lands and fields and is vegetated. The proposed road would consist of a 24-foot- (7-meter-) wide gravel road and a 3-foot- (1-meter-) wide shoulder on either side of the road. It would run approximately 27 miles (43 kilometers), connecting Kawaihae Harbor to the PTA. Work would include grading, paving, improving drainage, installing culverts at stream crossings and guardrails at drop-offs, and building storm drainage structures. Road grades steeper than 10 percent would be paved with asphalt or concrete. Where it runs through the Pu‘u Kohala Heiau National Historic Site, the PTA Trail would occupy trails that the Army has used for over ten years and for which the Army is  renegotiating access rights from the state and the National Park Service. Until the PTA Trail is complete, the Army would use public roads for travel from Kawaihae to PTA.

### Construction of Ammunition Storage Area

This proposal is to add three earth-covered ammunition igloos, totaling 6,750 square feet (627 square meters), to the existing ammunition storage facility. An ammunition holding area for daily distribution of ammunition would be constructed to safely hold loaded vehicles. Work would also include installing pole-mounted security lights, floodlights mounted above each entrance, and telephone and computer systems. Supporting facilities would include utilities, electric service, storm drainage, paving, access roads, and site improvements.

### Construction of Tactical Vehicle Wash Facility

The proposal is to construct a tactical vehicle wash facility with four wash stations. The stations would be sized to support a 60-foot- (18-meter-) long by 12-foot- (8-meter-) wide vehicle. The primary facility would consist of the preparation area and wash stations, featuring a high-pressure wash system. It would recycle water to minimize wastewater disposal. The water would flow through a water sediment basin, oil-water separators, and equalization basin and be recycled into a water supply reservoir. Treatment would include oil, grease, and grit removal and organic control. An oil-water separator would be provided to treat any residual water that does not go through the main system. A structure would be provided to house the mechanical secondary treatment units and the control panels necessary for the facility. This structure would be approximately 40 feet (12 meters) by 30 feet (9 meters). The structure would require louvers and would have a large door to install equipment and for maintenance. This facility would be built on a previously disturbed site.

*Construction of Range Maintenance Facility*

The proposed 15,150-square-foot (1,407-square-meter) consolidated range maintenance complex would be constructed on a previously developed site within the cantonment area of PTA. It would include administrative space for range maintenance, a carpentry shop, a welding shop, target and raw material storage, and parking for personal vehicles and other vehicles and equipment used by Range Division. Supporting facilities include a potable water system, a septic system, electric service and 150-kVA, three-phase transformer, paving, walks, parking, security fencing, and information systems. Air conditioning (estimated at 10 tons) would be provided for the administrative areas only. Mechanical ventilation will be provided in the warehouse and shop area.

*Runway Upgrade/Extension, Bradshaw Army Airfield*

This project involves constructing an aircraft runway that would provide a 5,600-foot-long (18,667-meters long) full strength paved runway with 300-foot-long (1,000-meters-) full strength paved overruns on each end. An operation complex to support runway activity would also be constructed. The total length of full strength pavement would be 6,200 feet (20,646 meters) long. The runway would be 100 feet (333 meters) wide with 25-foot-wide (83-meter wide) paved shoulders. This proposed configuration would provide a Class A Army airfield with the capabilities to operate the airfield as a training assault runway for C-17 and C-130 aircraft. Supporting facilities would include site preparation (clear/grubbing, excavation, grading, and storm drainage), a mobile asphalt concrete batching plant, water supply source and extension of the primary electrical service line from the base camp. The runway would be designed and lengthened to accommodate C-130 and C-17 aircraft under assault landing zone criteria.

*Installation Information Infrastructure Architecture*

Fiber optic cable would be installed from the cantonment area to the ranges, motor pool, and other facilities within the installation. The I3A is necessary for the Army's mission-essential requirements, as well as for connecting to the transformation training locations of the SBCT on the island of Hawai'i. The I3A project could consist of 62,000 feet of underground and aboveground cable that would provide additional links to the facilities and to the range complexes by upgrading the e-mail system, asset visibility system, automated personnel processing system, and video teleconferencing capability.

*Construction of Fixed Tactical Internet*

A group of vertical whip antennas, strategically placed throughout the installation and training areas, would be constructed. As a result, radios within military vehicles would be able to receive communication signals to process both voice and data. Four antennas would be installed at each proposed site on the island of Hawai'i. Existing tower sites would be used when possible. Two antennas are approximately four feet (1 meter) long and two inches (0.05 meter) in diameter. Two other antennas would be approximately 10 feet (3 meters) long and 2 inches (0.05 meter) in diameter. All would be mounted on antenna masts or existing utility poles, towers, or buildings. Each site area would be 20 feet (6 meters) by 25 feet (7.6 meters), including a 15-foot (5-meter) by 20-foot (6-meter) concrete pad for the support structure and shed. Sites would be accessed via existing roads in all cases. No security lighting would be installed at the sites. Equipment sheds would house two radios and four batteries. Of the 11 locations evaluated for construction of the FTI antennas on Hawai'i, a maximum of eight will be selected from the locations represented in the EIS. Locations will be chosen based on their suitability for communication logistics and avoidance of environmental concerns, such as cultural and biological resources.

#### *Construction of Training Roads at West PTA*

After acquisition of the WPAA parcel is complete, the Army plans to construct about 28 miles (45 km) of gravel training roads on the acquired property. The location of these gravel-training roads is as yet undetermined. The Army will comply with all applicable environmental statutes including, but not limited to, NEPA, the ESA, and the NHPA, in determining the location and potential impacts of these roads before construction. The Army will also consult with adjacent and nearby property owners and other interested parties on the location of the proposed training roads to address and resolve potential air quality and dust concerns.

### ***Land Transactions***

#### *Acquisition of West PTA*

This proposal is to acquire between 15,000 acres (6,070 hectares) and 23,000 acres (9,308 hectares) of land adjacent to PTA from Richard Smart Trust (Parker Ranch).

If it were to acquire the parcel, the Army would construct about 28 miles of gravel training roads on it, although the location of the roads is as yet undetermined. Construction activity on this parcel would be conducted as described above.

#### *Acquisition of Easement For Military Vehicle Trail, PTA to Kawaihae*

This project would require a perpetual easement of approximately 132 acres (53.4 hectares) to construct a 24-foot- (7-meter-) wide gravel road with three-foot- (1 meter-) wide gravel shoulders on both sides that would run from Kawaihae Harbor to PTA. If the proposed trail alignment changes, the Army will negotiate with the property owners on a new alignment and will conduct appropriate analysis and documentation in accordance with NEPA, ESA, and NHPA.

### ***Training***

#### *Operation of Anti-Armor Live Fire Training Range*

The training at the AALFTR is anticipated to affect up to 750 acres (304 hectares). The proposed range would be used between 180 and 242 days per year. Between 3 and 21 combat vehicles and between 5 and 10 support vehicles would be on-site. Approximately 10 TOW missiles and 23 Javelin missiles would be fired per year.

#### *Operation of BAX*

The proposed training at the BAX is anticipated to affect 2,075 acres (840 hectares). The BAX is anticipated to use combat vehicles a maximum of 242 days and a minimum of 180 days a year. Between 5 and 25 combat vehicles and between 5 and 10 support vehicles would be on-site. Although the BAX can support mounted and dismounted CALFEX exercises priority is given to mounted CALFEXs, since these cannot be conducted at SBMR, limiting opportunities for dismounted exercises. Since the Draft EIS, the training objective features have been updated to include a change from the current inventory of eighteen 105mm howitzers to eighteen 155mm howitzers. The Draft EIS analyzed twelve 155 mm howitzers. The Army has updated the analysis in the Final EIS to address eighteen 155mm howitzers.

*General SBCT Training*

Transformation activities relevant to this class or type of activity include military training on training lands outside of developed areas (e.g., cantonment areas). Such training would include live- (such as 155mm howitzers) and nonlive-fire, mounted maneuver training on 56,661 acres (22,930 hectares) on PTA and 23,000 acres (9,308 hectares) on WPAA (using vehicles such as the Stryker and HMMWV), and other nonlive-fire military training on foot. Most of the nonlive-fire training by SBCT forces would be similar to that currently being conducted by Light Infantry Brigades. Some training, such as maneuver training, would take place in areas previously not used for training, such as the WPAA. Each major element of the SBCT is composed of a number of smaller units. Individual training activities often consist of section-, team-, squad-, and platoon-sized units operating in a dispersed but coordinated manner.

Training includes establishing and using tactical and logistical operations and administrative centers, as well as smaller more dispersed activities, such as bivouac. As with current force training, exercises would continue to be at the squad through company level, with some opportunities for battalion and above training. All units would train 180 to 240 days per year; SBCT training would likely occur between 140 and 180 of those days.

Field activities, or training exercises, can involve a wide variety of activities, such as vehicle movement, maneuvers, and convoys, foot maneuvers, bivouacking, limited aviation training, and staff training exercises. Field exercises can generally take place in all training areas outside of the designated cantonment areas. Dismounted maneuver training will occur in all suitable areas presently used for foot training and activities will be the same as are currently conducted. No SBCT training is planned for the 1,500 acres of the Multi Purpose Range Complex (MPRC). Currently, trafficable areas available for mounted maneuver training exercises at PTA and WPAA are shown on Figure 2-6.

***Proposed Action Impacts***

Table 8-1 is a list of environmental impacts by specific SBCT project and resource category. This gives the public and reviewers a more detailed evaluation of impacts deriving from specific SBCT-related actions.

### 8.1.2 Reduced Land Acquisition

***Construction***

*Construction of QTR2*

Most of QTR2 would consist of new construction within Range 8, with some facilities available for modification and reuse.

**Table 8-1**
**SBCT Project Impacts Under the Proposed Action at PTA**

| 1391 Project # | SBCT Project Title | Location | Land Use | Visual Resources | Airspace | Air Quality | Noise | Traffic | Water Resources | Geology and Soils | Biological Resources | Cultural Resources | Human Health & Safety Standards | Socioeconomics /EJ | Utilities |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57197 | Battle Area Complex | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊘ | ⊗ | ⊘ | ⊙+ | ⊙+ |
| 57183 | Anti-armor Live-fire and Tracking Range | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊘ | ⊗ | ⊘ | ⊙+ | ⊙+ |
| 58273 | Construct Military Vehicle Trail, PTA-Kawaihae | Pōhakuloa | ⊙ | ⊘ | ○ | ⊙ | ⊙ | ⊙+ | ⊙ | ⊘ | ⊘ | ⊗ | ⊙ | ⊙+ | ⊙ |
| 58273 | Land Easement for Military Vehicle Trail, PTA-Kawaihae | Pōhakuloa | ⊙ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 57417 | Ammunition Storage | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊘ | ⊙+ | ⊙+ |
| 57414 | Tactical Vehicle Wash Facility | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙+ | ⊙ |
| 57411 | West PTA Maneuver Training Area Land Acquisition | Pōhakuloa | ⊙+ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 56994 | Range Maintenance Facility | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊙+ | ⊙ |
| 57408 | Runway Upgrade/Extension, Bradshaw AAF | Pōhakuloa | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊙ | ⊙+ | ⊙ |
| N/A | Fixed Tactical Internet | Pōhakuloa | ⊙ | ⊘ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙+ | ○+ |
| N/A | Installation Information Infrastructure Architecture | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙+ | ○+ |
| N/A | SBCT Training | Pōhakuloa | ⊙ | ⊙ | ⊙ | ⊗ | ⊘ | ⊙ | ⊙ | ⊗ | ⊗ | ⊗ | ⊘ | ⊙ | ⊙ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

PA = Proposed Action
RLA = Reduced Land Acquisition
NA = No Action
⊗ = Significant impact
⊘ = Significant but mitigable to less than significant impact
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact
N/A = Not applicable

#### *Reduced Land Acquisition Impacts*

Table 8-2 is a list of environmental impacts by specific SBCT project and resource category. This gives the public and reviewers a more detailed evaluation of impacts deriving from specific SBCT-related actions.

### 8.1.3 Public Comments

Public scoping comments regarding SBCT project activities at PTA focused on potential impacts related to the following:

- Public access to trails and other open space;
- Public hunting and other recreational activities;
- Changes in land use;
- Land use in the coastal zone at Kawaihae Harbor;
- Noise caused by training and helicopters at the Keamuku lands, Waiki'i Ranch, and other locations;
- Cultural resources and traditional practices at Parker Ranch, Kawaihae area, and other places;
- Biological resources, including endangered species living in caves;
- Goats and other animals in relationship to loss of habitat;
- Increase in weedy species and pests;
- Increased risk of wildfires;
- Traffic and public safety on Saddle Road;
- Remediation of hazardous materials and waste in soils and groundwater;
- Erosion and drainage from the training activities;
- Outdoor lighting and impacts on astronomy;
- Flight patterns;
- Water supply needs;
- Traffic on Saddle Road;
- Socioeconomic issues; and
- Fugitive dust from training activities, including wind erosion from disturbed areas.

During the DEIS public comment period, public comments on the SBCT project activities at PTA focused on the following:

- Impacts of increased marine traffic to and from the island of Hawai'i;
- Impacts of dust and noise from increased vehicles on local communities and wildlife;

**Table 8-2**
**SBCT Project Impacts Under RLA Alternative at PTA**

| 1391 Project # | SBCT Project Title | Location | Land Use | Visual Resources | Airspace | Air Quality | Noise | Traffic | Water Resources | Geology and Soils | Biological Resources | Cultural Resources | Human Health & Safety Standards | Socioeconomics /EJ | Utilities |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **PTA** | | | | | | | | | | | | | |
| 57197 | Battle Area Complex | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊘ | ⊗ | ⊘ | ⊙+ | ⊙+ |
| 57183 | Anti-armor Live-fire and Tracking Range | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊘ | ⊗ | ⊘ | ⊙+ | ⊙+ |
| 58273 | Construct Military Vehicle Trail, PTA-Kawaihae | Pōhakuloa | ⊙ | ⊘ | ○ | ⊙ | ⊙ | ⊙+ | ⊙ | ⊘ | ⊘ | ⊗ | ⊙ | ⊙+ | ⊙ |
| 58273 | Land Easement for Military Vehicle Trail, PTA-Kawaihae | Pōhakuloa | ⊙ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 57417 | Ammunition Storage | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊘ | ⊙+ | ⊙+ |
| 57414 | Tactical Vehicle Wash Facility | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙+ | ⊙ |
| 57411 | West PTA Maneuver Training Area Land Acquisition | Pōhakuloa | ⊙+ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 56994 | Range Maintenance Facility | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊙+ | ⊙ |
| 57408 | Runway Upgrade/Extension, Bradshaw AAF | Pōhakuloa | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊙ | ⊙+ | ⊙ |
| N/A | Fixed Tactical Internet | Pōhakuloa | ⊙ | ⊘ | ○ | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙+ | ○+ |
| N/A | Installation Information Infrastructure Architecture | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙+ | ○+ |
| N/A | SBCT Training | Pōhakuloa | ⊙ | ⊙ | ⊙ | ⊗ | ⊘ | ⊙ | ⊙ | ⊗ | ⊗ | ⊗ | ⊘ | ⊙ | ⊙ |
| 57462 | Qualification Training Range, QTR2 | Pōhakuloa | ⊙ | ⊙ | ○ | ⊙ | ⊙ | ⊙ | ⊙ | ⊘ | ⊘ | ⊗ | ⊘ | ⊙+ | ⊙+ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

PA = Proposed Action
RLA = Reduced Land Acquisition
NA = No Action
⊗ = Significant impact
⊘ = Significant but mitigable to less than significant impact
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact
N/A = Not applicable

- Impacts on hunting from the runway expansion;
- Impacts on caves;
- Impacts on endangered and threatened species and sensitive habitats;
- Impacts from invasive and nonnative species;
- Impacts from fire;
- Impacts on the local ranches;
- Impacts on marine resources at the harbor;
- Increased erosion from training;
- Impacts from $PM_{10}$ and fugitive dust;
- Revegetation and reclamation;
- Runoff effects on the marine environment;
- Impacts on cultural resources;
- Socioeconomic impacts on property values;
- Ordnance clean up;
- Impacts from lead in the soils;
- Cleanup after closure;
- Sites of contamination;
- MPRC settlement agreement;
- Hazardous materials and waste impacts, such as asbestos, depleted uranium, lead, and RDX;
- Conversion of agricultural land for trail development;
- Recreational access;
- NPDES permit issues;
- Easement acquisitions;
- Impacts on public services;
- Electrical system capacity;
- Vandalism;
- Water supply impacts;
- Vehicle wash wastewater;
- Impacts on the local unemployed;
- Conflicts between military training and public traffic on the new Saddle Road;
- Funding for public roads;
- Traffic impacts;

- Impacts on visual resources;
- Impacts on the groundwater aquifer;
- Impacts on surface water;
- Damage to wellheads; and
- Impacts from flooding.

## 8.2 LAND USE/RECREATION

The land uses and recreational resources for PTA, the WPAA, and the PTA Trail were identified through review of the INRMP (USARHAW and 25th ID[L] 2001b), the state Land Use District designations (State of Hawai'i 2002a), the state designations for Agricultural Lands of Importance to the State of Hawai'i (State of Hawai'i 2002a), the County of Hawai'i General Plan (County of Hawai'i 1989) with the proposed revision (County of Hawai'i 2001a), County of Hawai'i Zoning Code (County of Hawai'i 2001b), and the County of Hawai'i Real Property Tax Division data for Tax Map Key identifications and property boundaries (County of Hawai'i 2003).

### 8.2.1 Affected Environment

#### *Land Use*

*Pōhakuloa Training Area*

PTA is in the north-central portion of the island of Hawai'i, just to the west of the plateau formed by Mauna Loa and Mauna Kea volcanoes (Figure 8-1). Access to PTA is from Saddle Road, which connects the towns of Hilo to the east and Waimea to the north. PTA is the largest Army training area in the state, totaling 108,792 acres (44,027 hectares). Land uses at PTA include the cantonment area, Bradshaw Army Airfield (BAAF), maneuver training areas, drop zones, live-fire training ranges, artillery firing points, an ordnance impact area, and areas unsuitable for maneuver.

The cantonment area consists of 566 acres (229 hectares) with 154 buildings. The structures are mostly Quonset huts and include 11 dining facilities, two motor pools, rations warehouses, a bulk fuel facility, a chapel, a theater, a recreation club, and a medical facility (USARHAW and 25th ID[L] 2001b).

BAAF has a 3,696-foot (1,127-meter) runway and offers helicopter access and limited C-130 access (USARHAW and 25th ID[L] 2001b). Safety zones associated with BAAF extend 15,000 feet (4,572 meters) beyond each end of the runway and 1,500 feet (457 meters) to either side of the runway's center line.

Land suitable for field maneuvers consists of approximately 56,661 acres (22,930 hectares). This total acreage does not include the Multipurpose Range Complex (MPRC), which has been temporarily closed for training. The ordnance impact area is approximately 51,000 acres (20,639 hectares). Two exceptions to the ordnance impact area are two M16 ranges oriented to the east and three small "dudded areas" (where unexploded ordnance accumulates) east of Redleg Road (Nakata Planning Group LLC 2002a). Ranges, firing points, surface danger zones, and the ordnance impact area are shown on Figure 8-2. Existing military land uses within the project areas are listed in Table 8-3.

**Figure 8-1**
Land Use at Pōhakuloa Training Area

**Figure 8-2**
Ranges and Training Areas Pōhakuloa Training Area

**Table 8-3**
**Pōhakuloa Training Area Project Areas and Land Uses**

| Project Title | Existing Land Use |
|---|---|
| BAX | Training: ranges |
| AALFTR | Training: ranges |
| Ammunition storage area | Training |
| Tactical Vehicle Wash Facility | Training |
| Range Maintenance Facility | Cantonment area |
| Upgrade and reorient BAAF runway | Airfield |
| Fixed Tactical Internet sites | |
| Anti Armor Range 8 | Training |
| ʻAuwaiakeakua WT | Agricultural cattle ranch land with occasional use for military training |
| Kawaihae | Urban |
| Koloa WT | Agricultural cattle ranch land with occasional use for military training |
| Mauna Loa Observatory | Conservation District Resource Subzone |
| Puʻu Ahi | Training |
| Puʻu Kailua | Training |
| Puʻu Kanalopakanui | Agricultural cattle ranch land with occasional use for military training |
| Puʻu Keʻekeʻe | Agricultural cattle ranch land with occasional use for military training |
| Puʻu Pohakuloa | Cantonment area |
| Range Maintenance Facility | Cantonment area |
| Installation Information Infrastructure Architecture | Training and cantonment area at PTA |
| Maneuver in Training Area 23 (excluding the Multipurpose Range complex) | Temporarily closed maneuver training area |
| QTR2[1] | Training: range |

Sources: Tetra Tech, Inc. 2002; State of Hawaiʻi 2002a

[1]Construction and use of QTR2 at PTA is included in the Reduced Land Acquisition Alternative only and is not included in the Proposed Action.

PTA lands are within the state-designated Conservation District (Figure 8-3, State of Hawaiʻi 2002a). Conservation District Subzones are shown on Figure 8-3 and objectives are defined in Table 8-4. The County of Hawaiʻi General Plan shows PTA as conservation lands (Figure 8-4, County of Hawaiʻi 2001a). County zoning designates PTA as forest reserve (conservation) and open (County of Hawaiʻi 2001b). The state ALISH map shows the northwestern corner of PTA to contain a portion of land designated as Other agricultural land (Figure 8-5, State of Hawaiʻi 2002a).

**Figure 8-3**
State Land Use District Map Pōhakuloa Training Area

**Figure 8-4**
State Land Use Pattern Allocation Guide Map Pōhakuloa Training Area Trail

**Figure 8-5**
Agricultural Lands of Importance to the State of Hawai'i Pōhakuloa Training Area

**Table 8-4**
**Conservation District Subzones at PTA**

| Area of PTA | Conservation District Subzone | Subzone Objective |
|---|---|---|
| BAAF | General | Designate open space where specific conservation uses may not be defined. |
| Impact area | Limited | Limit uses where natural conditions suggest constraints on human activities. |
| Remainder of PTA | Resource | Develop, with proper management, areas to ensure sustained use of the area's natural resources. |

Source: State of Hawai'i 2002c

Recreation at PTA includes archery, biking, motor sports, and hunting. Archery tournaments are occasionally held in training areas 5 and 6, south of BAAF (R.M Towill Corp. 1997a). An annual bicycle race is held in May through training areas 1 and 4, southeast of BAAF. An annual motorsport race is held in May along the Redleg Trail through training areas 1 and 4.

PTA includes three types of public hunting units: A, E, and F. Portions of training areas 2, 10, and 11 are designated as hunting unit A and are part of the Mauna Kea Game Management Area. Training areas 1 and 3 through 20 are designated as hunting unit E. Table 8-5 presents the conditions for hunting mammals at PTA units A and E and the conditions for game bird hunting at the installation. Training areas 21 and 22 are designated as hunting unit F, but the Army has closed the hunting area on the eastern side of PTA (training area 21) due to concerns about vandalism and protecting archaeological resources.

The PTA INRMP recognizes the current open post nature of the installation that allows military training and public access for recreation to coexist. Proposed management objectives for outdoor recreation at PTA include the following:

- Continue current public access policies and procedures from 2002 to 2006, unless more effective or efficient systems become available (as part of a five-year review and evaluation period to determine continuity of policy);
- Recognize that the Hawai'i Division of Forestry and Wildlife (DOFAW) will continue to manage hunting and its associated game management programs at PTA;
- Continue to provide hunter harvest data to DOFAW as well as other monitoring data that may affect hunting programs;
- Continue to maintain unit F consistent with legally mandated requirements;
- Continue to provide access for bird dog training;
- Support DOFAW efforts to make water units accessible to game birds;
- Evaluate the option to allow DOFAW to draw water from firefighting water tanks directly into bird-only watering units;

**Table 8-5**
**Hunting at PTA**

| Conditions | Hunting Unit A | Hunting Unit E | Game Birds |
|---|---|---|---|
| **Game to be taken** | Wild pigs, wild sheep, and wild goats | Wild pigs, wild sheep, and wild goats | Ring-neck pheasant, green pheasant, Nepal Kalij pheasant; California valley quail, Japanese quail, Gamble's quail; chukar partridge, gray francolin, black francolin, Erckel's francolin; chestnut bellied sandgrouse, mourning dove, spotted dove (large dove), barred dove (small dove); and wild turkey. |
| **Permitted hunting methods** | Rifle, muzzleloader, handgun, shotgun, and bow and arrow. | Archery only | Archery only |
| **Open hunting periods** | Wild pigs: special seasons<br>Wild sheep and wild goats: year-round | Year-round | First Saturday in November through Martin Luther King Day or the third Sunday in January, whichever occurs later.<br>Special seasons for wild turkey, barred dove, and spotted dove. |
| **Open hunting days** | Daily; hunters must confirm with Division of Forestry and Wildlife | Daily | Saturdays, Sundays, and state holidays |
| **Special conditions and restrictions** | Open to pig hunters with valid tags. Only primitive weapons allowed during muzzleloader season. | Entry permit to PTA required from PTA Commander. Schedule subject to military training. | Hunting on private lands requires permission of landowner. |
| **Hunters** | Persons who have the appropriate hunting license, tags, permits, or permit tags on their person and who have signed in at the state hunter checking station. | | |

Sources: DLNR 1999a and 1999b

- Create a GIS database of wildlife water units; and
- Support requests for use of PTA lands for other outdoor recreation activities when such use is consistent with planned military activities, with the protection of natural and cultural resources, and with the availability of PTA resources to support such activities.

### *West PTA Acquisition Area*

The WPAA is in the Waikoloa area, at the western foot of Mauna Kea (Figure 8-1). Māmalahoa Highway forms the northwestern boundary and Saddle Road forms most of the eastern boundary. Saddle Road Junction, where these roads connect, forms the northern boundary. The proposed acquisition area is currently used for cattle grazing, limited hunting, and a quarry, and is leased between four and six times a year by the Army or other military entities for maneuver training. The cattle grazing is part of Parker Ranch, one of the nation's largest cattle ranches, with over 35,000 head of Angus and Charolais cattle that produce over 15 million pounds of beef annually.

The state ALISH map shows most of the WPAA as Other agricultural land (Figure 8-5 State of Hawai'i 2002a). These lands are of state-wide or local importance for the production of food, feed, fiber, and forage crops. They are important to agriculture in Hawai'i, yet they exhibit properties that exclude them from Prime or Unique classifications. The WPAA is designated by county zoning as agriculture (A-40a) (County of Hawai'i 2001b).

The WPAA is also a private hunting area, managed by Parker Ranch, used for hunting mammals year-round and birds from November through January. The bag limits are the same as for the state and hunters must have a valid hunting license.

Due to the historical military use of the area, the USACE's overall ordnance and explosives hazard level for the WPAA is low (Earth Tech 2002). The institutional controls for these low risk areas include community awareness outreach programs, educational media, and pre-coordinated construction support. UXO hazards along the Saddle Road corridor (extending approximately 164 feet [50 meters] from the road) need to be cleared to safe depth to support the heaviest track and wheeled vehicles that will use the area. This UXO cleanup project is addressed in Chapter 9, under Cumulative Impacts.

### *PTA Trail*

Land uses within the PTA Trail corridor include cattle grazing, agriculture, occasional military training, open space, existing utility easements, a portion of a former military vehicle trail, and Kawaihae Harbor. The proposed alignment is near the residential areas of Waikoloa Village and Kawaihae Village. The Army met with the Waikoloa Village Association, and the involved parties agreed on the alignment (Takayesu 2002). The portion of the military vehicle trail near Kawaihae Village is along the existing trail alignment.

PTA Trail begins at Kawaihae Bay and runs inland from the harbor and then turns south paralleling the current highway. It passes John Young's house on the coastal side of the property and then turns inland again as it crosses the lands of Pu'u Koholaā National Historic Park between Young's homestead and the two heiau in the park. The park is 85.3–acre park (National Park Service 2004). The trail travels up the gentle western slope of the island to PTA.

The state-designated land use districts for PTA Trail and immediately adjacent areas are mostly within the Agricultural District and Urban District at and near Kawaihae Harbor. The state ALISH map shows the southern portion of the proposed military vehicle trail as Other agricultural land (Figure 8-5 State of Hawai'i 2002a).

The 2001 proposed revisions to the County of Hawai'i General Plan show the military vehicle trail corridor and immediately adjacent areas as conservation lands (Figure 8-6

County of Hawai'i 2001a). Along Kawaihae Road, land use designations include urban expansion and low density urban. As the corridor progresses toward Kawaihae Harbor, land use designations include urban expansion and industrial. The 2001 proposed revisions include a rural area along Kawaihae Road. The harbor designations include industrial, medium density urban, and open area.

The proposed military vehicle trail passes through a variety of county zoning designations, including agricultural (A-5a and A-40a) and open (County of Hawai'i 2001b). The zoning at Kawaihae Harbor includes industrial (MG-1a), residential (RS-1.5), and open (O). Kawaihae Harbor and adjacent land to the east, across Akoni Pule Highway, is included in the Special Management Area (Figure 8-6) (County of Hawai'i 2001c). There is also a shoreline setback along the harbor property.

The southern portion of PTA Trail crosses the Parker Ranch-managed private hunting area located within the WPAA.

Due to the historical military use of the area, the USACE's ordnance and explosives hazard level for the PTA Trail alignment ranges from low to high (Earth Tech 2002). The policy regarding use of roads and trails is primarily dependent upon landowners and current land use (Streck 2003). The institutional controls for these areas include community awareness outreach programs, educational media, and pre-coordinated construction support.

### *Ownership*

#### *Pōhakuloa Training Area*

Most of PTA land is owned by the state or federal government, with state, federal, and private ownership of the three FTI sites located outside of the installation. The cantonment area includes ceded land (USARHAW and 25th ID[L] 2001b). Figure 8-7 shows land parcels within PTA, and Table 8-6 lists Tax Map Keys (defined in Chapter 3) of the affected land parcels and the associated landowners and lessees.

#### *West PTA Acquisition Area*

The 23,000-acre (9,308-hectare) proposed acquisition area (Tax Map Key 367001003) is owned by Richard Smart Trust (Parker Ranch) (Figure 8-8). The military leases this area approximately four to five times per year for military maneuver training.

#### *PTA Trail*

Mostly nonmilitary entities own land within the proposed military vehicle trail corridor. Affected parcels are shown on Figure 8-9, and Table 8-7 lists Tax Map Keys of the affected land parcels and the associated landowners and lessees.

**Figure 8-6**
Land Use Pattern Allocation Guide Map (Proposed) Pōhakuloa Training Area and PTA Trail

**Figure 8-7**
Special Management Area Map for Pōhakuloa to Kawaihae Trail

**Figure 8-8**
Affected Parcels Map Pōhakuloa Training Area

**Figure 8-9**
Affected Parcels Map for Pōhakuloa Training Kawaihae Trail West PTA Acquisition Area and Pōhakuloa to Kawaihae Trail

**Table 8-6**
**PTA Landowners and Lessees**

| Tax Map Key | Landowner (Lessee) |
|---|---|
| **PTA** | |
| 338001001 | State of Hawai'i |
| 338001013 | Hawaiian Home Commission (United States of America) |
| 344015008 | State of Hawai'i (United States of America) |
| 344016001 | State of Hawai'i |
| 344016005 | State of Hawai'i (United States of America) |
| 344016006 | State of Hawai'i (United States of America) |
| 344016007 | US Department of Defense Army (United States of America) |
| 371004006 | State of Hawai'i (United States of America) |
| 371004007 | State of Hawai'i (United States of America) |
| **Fixed Tactical Internet Locations Outside PTA Border** | |
| Mauna Loa Observatory | |
| 344016001 | State of Hawai'i |
| WPAA | |
| 367001003 | Richard Smart Trust, also known as Parker Ranch |
| Kawaihae | |
| 361003022 | United States of America |

Source: County of Hawai'i 2003

**Table 8-7**
**Proposed PTA Trail Landowners and Lessees**

| Tax Map Key | Landowner (Lessee) |
|---|---|
| 361003022 | United States of America |
| 361003025 | State of Hawai'i |
| 361003026 | State of Hawai'i |
| 361003051 | State of Hawai'i |
| 362001018 | Hale Wailani Partners LP |
| 362001019 | The Queen Emma Foundation (Parker Ranch) |
| 362001023 | The Queen Emma Foundation |
| 362001051 | Mauna Kea Development Corp. |
| 362001060 | The Queen Emma Foundation (County of Hawai'i) |
| 362001064 | The Queen Emma Foundation (Parker Ranch) |
| 362001070 | United States of America (National Park Service) |
| 366001002 | State of Hawai'i (Pale Koki Ranch, Inc.) |
| 366001068 | State of Hawai'i |
| 367001003 | Richard Smart Trust, also known as Parker Ranch |
| 368002008 | Waikoloa Land & Cattle Co. |
| 368002014 | Waikoloa Village Association |
| 368002018 | Waikoloa Village Association |
| 368002019 | Waikoloa Village Association |
| 368002022 | Waikoloa Property |

Source: County of Hawai'i 2003

### *Surrounding Land Use*

*Pōhakuloa Training Area*

Land uses surrounding PTA include cattle grazing, game management areas, forest reserves, and undeveloped land. Land to the northwest of PTA is agricultural and is primarily used for cattle grazing and also provides hunting opportunities for big game species and game birds. Parker Ranch manages the WPAA hunting lands. Land to the north of PTA includes the Ka'ohe Game Management Area (GMA), Mauna Kea State Park, and Mauna Kea Forest Reserve. Land to the east and south is included in the Mauna Loa Forest Reserve.

Lands surrounding PTA are generally within the state-designated Conservation District (Figure 8-3). Areas surrounding PTA are zoned by the county as forest reserve, open, or agriculture (County of Hawai'i 2001c).

Hiking trails in the vicinity include the 0.6-mile- (0.97-kilometer) long Pu'u Huluhulu Trail to the east and the 35-mile- (56-kilometer) long Mauna Loa Observatory Road to the southeast (Nā Ala Hele 2003). The Mauna Loa Observatory Road can be accessed on foot, bicycle, and four-wheel drive vehicles.

*West PTA Acquisition Area*

Land uses surrounding the proposed WPAA include cattle grazing, military training, agriculture, residential lots, and open space. Waiki'i Ranch is a gated residential ranch community bordered on three sides by the acquisition area. PTA is to the south-southeast of the area and the occasionally used Pu'u Pā Military Maneuver Area is adjacent to the northern tip, west of Mamalahoa Highway. The remaining surrounding lands are used for recreation and ranching or are undeveloped. Kilohana Girl Scout Camp and the State Ka'ohe GMA are located immediately east of WPAA (Figure 8-1). The state ALISH map shows lands surrounding the WPAA designated as Other agricultural land (Figure 8-5).

The Pu'u Lā'au Road is an 8.4-mile (13.5-kilometer) dirt and gravel road located east of the WPAA. This road can be accessed on foot, bicycle, horse, and four-wheel drive vehicles (Nā Ala Hele 2003). The generally undeveloped land west of the WPAA and Mamalahoa Highway is identified as Waikoloa Development Ranch Lots.

Lands surrounding the proposed WPAA are zoned by the county as forest reserve, open, or agriculture (County of Hawai'i 2001b).

*PTA Trail*

Land uses surrounding the proposed military vehicle trail include cattle grazing, residential (Waikoloa Village and Kawaihae Village), Pu'ukoholā Heiau National Historic Site, agriculture, agricultural subdivision, open space, and periodic military training. The 2001 proposed revisions to the County of Hawai'i General Plan show the areas immediately adjacent to the PTA Trail corridor as agricultural, proposed rural, proposed urban expansion, medium density urban, and industrial (Figure 8-5). Land use designations surrounding the military vehicle trail land to the northwest are extensive agriculture and intensive agriculture. Kawaihae Harbor includes a commercial port harbor and two recreational boat harbors, one at the north end and one at the south end. The 15.4-mile (24.8-kilometer) long coastal Ala Kahakai Trail (Kawaihae-Anaehoʻomalu) is located south of Kawaihae Harbor (Nā Ala Hele 2003).

***Surrounding Land Ownership***

*Pōhakuloa Training Area*

Parker Ranch owns the land northwest of PTA. The state owns the lands to the north, southeast, south, and west of PTA. The Hawaiian Home Commission owns the land to the east, and Kamehameha Schools owns the land to the southwest of PTA.

*West PTA Acquisition Area*

Adjacent landowners include Parker Ranch, State of Hawaiʻi, various Waikiʻi Ranch landowners, and owners of the Waikoloa Development Ranch Lots.

*PTA Trail*

Ownership of land adjacent to the proposed military vehicle trail corridor is the same as the land within the proposed construction areas, listed in Table 8-7.

### 8.2.2 Environmental Consequences

***Summary of Impacts***

Table 8-8 provides a summary of impacts associated with land use and recreation at PTA, WPAA and PTA Trail. Less than significant impacts on land use would occur under conversion of agricultural land to training land, construction of Fixed Tactical Internet sites in a Conservation District, during the temporary construction of the projects, and due to SBCT training on lands currently used for training. Beneficial impacts on recreational land use would occur because approximately 23,000 acres (9,308 hectares) of private hunting land would be opened to the public when the land is not used for training. There would be no impacts under No Action.

***Proposed Action (Preferred Alternative)***

Environmental impacts discussed in this section are the result of the following: the construction of new training areas and ranges; operation of new training areas and ranges; acquisition of additional land; construction and use of a military vehicle trail; and additional training associated with the Proposed Action.

*Less than Significant Impacts*

*Conversion of agricultural land to training land.* Acquisition of the WPAA would involve transferring approximately 23,000 acres (9,308 hectares) of fee simple land from the Richard Smart Trust (Parker Ranch) to the Army. The additional 23,000-acre (9,308-hectare) WPAA would be used for a military vehicle trail, drop zone, and brigade task force maneuver training area. Most of the proposed acquisition area would be used for general SBCT training, and land use within the project area would be converted from agriculture to training land. The proposed training land use of agricultural grazing land at the WPAA is not

**Table 8-8**
**Summary of Potential Land Use/Recreation Impacts at PTA**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Conversion of agricultural land to training land | ⊙ | ⊙ | ○ |
| Impacts on natural resources management and recreational land use | ⊙+ | ⊙+ | ○ |
| Construction of Fixed Tactical Internet in a Conservation District | ⊙ | ⊙ | ○ |
| Impacts on land use during construction activities | ⊙ | ⊙ | ○ |
| SBCT training on lands currently used for current force training | ⊙ | ⊙ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | | | |
|---|---|---|---|---|---|
| ⊗ | = | Significant | + | = | Beneficial impact |
| ⊘ | = | Significant but mitigable to less than significant | N/A | = | Not applicable |
| ⊙ | = | Less than significant | | | |
| ○ | = | No impact | | | |

consistent with the land use set forth in the County of Hawai'i General Plan (County of Hawai'i 1989), and the County of Hawai'i Zoning Code (County of Hawai'i 2001b). General military training within the proposed acquisition area is not expected to affect off-post land use. In accordance with the Farmland Protection Policy Act, the Army has completed the Farmland Conversion Rating Form in coordination with NRCS. This form assists the federal government in evaluating the impacts of converting farmland to nonagricultural use (see Appendix E).

The WPAA is used for grazing when adequate rainfall results in sufficient vegetation (Hoke 2002). The WPAA would convert two percent of the total designated agricultural lands on the island (three percent of the agricultural lands that are currently in use for pasture land and range land on the island) to military training land (County of Hawai'i 2001a). This would be a less than significant impact.

Various military units lease this area approximately four to six times per year for military maneuver training. A change in ownership of the area from private to military is likely to result in an increase in military training use to 8 to 12 times per year for all size units.

The ITAM program would be used to identify and mitigate potential impacts on the land. The Army is considering establishing a cooperative relationship to allow continued grazing at WPAA in conjunction with training on the land, subject to constraints posed by training.

PTA Trail construction would require approximately 132 acres (53.4 hectares) of land easements. The trail alignment is generally along undeveloped property boundaries, existing roads, and existing utility easements. Hence, trail construction and use is not expected to significantly affect land use. This would result in the land being more intensively used following the Proposed Action, with vehicle traffic between PTA and Kawaihae Harbor increasing in vehicle density from 40 to between 96 and 145. Frequency of travel from Kawaihae to PTA for battalion- or brigade-level training exercises would increase from twice per year to four times per year. The Army would consult with land owners so that, following construction of the PTA Trail, joint use of the trail would be coordinated to minimize impacts on land use.

*Impacts on natural resources management and recreational land use.* The increased in air flights at PTA could increase reactions of some game mammals or drive them further from the road. This may result in a decrease of roadside availability of game animals to hunters. This impact would be less than significant.

*Construction of Fixed Tactical Internet in a Conservation District*. Construction of one antenna in the Conservation District Resource Subzone, and within the Mauna Loa Forest Reserve, would result in a less than significant change in land use. The new antenna facility would reuse an existing site, where possible, and when an existing facility is not available the new antenna would be constructed on a relatively small area (no more than 500 square feet [46.5 square meters]). The new facility would also be located, where possible, close to existing access roads or trails. It would be sited, painted, and landscaped to minimize its impact on surrounding areas and users. As required in a Conservation District, endemic or indigenous plants will be used to renaturalize project areas where natural vegetation plant cover has been disturbed. Construction would be scheduled, where possible, to minimize conflicts with existing recreation activities. In addition, antenna sites are available for emergency efforts for aiding or rescuing stranded or lost hikers and hunters.

*Impacts on land use during construction activities.* During construction activities, land uses (including recreation) may be temporarily affected. Impacts associated with construction of the PTA Trail would be greater due to the presence of UXO along the alignment. Prior to construction, the UXO cleanup would involve identifying the MPM area – a safety radius associated with UXO. Owners and occupants of the areas within the MPM would be notified, and the following actions would occur, as needed: road closures and coordination with local law enforcement agencies, fire departments and transportation agencies. In addition, there may be temporary evacuation of structures within the MPM (Streck 2003). The Army believes these impacts would be less than significant because the likelihood of evacuations or road closures is low and their duration, if required, would be short.

*SBCT training on lands currently used for training*. Most of the land area within PTA that would be used for general SBCT training is currently being used. The primary land use difference between training and SBCT training is the introduction of the Stryker vehicle. This would result in the land being more intensively used following the Proposed Action. On the WPAA, the Stryker would be introduced for maneuver training. To prevent land degradation and allow for the continued use of training lands, the Army incorporates all training lands into its ITAM program.

*Beneficial impacts.* Projects associated with PTA, the WPAA, and PTA Trail would not affect natural resources management areas. The WPAA consists of Parker Ranch-managed private hunting land. Beneficial impacts on recreational land use would occur because approximately 23,000 acres (9,308 hectares) of private hunting land would be opened to the public for hunting game birds and game mammals when the land is not used for training. The hunting conditions would be similar to the state rules, and hunters must have a valid hunting license. In addition, the Army would continue its cooperative efforts with the state to provide access to hunting areas on PTA.

*Additional mitigation:* In response to public comments, the Army proposes to coordinate with State of Hawai'i DLNR to create additional public hunting check in stations for the WPAA.

### Reduced Land Acquisition Alternative

Impacts from construction and land transaction projects would be the same as those for the Proposed Action, except that QTR2 would be constructed within an existing training range area at PTA on the island of Hawai'i instead of on the South Range Acquisition Area. Impacts on recreational land use due to training would be the same as those for the Proposed Action.

#### *Less than Significant Impacts*

*Conversion of agricultural land to training land.* Impacts from converting 23,000 acres (9,308 hectares) of land would be the same as those for the Proposed Action.

*Construction of Fixed Tactical Internet in a Conservation District.* Impacts from construction of the Fixed Tactical Internet would be the same as for the Proposed Action.

*Land use during construction activities.* Impacts on land use during construction activities would be the same as for the Proposed Action, with the addition of construction of QTR2 on an existing training range area.

*SBCT training on lands currently used for training.* Impacts on existing training lands would be the same as for the Proposed Action.

*Impacts on natural resources management and recreational land use.* Impacts on natural resources management and recreational land use would be the same as those for the Proposed Action.

#### *Beneficial Impacts*

*Impacts on natural resources management and recreational land use.* Impacts on natural resources management and recreational land use would be the same as those for the Proposed Action.

### ***No Action Alternative***

*No Impacts*

Under No Action, transformation would not occur, so no major changes to training areas would take place in Hawai'i. The Army would continue to operate and maintain its range, training areas, and support facilities in order to meet its current force training mission requirement. However, the level of training would change occasionally in response to this requirement and as a result, the land uses of these areas may change. If future changes could affect the environment, NEPA documentation would be prepared.

## 8.3 VISUAL RESOURCES

### 8.3.1 Affected Environment

The following PTA discussion is divided into two subject areas, PTA and PTA Trail. The proposed WPAA is expected to have visual characteristics similar to PTA because of its proximity. The ROI includes all areas within the line of sight of activities or changes proposed at PTA or PTA Trail. Because PTA Trail extends from Kawaihae to PTA, the ROI includes a corridor of land along this route, including views from coastal and nearshore areas, adjacent roadways (Kawaihae Road, Hawaiʻi Belt Road, and Saddle Road), populated areas along the route, and adjacent preserve areas.

PTA and PTA Trail are within the planning area of the General Plan of Hawaiʻi, which establishes the specific policies and standards for the island to increase and enhance scenic resources. Specific standards provide guidelines for designating sites and vistas of extraordinary natural beauty that must be protected, including the following types of features:

- Distinctive and identifiable landforms distinguished as landmarks, such as Mauna Kea;
- Coastline areas of striking contrast;
- Vistas of distinctive features; and
- Natural or native vegetation, which makes a particular area attractive (County of Hawaiʻi 1989, 13).

#### *Landscape Character*

*Pōhakuloa Training Area*

The landscape of PTA is characterized by panoramic views of the broad open area between Mauna Kea and Mauna Loa. The gently sloping form and smooth line of Mauna Kea to the north and Mauna Loa to the south are dominant background features of the visual landscape.

There are few human features in the area except roads and support facilities within the training area and structures, roads, and an airfield within the cantonment area of PTA. The cantonment area is a visually distinct element of the landscape. Vegetation is generally grasses and shrubs that tend to be sparse and generally low in height. Terrain in the PTA area is gently sloping and open, periodically interrupted by remnant volcanic cones (puʻu). Lava flows create dark visually receding areas throughout PTA. The extremely uniform vegetation and topography result in middleground and background views of PTA that lack visual complexity but that are dramatic in their expansiveness. The panoramic views, the integrated visual space, and the unity of the natural features give this area a high overall visual quality, despite the uniformity of the landscape.

Most proposed SBCT modifications at PTA would be within the middleground or background when viewed from surrounding areas, such as Saddle Road, except for those in the cantonment area.

*West PTA Acquisition Area*

The WPAA is in the Waikoloa area, at the western foot of Mauna Kea (Figure 8-1). The WPAA land steadily slopes away from Mauna Kea and toward the ocean. Māmalahoa Highway forms the northwestern boundary and Saddle Road forms most of the eastern boundary; Saddle Road Junction, where these roads connect, forms the northern boundary. Cattle grazing, limited hunting, quarrying, and occasional Army training compose the activities in the proposed acquisition area.

*PTA Trail*

As proposed, PTA Trail begins at Kawaihae Harbor and would run inland along an existing trail from the harbor, turns south paralleling the current highway, and then would turn inland again as it crosses the lands of Pu'ukoholā Heiau National Historic Site. The proposed trail would travel up the gentle western slope of the island to PTA. The area through which the route passes is largely undeveloped except for the village of Waikoloa. From most viewing locations along major roadways or other population centers, the trail would be a middle or background feature and would be obstructed by topography and vegetation. The proposed route would be most visible where it would parallel the Kawaihae Road and where it would cross the Hawai'i Belt Road.

Terrain along PTA Trail is generally gently sloping with intermittent pu'u. Lava flows that create dark, visually receding areas occur throughout the proposed trail alignment. Vegetation generally consists of grasses and low shrubs, with only occasional sparse trees, resulting in a fine even texture to the landscape. The gradually sloping forms of Mauna Kea and Muana Loa are the dominant background features along the entire alignment. As a result the middleground and background views along PTA Trail lack visual complexity but are dramatic in their expansiveness. The landscape through which the trail would pass ranges from heavily modified areas near Kawaihae with low to moderate visual quality, to areas with little modification and panoramic views with high overall visual quality.

***Sensitive Views***

In response to public comments regarding scenic views this section has been expanded. The General Plan of the County of Hawai'i lists the following locations as examples of natural beauty (County of Hawai'i 1989):

- The scenic countryside around Waikii (TMK 6-7-01:003);
- The mauka and makai view plane from various locations along Queen Ka'ahumanu Highway in South Kohala and North Kona;
- The Mauna Kea State Park area (TMK 4-4-16:003); and
- The Pu'ukoholā Heiau National Historic Site.

Sensitive views may occur in areas of recreational or high public use. These include Mauna Kea State Recreation area adjacent to PTA, beach areas near Kawaihae, The Puʻukoholā Heiau National Historic Site, and adjacent roadways. The primary public viewing area on or near PTA is along the Saddle Road corridor. Saddle Road traverses PTA more or less along its northern boundary. Public traffic through the area is generally light, and travelers typically drive through without stopping. While the typical public view of the PTA area is from a vehicle traveling at normal speed, some hikers, photographers, and artists pause along Saddle Road to appreciate the views. Other roadways near proposed SBCT activities include Kawaihae Road and the Hawaiʻi Belt Road.

### 8.3.2 Environmental Consequences

***Summary of Impacts***

Under the Proposed Action, significant but mitigable impacts on existing views would occur as a result of construction of PTA Trail and installation of antenna support structures. PTA Trail would traverse Puʻukoholā Heiau National Historic Site. It would also traverse a large area of open space, paralleling and crossing existing roadways at several locations along the route. Construction of the trail would not substantially alter the landscape but would result in significant but mitigable impacts on existing views.

Range-related projects proposed under the Proposed Action include the BAX, along Menehune Road in the vicinity of Puʻu Menehune and Range 12, the AALFTR, along Redleg Trail on the site of Ranges 3, 8 and 10, and the Range Maintenance Facility in the PTA cantonment area. Because the Army uses PTA for weapons qualification and maneuver training, these projects would not significantly alter land use or require significant changes in landform or vegetative cover. The BAX site is only partly visible from Saddle Road, located as it is mainly in the middleground and background areas of the view. The AALFTR site is remote from any public areas on or near PTA. The surrounding terrain effectively screens the AALFTR site from direct view. The design of each of these ranges uses topography and locally available materials to help minimize visual impacts. The Range Maintenance Facility would be constructed on a developed site within the PTA cantonment area and would require the demolition of several buildings. Although it is easily visible from Saddle Road, its appearance would improve the visual quality of the immediate area because the buildings to be replaced are in poor condition.

Other construction within PTA, including realignment of BAAF and construction of the ammunition storage facility and the tactical vehicle wash, would occur in previously developed areas and would not significantly affect an existing view or landscape. Potential impacts on visual resources are summarized in Table 8-9.

***Proposed Action (Preferred Alternative)***

*Significant Impacts Mitigable to Less than Significant*

*Impact 1: Modification of the existing views, Construction of PTA Trail.* PTA Trail would be constructed largely within open space areas not visible from any sensitive view points;

however, the proposed trail would be visible from Kawaihae Road, which it parallels and crosses, and Hawai'i Belt Road, which it also crosses.

**Table 8-9**
**Summary of Potential Visual Resources Impacts at PTA**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Impairment of view during the construction phase | ⊙ | ⊙ | ○ |
| Modification of existing view | ⃠ | ⃠ | ○ |
| Alteration of the landscape character | ⊙ | ⊙ | ○ |
| Consistency with visual resource policies | ⊙ | ⊙ | ○ |
| Impairment of view from visible fugitive dust | ⊙ | ⊙ | ○ |
| Alter nighttime light and glare | ⊙ | ⊙ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⃠ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact
N/A = Not applicable

Segment one of the trail extends from Kawaihae Harbor adjacent to Highway 19 (also referred to as Queen Ka'ahumanu Highway) to the Highway 19 trail crossing. The proposed PTA Trail would use an existing trail through the Pu'ukoholā Heiau National Historic Site near the highway. This segment of the trail would be visible from residential areas and to motorists on Highway 19 looking north (Photo 8-1) but would not be visible to visitors of the historic site. Although Highway 19 is not designated as a scenic route, the road is highly traveled, exposing a large number of potential viewers to the project. The trail in this segment would follow an existing roadway/trail alignment. This area, especially near Kawaihae Harbor, has been extensively altered. Based on the criteria outlined in Section 4.3.1, the visual sensitivity and impact on views along this segment of the trail would be moderate.

Segment two of the trail extends from Highway 19 to the Hawai'i Belt Road. This segment of the trail would be visible from Highway 19 looking south, the Hawai'i Belt Road looking northwest and southeast, and the Māmalahoa Highway looking north. In addition, the trail alignment would be visible from Waikoloa Road and, in the middleground, from the village of Waikoloa. The trail would follow existing utility corridors for a portion of this segment after crossing Highway 19. Most of this segment is open land, consisting of grasses and shrubs, with periodic areas of lava (Photo 8-2). Much of the trail alignment would not be

Photo 8-1. View from Highway 19, looking northeast from Kawaihae Harbor.

Photo 8-2. View from Māmalahoa Highway, looking north.

visible due to low viewing angles, resulting in the trail being screened by vegetation or topography. The views from these roadways are not designated as scenic but are highly traveled. This area is considered to be of high sensitivity due to the expansive views and the lack of cultural modification. The impact on views along this segment of the trail would be moderate.

Segment three of the trail extends from the Hawai'i Belt Road to PTA. This segment could be visible from the Hawai'i Belt Road, looking northwest and southeast, although most of the trail alignment would not be visible because it would be screened by vegetation or topography (Photo 8-3). Most of this segment is open land, consisting of grasses and shrubs with areas of lava occurring throughout. The views from these roadways are not designated as scenic but are highly traveled. This area is considered to be of high sensitivity due to the expansive views and the lack of cultural modification. The impact on views along this segment of the trail would be moderate to severe.

Photo 8-3. View of typical road intersection along Hawai'i Belt Road.

*Regulatory and Administrative Mitigation 1.* None identified.

*Additional Mitigation 1.* The Army proposes to construct military vehicle trails to conserve natural features, including terrain and vegetative cover, to the extent practicable. Use of roadbed materials that contrast sharply with existing conditions will be avoided to the extent practicable. To avoid creating a discordant linear feature, the road alignment would, where possible, follow the natural contours of the land. Cut slopes would be minimized or avoided, where practicable, and would be blended into the landscape by rounding the edges of the slope and differentially orienting the slope and the road bed alignments where practicable.

Use of these techniques would be varied based on the specific conditions, including depth of the cut, orientation of the slope, and type of material (e.g., dirt slope and rock slope).

*Impact 2: Modification of the existing views, Construction of FTI.* Several of the proposed FTI antennas and support equipment sheds would be within potentially sensitive viewsheds, such as roadways or forest preserves. Several sites proposed for FTI antennas, including Pu‘u Kanalopakanui, Pu‘u Ke‘eke‘e, Pu‘u Ahi, Pu‘u Kailua, are areas where there are few human-made modifications and where FTI facilities would be on hilltops, silhouetted on the visual horizon (Photos 8-4 and 8-5). Viewpoints along Saddle Road or the Hawai‘i Belt Road are not designated as scenic but are frequently traveled routes with high aesthetic value.

Although the proposed locations are prominent features from public roadways, they are not unique within the area. In addition, these locations are all at least one mile (1.6 meters) from potentially sensitive viewpoints, with the exception of Pu‘u Ke‘eke‘e, which is approximately 0.5 mile (0.8 meter) from Saddle Road. At this distance, the proposed 20-foot (6.1-meter) tower/antenna structure and equipment shed would be in the middleground and would be visually indistinct. Thus, installing the FTI equipment at these locations would have a significant but mitigable impact on visual quality.

Placing antennas at Kawaihae Harbor, the Anti Armor Range 8, Mauna Loa Observatory, Pu‘u Pōhakuloa, and the Range Maintenance Facility would make them visible from surrounding roads or recreational areas; however, because of development in these areas, the antennas and equipment would be less visually inconsistent. Antennas at ‘Auwaiakeakua and Kōloa would be installed near water towers and would similarly have less impact on the overall visual character of the area. Although installation of FTI equipment at these locations would have less impact than the pu‘u sites described previously, they would nevertheless have a significant but mitigable impact on visual quality.

*Regulatory and Administrative Mitigation 2.* None identified. *Additional Mitigation 2.* Where practicable, the Army proposes to enhance existing site conditions to help screen the proposed tower and support shed from the surrounding area. The tower site will be developed to conserve existing natural features, including terrain and vegetative cover, to the extent practicable. The equipment shed would be located to maximize use of natural screening if possible. If necessary, vegetation will be planted to provide additional screening, or screening will be constructed using materials that mimic the color and/or texture of the surrounding area, where practicable. If possible, materials used for the tower and equipment shed will be nonreflective, weathered, or otherwise painted to blend with the natural surroundings.

Photo 8-4. View south from Saddle Road toward Pu‘u Ke‘eke‘e.

Photo 8-5. View south from Saddle Road toward Pu‘u Ahi.

*Less than Significant Impacts*

*Modification of the existing views.* The Range Maintenance Facility and the modifications of BAAF would replace development in the PTA cantonment area and would not result in any substantial change in visual quality. Additional ammunition storage igloos would be built in an area of similar development and would be covered with earth to blend with the surrounding natural environment. The area would not be visible or would be at such a distance from public viewing points (off-post or along Saddle Road) that no significant change in the visual quality of the area would be discernable.

The BAX and AALFTR are either not visible or they are at such a distance from public viewing points that no significant change in the visual quality of the area would be discernable. Implementing the Proposed Action would result in an expanded training area, a change in the type of vehicles used (Stryker vehicles), and an increase in the number of vehicles employed by the 2nd Brigade. Use of the Stryker would allow training units to drive off-road and over steeper terrain than they can now with the vehicles used. Nevertheless, within PTA, many of the training areas and roads are only partially visible from Saddle Road because terrain, distance, and, to a lesser degree, vegetation effectively screen training activities. The visual impact of these training activities would be limited primarily to traffic into and out of the PTA area, along established travel routes or the proposed PTA Trail, discussed above, particularly the existing trail through the Puʻukoholā Heiau National Historic Site.

Photo 8-6 is the view from Saddle Road as the traveler enters PTA from the west. The view tends to be open, with little variation in landform, color, or texture. The two primary features of this view are the slopes of Mauna Kea on the left and Mauna Loa on the right, which frame the view. From this vantage point, the SBCT-related projects would be near or beyond the horizon.

Photo 8-6. View from Saddle Road at the PTA western boundary looking east.

Photo 8-7 is a view from Saddle Road near the cantonment area. The view again is open with little variation of landform, color or texture. Vegetation is more discernable in the foreground and middle ground areas of the view and tends to obscure human-made features. Several volcanic cones are visible and tend to serve as the dominant landform feature. The slopes of Mauna Loa are visible in the background. From this vantage point, the BAX site is located primarily in the middleground of the view, toward the center-right. The AALFTR site is screened by terrain on the left.

Photo 8-7. View from Saddle Road near the cantonment area, looking south toward the BAX site.

Photo 8-8 is a view from Saddle Road south and east of the cantonment area. The view is open, although less so than views farther west. The landforms in this area are relatively flat, and color and texture are more varied. The dominant feature is the slope of Mauna Loa in the background. There is essentially no middleground within this view. The AALFTR site, which lies to the right in this view, is never visible. The BAX site is farther to the west and is not discernable either.

Photo 8-9 is the view from Saddle Road as the traveler enters PTA from the east. The views in this area are typically open due to the flat terrain, although the terrain is rolling in places due to the lava fields. The colors and textures in this area are dominated by the lava fields. Vegetation is absent or less noticeable. Several volcanic cones are prominent features in the middle ground, and, as in the approach from the west, the slopes of Mauna Kea and Mauna Loa frame the view. The SBCT-related project sites are beyond the horizon in this view. None of these sites are visible until a viewer traveling west approaches the cantonment area.

Photo 8-8. View from Saddle Road, looking south toward the AALFTR site.

Photo 8-9. View from Saddle Road near the PTA eastern boundary, looking west.

The views depicted above are typical for the PTA area. The locations of the primary SBCT training areas are such that no change in visual quality is anticipated from the Proposed Action. Project-related activities are visible from recreational areas on the higher slopes of Mauna Kea and Mauna Loa, although at such a distance any details are not discernable.

The use of this section of PTA Trail would substantially increase and add inconsistent visual elements to this area, but these impacts would be less than significant due to the intermittent and temporary nature of the impact and the fact that most views of the trail would be obscured by vegetation and terrain. The use of the trail through the Pu‘ukoholā Heiau National Historic Site is near the state highway and removed from the cultural features of the park. The trail has historically been used by military vehicles.

*Alteration of landscape character.* Implementing the Proposed Action at PTA would introduce new structures and additional training maneuvers that would be visually incompatible with the surrounding natural features. These features are not expected to significantly alter the landscape character because they would not involve large changes in land form or use, they would largely be obscured by topography and vegetation, and they would be at such distances from sensitive viewing locations that visual detail would be lost.

*Impairment of view during the construction phase.* Construction within PTA, except the cantonment area, would not be visible from surrounding sensitive viewing areas. Due to the industrial nature of the cantonment area, project-related construction here would not substantially affect sensitive views from Saddle Road or the surrounding area. PTA Trail would be constructed largely outside of any view corridors. In proximity of major roadways, trail construction would have only a minor impact because the area of effect would be relatively small and would be obscured by vegetation and topography.

*Consistency with visual resource policies.* Construction and training in PTA would occur in areas that would not alter views from public roadways or sensitive view areas and would be substantially consistent with the visual preservation objectives stated in the General Plan for the County of Hawai‘i. Measures described above to ensure potential impacts on sensitive views are minimized during PTA Trail construction would ensure consistency with the visual resource preservation policies of the General Plan for the County of Hawai'i.

New facilities and training activities in PTA would increase the amount of artificial light, potentially affecting astronomical facilities on Mauna Kea. Article 9, Outdoor Lighting of the County of Hawai'i County Code, strictly defines the requirement to control outdoor lighting within the county. Due to the sensitive nature of astronomical instrumentation on Mauna Kea, proposed roadway, equipment yard, parking, training and security lighting at PTA is required to adhere to the specifications outlined in Table 14-A of Article 9. All proposed lighting should be equipped with fixtures that adhere to the code. Night training at PTA, which includes the use of flares and light emitting munitions and explosives, is not considered detrimental at this time; however, if the Proposed Action would increase night training, it would contribute to the overall light pollution problem in the county. In such a case, the Army should increase its sensitivity to the contribution resulting from these training activities.

*Impairment of views from visible fugitive dust.* As discussed in Section 8.5, training at PTA would increase fugitive dust in two ways. Vehicles traveling on unpaved roads and in off-road maneuver areas would be an ongoing intermittent source of increased fugitive dust emissions. Wind erosion from areas disturbed by off-road vehicle maneuver activity would be an additional permanent source of increased fugitive dust emissions. Soil erosion is discussed in Section 8.9. Although wind would create visible fugitive dust clouds, it would also help dissipate the clouds so that the dust would not stay suspended in the air for an extended duration. Also, the training areas are largely outside the public viewshed. It is assumed the fugitive dust and soil mitigation identified in Sections 8.5 and 8.9 would be implemented to keep soil erosion and compaction to a minimum. As a result, visual impacts would be less than significant with respect to visible fugitive dust.

*Alteration of nighttime light and glare.* Under the Proposed Action, lighting not used during training, such as that for the ammunition storage area and cantonment, would be low sodium vapor lighting and would be used mostly during the day. It would also be properly oriented and shielded to illuminate specified areas. The use of nighttime lighting devices, such as flares, during training would increase. The use of these devices is not expected to increase dramatically because training with night vision goggles would be conducted in training areas. The increased use of lighting devices for training would mostly be in the WPAA and not in Army areas closest to, for example, nearby observatories, which require dark surroundings during nighttime operations. The Army has not received complaints regarding nighttime light and glare from nearby observatories. Visual impacts would be less than significant with respect to altering nighttime light and glare.

### ***Reduced Land Acquisition Alternative***

#### *Less than Significant Impacts*

*Modification of the existing views.* Like the other SBCT-related range projects proposed at PTA, the QTR2 site is either screened or at such a distance from public viewing points (off-post or along Saddle Road) that no significant change in the visual quality of the area would be discernable. Other than the addition of several small buildings composing the ROCA, the construction of QTR2 would not significantly alter land use or require significant changes in landform or vegetative cover beyond that proposed under the Proposed Action.

The change in the type and increase in the number of vehicles employed by the SBCT under the Proposed Action would occur similarly with implementation of Reduced Land Acquisition. However, unlike their use on the other SBCT-related ranges, these vehicles would not be utilized as part of the qualification and/or training exercises associated with QTR2. Therefore, the visual impact of these vehicles would be no more significant than under the Proposed Action.

Terrain, distance, and, to a lesser degree, vegetation surrounding the site would effectively screen the proposed training facilities and activities. No significant impacts on views are associated with implementing this alternative.

*Alteration of landscape character.* The addition of several small buildings that make up the ROCA at QTR2 would not significantly alter the landscape character at PTA. The range would be on Range 8, which already contains several small structures and is also proposed for use by the AALFTR. Reduced Land Acquisition would result in less than significant impacts on the landscape character of PTA.

*Impairment of views from visible fugitive dust.* Similar to impacts from the Proposed Action, the impacts on the impairment of views from visible fugitive dust would not be significant.

*Alteration of nighttime light and glare.* Similar to impacts from the Proposed Action, the impacts from the alteration of nighttime light and glare would not be significant.

### No Action Alternative

No Impacts

The existing baseline for visual resources would continue under the No Action Alternative. Under the status quo of No Action, because no training, construction or land use changes are proposed, no impacts on visual resources are anticipated at PTA.

## 8.4 AIRSPACE USE

### 8.4.1 Affected Environment

The affected airspace environment is described below in terms of its principal attributes, namely controlled and uncontrolled airspace, special use airspace, military training routes, en route airways, airports and airfields, and air traffic control. Jet routes, all above 18,000 feet (5,486 meters), are well above the activities proposed and are not considered part of the ROI. The maximum height of each FTI antenna is 100 feet or the FAA-approved height, whichever is lower. Before the design is finalized, the Army will coordinate with the FAA to ensure that each antenna does not obstruct air navigation, including approach and departure clearance near any runway or airfield.

#### *Controlled and Uncontrolled Airspace*

The airspace in the PTA ROI includes uncontrolled Class G airspace, which extends from the surface to a ceiling of 1,200 feet (366 meters), and controlled Class E airspace, which is airspace above 1,200 feet (366 meters), unless the special use airspace, discussed below, is activated. BAAF is surrounded by Class D airspace extending from the surface to a ceiling of 8,700 feet (2,652 meters).

Appendix F provides a full definition of the different classes of airspace and an explanatory diagram.

#### *Special Use Airspace*

The R-3101 restricted area lies above the PTA, extending from the surface to 30,000 feet (9,144 meters). The effective altitudes, time of use, and controlling agency for the restricted area are given in Table 8-10. During the published hours of use, the agency using the airspace is responsible for controlling all military activity within the restricted area and for determining that its perimeters are not violated. When the airspace is scheduled to be inactive, the agency releases it back to the controlling agency or center, and, in effect, the airspace is no longer restricted.

**Table 8-10**
**Special Use Airspace in the Pōhakuloa Training Area Airspace ROI**

| Number/Name | Effective Altitude (in feet) | Time of Use | Controlling Agency |
|---|---|---|---|
| R-3103 | To 30,000 (To 9,144 meters) | Intermittent[1] | Honolulu CERAP |

Source: NACO 2002
Notes:
[1]By NOTAM issued 12 hours in advance

#### *Military Training Routes*

There are no formal, published military training routes in the PTA airspace ROI; however, the R-3103 restricted area is heavily used for helicopter training exercises, with an average of 900 aircraft movements per month, 99 percent of which involve helicopters. The movement statistics cover all DOD branches, including the Hawaiʻi Air National Guard (Ahching 2002a, 2002b).

#### *En Route Airways*

No low altitude en route airways enter or transect the ROI, but general aviation aircraft use the airspace in the ROI. This includes all civil aviations operations other than scheduled air services and unscheduled air transport operations for hire.

#### *Airports and Airfields*

BAAF and a private airfield, Puʻu Waʻa Waʻa, are the only airfields in the PTA airspace ROI. BAAF had an average of 33 takeoffs and landings per day in 2001, all of which were military aircraft (AirNav.Com 2002).

#### *Air Traffic Control*

Air traffic in the ROI is managed by the Honolulu <u>Control Facility </u>and the BAAF control tower.

### 8.4.2 Environmental Consequences

This section addresses the environmental consequences of the Proposed Action and No Action on airspace.

#### *Summary of Impacts*

Table 8-11 summarizes potential airspace impacts. There would be a less than significant impact to airspace by shifting the initial approach fix location. There would be no impacts on the other impact issues.

<u>*Less Than Significant Impacts*</u>

<u>*Change in En Route Airways, or IFR Procedure.*</u> Although there are no low altitude en route airways in the PTA airspace ROI, use of the new, reoriented runway at BAAF by C-17 and C-130 aircraft has the potential for adverse airspace impacts. Reorienting the runway by five degrees would affect the current instrument approach procedures by changing the compass direction in which the aircraft points when approaching the airfield, shifting the initial approach fix (IAF) location, and changing the missed approach point and track. The IAF is the point where aircraft pilots depart the en route phase of their flights and maneuver to enter the intermediate segment of the instrument approach before committing to the final approach. In the intermediate segment, aircraft configuration, speed, and positioning adjustments are made for transition to the final approach. Missed approach procedures (MAP) are established for all instrument approaches and are designed to assist pilots by providing precise navigational guidance to avoid and clear any ground obstructions and to reestablish exact alignment and descent of aircraft on approach to a runway. This change in heading, IAF location, and MAP could interfere with the instrument approach pattern of other airports or airfields in the vicinity.

**Table 8-11**
**Summary of Potential Airspace Impacts at PTA**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Reduction in navigable airspace | ○ | ○ | ○ |
| New or modified special use airspace: UAV flights | ○ | ○ | ○ |
| Change to a military training route | ○ | ○ | ○ |
| Change in enroute airways, or IFR procedure | ⊙ | ⊙ | ○ |
| Restriction of access to airports/airfields | ○ | ○ | ○ |
| Obstruction to air navigation | ○ | ○ | ○ |
| Aviation safety | ○ | ○ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant

⃠ = Significant but mitigable to less than significant

⊙ = Less than significant

○ = No impact

\+ = Beneficial impact

N/A = Not applicable

### *Proposed Action (Preferred Alternative)*

*Less than Significant Impacts*

*Change in En Route Airways or IFR Procedure.* This impact would be less than significant because the Army would not substantially alter the runway layout at BAAF without prior notice and consultation with the FAA, as provided by 49 USC Section 44718 (FAA 2001). This consultation and review process would ensure that any impacts on airspace would not be significant.

Reorienting and extending the runway also would shift and reorient the runway's clear zone and accidental potential zones that extend beyond the end of each runway. This could affect land use and biological and cultural resources because clear zones must be cleared, graded, and free of objects, as specified in FAR Part 139, Section 309, and people-intensive uses are discouraged in accidental potential zones. The potential for indirect impacts on land use, biological and cultural resources, and the noise environment from the Proposed Action at BAAF, as well as the increase in the number of C-17 and C-130 aircraft flights, are addressed in section 9.2.5 of this document.

The proposed upgrade, extension, and reorientation of the BAAF runway to support C-17 aircraft would not have an impact from its construction because air traffic would not be curtailed or diverted during the construction period.

### *No Impacts*

*Reduction in Navigable Airspace.* There would be no requirement for new or modified special use airspace to accommodate the Proposed Action nor any requirement for the imposition of any flight restrictions, thus no reduction in the ROI's navigable airspace.

*New or Modified Special Use Airspace: UAV flights.* The proposed UAV flights would normally be conducted within the R-3103 restricted area in the center of the island of Hawai'i; thus, the UAV flights would use existing special use airspace. Although the nature and intensity of use varies over time and by individual special use airspace area, the proposed UAV flights represent the kinds of activities that the special use airspace was created for. Restricted areas contain airspace within which the flight of aircraft, while not wholly prohibited, is subject to restrictions. Activities within these areas must be confined because of their nature or limitations imposed on aircraft operations that are not part of these activities or both. During the published hours of use (intermittent by NOTAM 12 hours in advance for R-3103), the using agency would be responsible for controlling all military activity within the restricted area and for determining that its perimeters are not violated. When the airspace is scheduled to be inactive, the using agency releases it to the controlling agency (Honolulu Combined Center Radar Approach Control), and, in effect, the airspace is no longer restricted. As such, the UAV flights would not represent an adverse impact on special use airspace and would not conflict with any airspace use plans, policies, or controls.

*Change to a Military Training Route.* There are no published military training routes in the ROI, Consequently, no changes to military training routes would result.

*Restriction of Access to Airports/Airfields.* Access to, or the use of, airports/airfields available for public use, would not be affected by the Proposed Action, and commercial or private airport/airfield arrival and departure traffic flows would not be affected.

*Obstruction to Air Navigation.* Construction of the fixed tactical internet antennas throughout PTA and associated training areas would be well below the 500-foot (152-meter) above ground level threshold for an obstruction to air navigation specified by the FAA (FAA 2001). The antennas also would be at sufficient distance from the BAAF upgraded, extended, and reoriented runway (see Figure D-24 in Appendix D) to be below the military airport imaginary surface thresholds (e.g., 150 feet [45.7 meters] above the airfield elevation within 7,500 feet [2,286 meters] of the runway) (FAA 2001); therefore, this would not constitute an obstruction to air navigation.

*Aviation Safety.* Increased air traffic at BAAF as a result of C-130 and C-17 aircraft operations in support of SBCT training would have no impacts on aviation safety and no adverse impacts on public health and safety are anticipated. The strict procedures and rules in place governing flight operations in both controlled/uncontrolled navigable airspace and special use airspace, coupled with the Army's excellent aviation safety record in Hawaii make future adverse impacts on public health and safety extremely unlikely.

BAAF lies in Class D airspace, so all aircraft operations would be subject to air traffic control clearances and instructions, thus avoiding any adverse direct impacts on air traffic. (The indirect effects of increased air traffic on the potential for noise impacts are addressed in Section 9.6.)

For those UAV flights that could not be contained wholly within the R-3103 restricted area, operations would be conducted in accordance with well-defined FAA procedures for remotely operated aircraft. At least 60 days before UAV operations, the FAA regional office in Honolulu would have to approve the UAV flights, which would be contingent on the Army demonstrating that the flights would be as safe as those for manned aircraft. Methods include radar observation, forward or side-looking cameras, electronic detection systems, observation from one or more ground sites, or a combination of these. In addition, coordination, communications, route and altitude procedures, and lost link/mission abort procedures would all have to be identified (FAA 2001). Consequently, authorized UAV flights would have no impact on navigable controlled and uncontrolled airspace, special use airspace, military training routes, en route airways, and airports and airfields, nor would they constitute an obstruction to air navigation in the airspace ROI; therefore, there would be no airspace impacts. The potential for indirect impacts on the noise environment are addressed in Section 9.6.

### *Reduced Land Acquisition Alternative*

The airspace impacts associated with Reduced Land Acquisition would be identical to those described for the Proposed Action.

### *No Action Alternative*

*No Impacts*

The existing baseline for airspace would continue under No Action. Under the status quo of No Action, continued flight support for training would continue to have no impacts on airspace. BAAF lies in Class D airspace, so all aircraft operations are subject to air traffic control clearances and instructions. Air traffic control separation service is provided to instrument flight rules aircraft only, but all aircraft pilots are given traffic advisories and, on request, conflict resolution instructions. Continued flight support for training out of BAAF would continue to have no impacts on navigable controlled/uncontrolled airspace, special use airspace, military training routes, en route airways and jet routes, airports and airfields, and aviation safety, nor would it create obstructions to air navigation in the airspace ROI. Future UAV flights, if introduced, would also have no impacts on airspace for the reasons stated under the Proposed Action discussion. Thus, there would be no impacts on airspace because none of the factors considered in determining impacts apply.

## 8.5 AIR QUALITY

### 8.5.1 Affected Environment

There are no air quality monitoring stations close to PTA. The closest air quality monitoring stations are in Hilo and Kona. The monitoring station in Hilo collects data on sulfur dioxide and $PM_{10}$ levels. The Kona monitoring station in Kealakekua currently collects data on sulfur dioxide levels; $PM_{10}$ monitoring at this station was discontinued in June 2000. Military vehicles, aircraft flight operations (mostly helicopters), and ordnance use represent the major Army emission sources that are present at PTA. A package rock crushing facility from SBMR is moved to PTA when needed.

A rain gage at Bradshaw Army Airfield records precipitation data. Annual precipitation averages 16.9 inches per year, ranging from 1.6 inches in June to 4.4 inches in March (WeatherDisc Associates 1990). The Army operates four automated weather stations at PTA, one each in the eastern, southern, north-central, and western portions of PTA. Data from these stations are used in a real-time context for fire management purposes. Consequently, comprehensive data summaries from these stations are not available. Wind speed data from these stations have been evaluated to assist in evaluation of potential wind erosion conditions. Data from the eastern and western stations are most representative of conditions in areas where troop and vehicle maneuver activity occurs. Three years of data from the eastern station show an average hourly wind speed of 13 mph (21 kph) and a maximum hourly average wind speed of 33 mph (53 kph). Hourly average wind speeds at the eastern station exceeded 8.2 mph (13 kph) 75 percent of the time and exceeded the 15 mph (24 kph) threshold commonly associated with wind erosion processes about 35 percent of the time. Three years of data from the western station show an average hourly wind speed of 8.4 mph (13.5 kph) and a maximum hourly average wind speed of 44 mph (71 kph). Hourly average wind speeds at the western station exceeded 4.7 mph (7.6 kph) 75 percent of the time. The low-density silty soils common in the WPAA are subject to wind erosion at lower wind speeds than most soils. Wind speeds on the western side of PTA exceed the likely wind erosion threshold of 12 mph (19 kph) about 15 percent of the time.

Although Hawai'i is in a $PM_{10}$ attainment area under the Clean Air Act, the island of Hawai'i and the surrounding land at PTA have experienced discrete events in which dust impacts have had adverse effects. $PM_{10}$ emissions are important because they are easily airborne and are small enough to be inhaled deep into the lungs creating potential adverse health effects. Because of the extremely small particle size of the soils found on WPAA, the particles easily become airborne during high wind events and other disturbances once vegetation has been removed. In July 1999, a severe dust storm resulted from wind blowing over areas denuded of vegetation by a recent fire. The result was fugitive dust emissions at high enough levels to require temporary evacuation of residences at Waiki'i Ranch.

### 8.5.2 Environmental Consequences

#### *Summary of Impacts*

The Army identified in the Draft EIS a potential significant impact from fugitive dust under the Proposed Action and the RLA Alternative. The Draft EIS separated the fugitive dust impacts into two components: dust generated directly by vehicle travel on unpaved roads or off-road maneuver areas, and dust generated by wind erosion from areas disturbed by off-road vehicle activity. In response to agency and public comments the Army conducted additional modeling which provided a better understanding of the on-site conditions and potential adverse impacts from fugitive dust. The Army proposes additional mitigation programs that are known to be effective for controlling fugitive dust, reducing the severity of the potential impacts. Implementing these measures will avoid exceeding the $PM_{10}$ standards and will avoid unacceptable impacts on human health and visual resources. The Army acknowledges and has considered the public's concern that annoying dust will be intermittently produced by training and convoy activities at PTA. The Army also recognizes that the potential magnitude of fugitive dust impacts from wind erosion at WPAA are sensitive to the amount of vegetation cover that can be maintained on the area. There is significant uncertainty about the extent to which vegetation cover will be reduced by vehicle maneuver activity at WPAA. Consequently, the Army has retained the significant impact designation for this impact in this Final EIS, even though the Army believes that wind erosion will not violate state or federal air quality standards at off-post locations.

Based on the additional modeling and mitigation measures, the impact of fugitive dust from vehicle activity on unpaved areas has been changed from a significant impact to significant but mitigable to less than significant. Fugitive dust $PM_{10}$ emissions from military vehicle use on unpaved roadways and off-road areas would increase by about 429 tons per year (390 metric tons per year) compared to No Action conditions. Visible dust is a clear indication of airborne $PM_{10}$ concentrations that are typically in the range of several thousand micrograms per cubic meter. It takes only a few hours of such concentrations to produce a 24-hour average that exceeds the state and federal 24-hour average $PM_{10}$ standard of 150 micrograms per cubic meter. $PM_{10}$ emissions represent the size fractions of suspended particulate matter that are likely to penetrate into the lower respiratory tract creating potential adverse health effects. The substantial increase in fugitive $PM_{10}$ emissions from military vehicle use at PTA, the potential for exceeding the federal 24-hour $PM_{10}$ standard, and the potential impacts on quality of life to surrounding communities result in a significant air quality impact at PTA under the Proposed Action and the RLA. The impact from fugitive dust emissions would be reduced to a less than significant level through mitigation programs that include the use of washed gravel on military vehicle trails; periodic application of dust control chemicals; monitoring of ambient $PM_{10}$ concentrations; and/or development of an adaptive management program to manage training area lands and to modify training procedures as necessary to ensure compliance with federal air quality standards. Wind erosion from areas disturbed by vehicle maneuver activity would increase by about 1,602 tons per year (1,453 metric tons per year) compared to No Action. The potential magnitude of wind erosion is strongly dependent on the extent of vegetation cover that can be maintained on areas subject to vehicle maneuver activity. As long as high levels of vegetation cover are maintained on the WPAA, only extreme periods of very strong winds would have the potential to generate off-post $PM_{10}$ levels above the value of the state and federal 24-hour $PM_{10}$ standards. The low probability of such extreme high wind conditions indicates that wind erosion at WPAA would be unlikely to generate off-post $PM_{10}$ levels above the value of the state and federal 24-hour $PM_{10}$ standards under the Proposed Action and the RLA Alternative. That conclusion, however, depends in part on maintaining a high level of vegetation cover at WPAA. The Army's DuSMMoP and ITAM program would substantially mitigate potential wind erosion problems by providing management tools that would help limit damage to vegetation from off-road vehicle maneuver activity. Although violation of air quality standards is not likely, the overall level of $PM_{10}$ generated by wind erosion would increase as a result of the Proposed Action. Given the resulting increase in overall $PM_{10}$ levels, the uncertainties associated with any estimate of potential wind erosion conditions, and public perceptions of the potential magnitude of this impact, the Army considers wind erosion from the WPAA to be a significant air quality impact under the Proposed Action.

Construction activities under either the Proposed Action or the RLA Alternative would result in nitrogen oxide emissions from construction equipment that would be 192 to 213 tons (174 to 193 metric ton) in 2005 and 184 to 186 tons (167 to 169 metric tons) in 2006. Nitrogen oxide emissions are of concern primarily as an ozone precursor. Even though the construction emissions increase substantially in 2005 and 2006, annual emissions of ozone precursors from construction activities associated with the Proposed Action or the RLA Alternative would be too small to have a measurable effect on ozone levels. Consequently, construction-related emissions would have a less than significant air quality impact under the Proposed Action or the RLA Alternative and would not change the attainment status of the area.

Ordnance use at PTA would increase by about 70 percent under the Proposed Action and by about 110 percent under the RLA Alternative. Because emission quantities from ordnance use are very small and include only trace quantities of hazardous components, no significant air quality impacts would occur. SBCT transformation would add the Stryker armored vehicle to the tactical and support vehicle types currently used at PTA. Overall military vehicle use would double under the Proposed Action or the RLA Alternative. The net increase in military vehicle engine emissions would be 3.9 tons (3.5 metric tons) per year for reactive organic compounds, 37 tons (34 metric tons) per year for nitrogen oxides, 11.5 tons (10.5 metric tons) per year for carbon monoxide, 0.4 ton (0.4 metric ton) per year for sulfur oxides, and 3.3 tons (3 metric tons) per year for $PM_{10}$. This minimal increase in emissions from vehicles would result in a less than significant impact. The addition of fixed wing cargo aircraft and UAV flight operations at PTA under the Proposed Action or the RLA Alternative would result in a less than significant increase in overall aircraft emissions. There would be a slight increase in the risk of wildfires at PTA under the Proposed Action or the RLA Alternative, but emissions associated with wildfires at PTA would remain a less than significant impact.

No additional staff personnel would be based at PTA under the Proposed Action or RLA. Consequently, there would be no air quality impact at PTA from changes in personnel numbers under the Proposed Action or RLA.

Table 8-12 summarizes the significance of air quality impacts at PTA under the Proposed Action, RLA, and No Action.

**Table 8-12**
**Summary of Potential Air Quality Impacts at Pōhakuloa Training Area**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Emissions from construction activities | ⨀ | ⨀ | ○ |
| Emissions from ordnance use | ⨀ | ⨀ | ⨀ |
| Engine emissions from military vehicle use | ⨀ | ⨀ | ⨀ |
| Fugitive dust from military vehicle use | ⃠ | ⃠ | ⨀ |
| Wind erosion from areas disturbed by military vehicle use | ⊗ | ⊗ | ⨀ |
| Emissions from increased aircraft operations | ⨀ | ⨀ | ⨀ |
| Emissions from wildfires | ⨀ | ⨀ | ⨀ |
| Other emissions from personnel increases | ○ | ○ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table.

LEGEND:

| | | | | | |
|---|---|---|---|---|---|
| ⊗ | = Significant | | + | = | Beneficial impact |
| ⃠ | = Significant but mitigable to less than significant | | N/A | = | Not applicable |
| ⨀ | = Less than significant | | | | |
| ○ | = No impact | | | | |

### *Proposed Action*

*Significant Impacts*

*Impact 1: Wind Erosion from Areas Disturbed by Military Vehicle Use.* Off-road vehicle activity will reduce or eliminate vegetation cover in affected areas, resulting in increased susceptibility to wind erosion. The amount of off-road vehicle activity at PTA would increase by 89 percent under the Proposed Action. In addition, the area available for off-road vehicle maneuvers would increase from 8,843 acres (3,579 hectares) to 31,518 acres (12,755 hectares). Most of the additional land that would become available for off-road vehicle maneuvers has a very high potential for wind erosion if vegetation cover is reduced. The introduction of off-road vehicle maneuver activity into areas currently used for cattle grazing would be expected to reduce vegetation cover and increase the extent of ground disturbance. An estimated 2,447 tons per year (2,220 metric tons per year) of $PM_{10}$ would be generated by wind erosion from the affected areas. This represents a net increase of about 1,602 tons (1,453 metric tons) per year compared to No Action. $PM_{10}$ emissions are important because they are easily airborne and are small enough to be inhaled deep into the lungs, creating potential adverse health effects.

The dispersion modeling results obtained for evaluating a brigade level vehicle maneuver exercise on a 10,000-acre (4,047 hectare) portion of WPAA were used to extrapolate potential $PM_{10}$ concentrations from wind erosion conditions. The extrapolation procedure adjusted the maneuver exercise modeling results to account for wind erosion emission rates at different wind speeds and the effect of variable wind speeds on dispersion and dilution of the resulting emissions. The extrapolated modeling results were evaluated in the context of wind speed frequency data from the Army's West PTA automated weather station.

Vehicle maneuver activity at WPAA is expected to be widely dispersed over large portions of the area and thus would minimize the extent of vegetation damage resulting from the maneuver exercises. The specific $PM_{10}$ increments generated by wind erosion would vary with distance from the WPAA and with the number of hours per day when average hourly wind speeds exceed 12 mph (5.4 meters per second). Wind erosion emission rates increase rapidly when the average hourly wind speed reaches or exceeds 20 mph (8.9 meters per second). Based on three years of meteorological data from the Army's West PTA automated weather station, wind speeds at WPAA would be expected to reach or exceed 20 mph (32 kph) for 216 hours in a typical year. Wind speeds above 30 mph (48 kph) occur at WPAA about 24 hours per year. Wind speed frequency distributions for the west side of PTA indicate that days with persistent wind speeds above 20 mph (32 kph) are uncommon.

As long as high levels of vegetation cover are maintained on the WPAA, only extreme periods of very strong winds would have the potential to generate off-post $PM_{10}$ levels above the value of the state and federal 24-hour $PM_{10}$ standards. If hourly average wind speeds stayed above 25 mph (40 kph) and blew in the same direction for an entire calendar day, then the federal 24-hour $PM_{10}$ standard could be exceeded at distances of up to 3,200 feet (975 meters) from the WPAA. However, it is very unlikely that a day with such an extreme high wind speed would occur. Historically, a more realistic but still unlikely high wind speed scenario would be a day with 12 hours of wind speeds above 25 mph (40 kph) and 12 hours with wind speeds of 20 to 25 mph (32 to 40 kph). This would limit the occurrence of dust levels above the value of the state and federal 24-hour $PM_{10}$ standards to locations within about 500 feet of the wind erosion source area. The low probability of such extreme high wind conditions indicates that wind erosion at WPAA would be unlikely to generate $PM_{10}$ levels above the value of the state and federal 24-hour $PM_{10}$ standards at Waiki‘i Ranch or the Kilohana Girl Scout Camp.

The Army's DuSMMoP and ITAM program would substantially mitigate potential wind erosion problems by providing management tools that would help limit damage to vegetation from off-road vehicle maneuver activity. Although violation of air quality standards is not likely, the overall level of $PM_{10}$ generated by wind erosion would increase as a result of the Proposed Action. Given the resulting increase in overall $PM_{10}$ levels, the uncertainties associated with any estimate of potential wind erosion conditions, and public perceptions of the potential magnitude of this impact, the Army considers wind erosion from the WPAA to be a significant air quality impact under the Proposed Action.

*Regulatory and Administrative Mitigation 1.* The Army will develop and implement a DuSMMoP for the training area. The plan will address measures such as, but not limited to, restrictions on the timing or type of training during high risk conditions, vegetation monitoring, dust monitoring, soil monitoring, and buffer zones to minimize dust emissions in populated areas. The plan will determine how training will occur in order to keep fugitive dust emissions below CAA standards for $PM_{10}$ and soil erosion and compaction to a minimum. The Army will monitor the impacts of training activities to ensure that emissions stay within the acceptable ranges as predicted and environmental problems do not result from excessive soil erosion or compaction. The plan will also define contingency measures to mitigate the impacts of training activities which exceed the acceptable ranges for dust emissions or soil compaction.

The Army will continue to implement land restoration measures identified in the INRMP. Mitigation measures include, but are not limited to, implementation of the ITAM program to identify and inventory land condition using a GIS database; coordination between training planners and natural resource managers; implementation of land rehabilitation measures identified in the INRMP; monitoring of the effectiveness of the land rehabilitation measures; evaluation of erosion modeling data to identify areas in need of improved management; and implementation of education and outreach programs to increase user awareness of the value of good land stewardship.

Rotation of maneuver activities among available areas is potentially effective when the available area substantially exceeds the area needed for individual exercise events. While WPAA appears to provide sufficient area to allow for rotation of training activity among different geographic areas, dispersing maneuver activity over large portions of WPAA may actually prove more effective than attempts to combine activity rotation with vegetation reseeding programs. Vegetation reseeding programs normally would require the rotation of maneuver activities among available areas. The effectiveness of reseeding programs depends on having adequate germination and vegetation establishment periods between repeated disturbances. The large acreage available at WPAA may not provide adequate opportunity for reseeding programs to be effective given the relatively low annual rainfall. Although activity rotation and vegetation reseeding programs remain an option that the Army will consider, the proposed DuSMMoP represents a more practical approach to mitigating potential wind erosion problems.

### *Significant Impacts Mitigable to Less Than Significant*

*Impact 2: Fugitive Dust from Military Vehicle Use.* Approximately 800 vehicles could participate in a single brigade level training exercise. Resulting $PM_{10}$ emissions would be approximately 1,228 tons per year (1,114 metric tons per year). This represents an increase of about 429 tons (390 metric tons) per year compared to No Action conditions.

Sources of fugitive dust associated with military vehicle traffic include vehicle convoys on military vehicle trails, vehicle maneuver training on gravel or dirt roads inside military installations, and off-road military vehicle maneuvers inside military installations. Approximately 88 percent of the net increase in fugitive $PM_{10}$ emissions would be associated with vehicle travel on unpaved roads, while the remaining 12 percent represents potential emissions from off-road vehicle maneuver activity.

$PM_{10}$ represents the size fractions of suspended particulate matter that are likely to penetrate into the lower respiratory tract, creating potential adverse health effects. The 429 tons (390 metric tons) per year increase in fugitive $PM_{10}$ emissions generated by military vehicles at

PTA, the potential for exceeding the federal 24-hour $PM_{10}$ standard, and the potential impacts on quality of life to Waiki'i Ranch residents and users of Kilohana Girl Scout Camp result in a significant air quality impact at PTA under the Proposed Action. The impact from fugitive dust emissions would be reduced to a less than significant level through mitigation programs that include the use of washed gravel on military vehicle trails, periodic application of dust control chemicals, monitoring of ambient $PM_{10}$ concentrations, and development of an adaptive management program to manage training area lands and modify training procedures as necessary to ensure compliance with federal air quality standards.

Dispersion modeling analyses discussed below indicate that fugitive dust emissions from vehicle travel on unpaved roads and from vehicle operations in off-road maneuver areas have the potential for violating the federal 24-hour $PM_{10}$ standard at off-post locations. The substantial increase in fugitive $PM_{10}$ emissions from military vehicle use at PTA, the potential for exceeding the federal 24-hour $PM_{10}$ standard, and the potential impacts on quality of life to surrounding communities result in a significant air quality impact at PTA under the Proposed Action. The impact from fugitive dust emissions would be reduced to a less than significant level through mitigation programs that include the use of washed gravel on military vehicle trails, periodic application of dust control chemicals, monitoring of ambient $PM_{10}$ concentrations, and/or development of an adaptive management program to manage training area lands and modify training procedures as necessary to ensure compliance with federal air quality standards.

In response to USEPA and public comments, the Army conducted a more detailed modeling and analysis of fugitive dust issues. The intent of the modeling was to better determine the potential degree of impact and the geographic extent of the impact. The model the Army used is a widely used standard dispersion model (see Appendix G for further detail). Emission rate, vehicle activity, and weather condition factors considered in the modeling included the following:

- Soil type;
- Particle settling and deposition based on particle size and density;
- Soil moisture;
- Climatic conditions, including wind speed, wind direction, rainfall, and atmospheric stability;
- Vegetation cover;
- Vehicle traffic conditions, including the types of vehicles, their weight, number of wheels, and hourly traffic volumes; and,
- Geographic size of the disturbed area.

Vehicle convoys on the PTA Trail would vary considerably in size, ranging from just a few vehicles to several hundred for a major exercise at PTA. Most convoy traffic would be in one direction on a given day, since troops participating in exercises at PTA normally spend several days to a few weeks at the installation before departing. For modeling purposes, it was assumed that total traffic volumes on the PTA Trail might be as high as 500 vehicles per day. If road surfaces are dry and winds are light, even relatively modest numbers of vehicles can create sufficient dust to cause downwind $PM_{10}$ concentrations of more than 150 micrograms per cubic meter. In the absence of any dust control measures, daily traffic volumes of about 100 vehicles per day have the potential for causing $PM_{10}$ problems at locations within 2,000 feet (610 meters) of the roadway. Lower daily traffic volumes could cause $PM_{10}$ problems over shorter distances, and higher daily traffic volumes could cause $PM_{10}$ problems over larger distances. Without any dust control measures, daily traffic volumes of 300 vehicles per day could cause $PM_{10}$ problems at locations within one mile (1.6 kilometers) of the roadway.

Potential $PM_{10}$ problems from vehicle traffic on the PTA Trail can be reduced substantially by a combination of feasible mitigation measures, including the use of washed gravel for surfacing military vehicle trails and/or implementing a dust management program that may include road paving or periodic application of chemical dust suppressants. Alternative dust control compounds include hygroscopic salts (such as calcium chloride or magnesium chloride solutions) and synthetic polymer compounds (such as polyvinyl acetate or vinyl acrylic). If properly applied, dust control measures for unpaved roads would be expected to achieve at least 90 percent control of fugitive dust under the weather conditions and roadway use levels prevalent at USARHAW installations.

Expected $PM_{10}$ concentrations downwind of the PTA Trail are illustrated in Figure 8-10, assuming a maximum day traffic volume and implementation of the proposed dust control program. The assumed daily traffic volume (500 vehicles per day) would occur infrequently. Most days would have significantly less vehicle traffic and thus would have lower fugitive dust impacts than indicated in Figure 8-10. Successful implementation of the proposed dust control program would result in high $PM_{10}$ levels being restricted to locations within 400 feet (122 meters) of the trail, assuming persistent wind directions for the entire period during which there is significant vehicle traffic. Due to traffic control procedures at public road crossings, hourly traffic volumes on the PTA Trail generally would be less than 100 vehicles per hour. Since most days would have much lower traffic volumes than the maximum assumed for this analysis, actual areas affected by high concentrations of $PM_{10}$ would typically be within 100 feet (30.5 meters) of the trail.

In addition to the PTA Trail, there are numerous gravel and dirt roads present within PTA. While dirt roads have a higher per-vehicle emission rate than gravel roads, approximately 75 percent of the on-post unpaved roads have a gravel surface. Dirt roads generally carry much smaller traffic volumes than do the gravel roads. Mitigation measures applied to the PTA Trail generally would be applicable to on-post unpaved roads. Consequently, the fugitive dust modeling for PTA Trail is considered representative of conditions for on-post gravel and dirt roads. High concentrations of $PM_{10}$ would be limited to locations close to the unpaved roadways and would not extend beyond installation boundaries.

Given the anticipated effectiveness of feasible mitigation measures, fugitive dust from vehicle travel on unpaved roads at PTA is considered a significant but mitigable to less than significant impact.

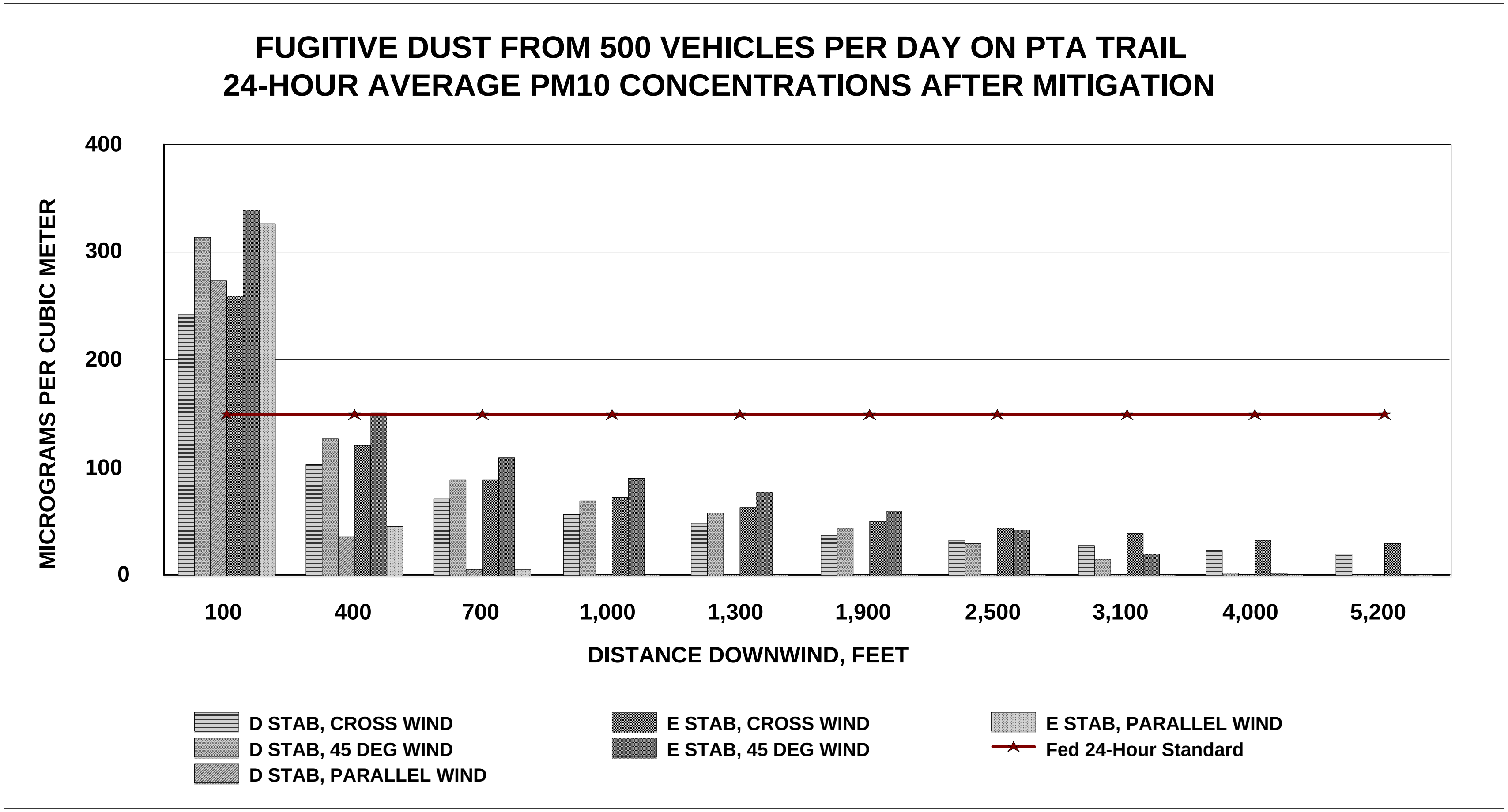



Chart shows potential $PM_{10}$ concentrations under varied weather conditions: three wind directions relative to the local trail alignment, and two atmospheric stability conditions (neutral D stability and mild inversion E stability).

Figure 8-10. Potential $PM_{10}$ Concentrations Along PTA Trail With Proposed Dust Control Mitigation Program

The existing boundaries of PTA provide a modest area suitable for off-road vehicle maneuver training. The WPAA would greatly expand the area available for vehicle maneuver training. As indicated in Figure 2-6, most of the available maneuver area would occur as a relatively contiguous parcel that wraps around three sides of the Waiki'i Ranch residential development. The Kilohana Girl Scout Camp also would be bordered by the WPAA. The primary purpose of the WPAA is to support company, battalion, and brigade level maneuver exercises. Small unit maneuvers would not involve sufficient vehicle activity to create off-post $PM_{10}$ problems. Regardless of scale, most maneuver exercises tend to have their major activity concentrated into one or more periods of activity lasting two to three hours.

Company level vehicle maneuver exercises would typically be spread over 2,000 to 5,000 acres (809 to 2,023 hectares). A 2,500-acre (1,112-hectare) activity area was assumed for modeling company level exercises. Daily activity durations of two hours, three hours, and four hours were evaluated for the company level exercise scenario. Battalion level exercises would involve three companies operating in a coordinated but semi-autonomous manner. Such exercises could be spread over a large portion of the WPAA. To provide a conservative analysis, the modeling evaluation assumed that a battalion level exercise would be concentrated on a 6,000-acre (2,428-hectare) area. Daily activity durations of two hours, four hours, and six hours were evaluated for the battalion level exercise scenarios. Brigade level exercises would typically utilize the entire 23,000 acres (9,308 hectares) of WPAA. To provide a conservative analysis, the modeling evaluation assumed that a brigade level exercise would be concentrated on a 10,000-acre (4,047-hectare) area. Daily activity durations of four hours, six hours, and eight hours were evaluated for the brigade level exercise scenario. As was the case for the military vehicle trail modeling, all analyses of off-road maneuver exercises assumed that ground surface conditions would be dry.

Modeling results for a company level exercise are presented in Figure 8-11. Because vehicle activity and resulting fugitive dust emissions would be widely dispersed, individual downwind locations would experience only low concentrations of $PM_{10}$. $PM_{10}$ impacts from company level vehicle maneuver exercises would be less than significant.

Modeling results for a battalion level exercise are presented in Figure 8-12. Modeling results for a brigade level exercise are presented in Figure 8-13. For a concentrated activity scenario such as the one analyzed, vehicle activity and resulting fugitive dust emissions would produce relatively high $PM_{10}$ concentrations at downwind distances that would be likely to reach off-post locations. The geographic extent of high $PM_{10}$ concentrations would depend partly on weather conditions and partly on the duration of periods with significant vehicle activity. Events with only four hours of significant vehicle activity in a day could create high $PM_{10}$ concentrations as far as 3,000 feet (914 meters) from the edge of the activity area. Events with six hours of significant vehicle activity in a day could create high $PM_{10}$ concentrations as far as 1.5 miles (2.4 kilometers) from the edge of the activity area. Events with eight hours of significant vehicle activity in a day could create high $PM_{10}$ concentrations at distances of more than 2 miles (3.2 kilometers) from the edge of the activity area. $PM_{10}$ impacts from brigade level vehicle maneuver exercises would be significant but mitigated to a less than significant impact through the proposed mitigation measures.

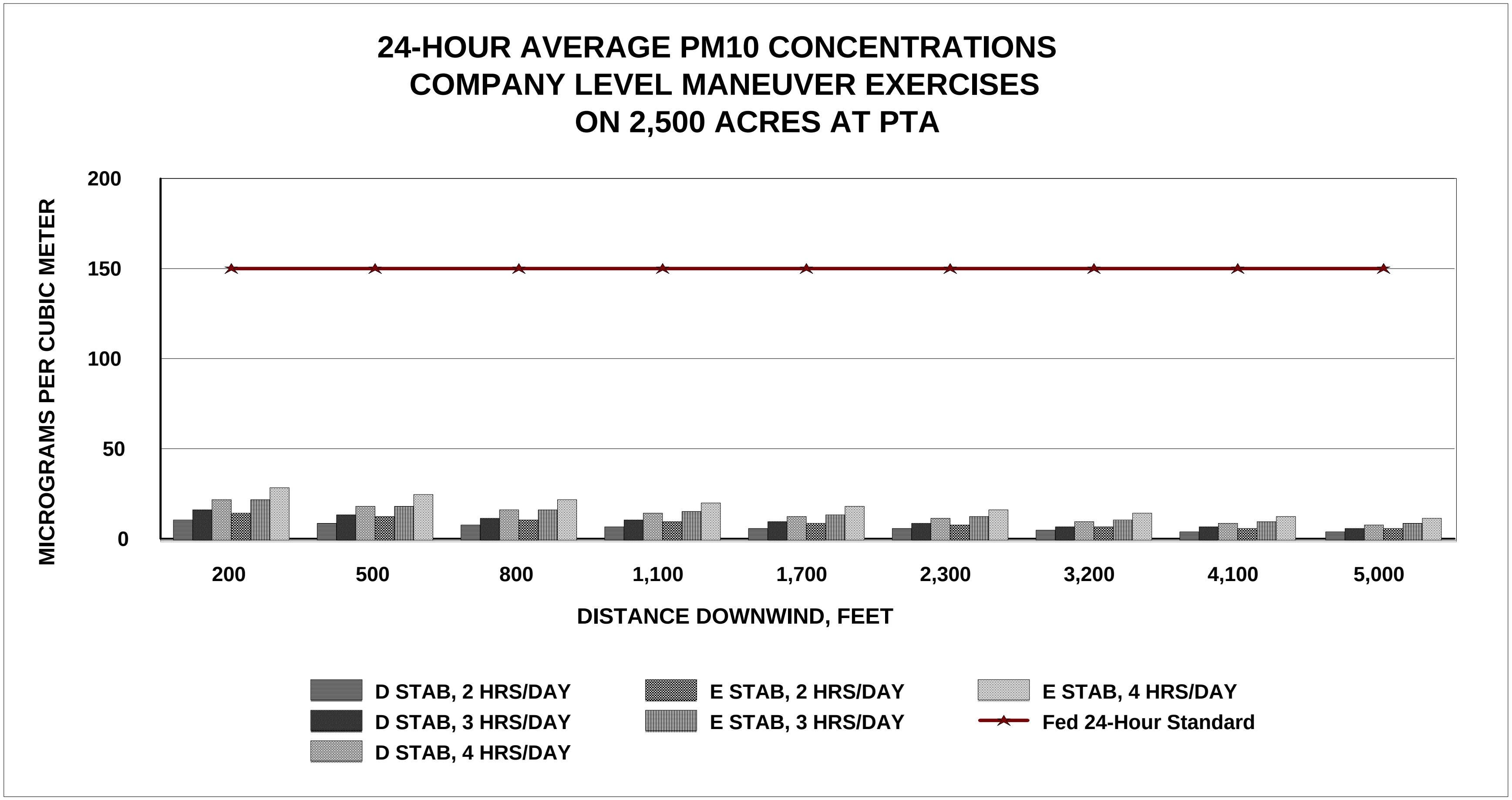



Chart shows potential $PM_{10}$ concentrations under two atmospheric stability conditions (neutral D stability and mild inversion E stability) and varied durations of vehicle maneuver activity during one or two company level exercise events in a single calendar day.

Figure 8-11. Potential $PM_{10}$ Concentrations Downwind of Company Level Vehicle Maneuver Exercise Activity at PTA

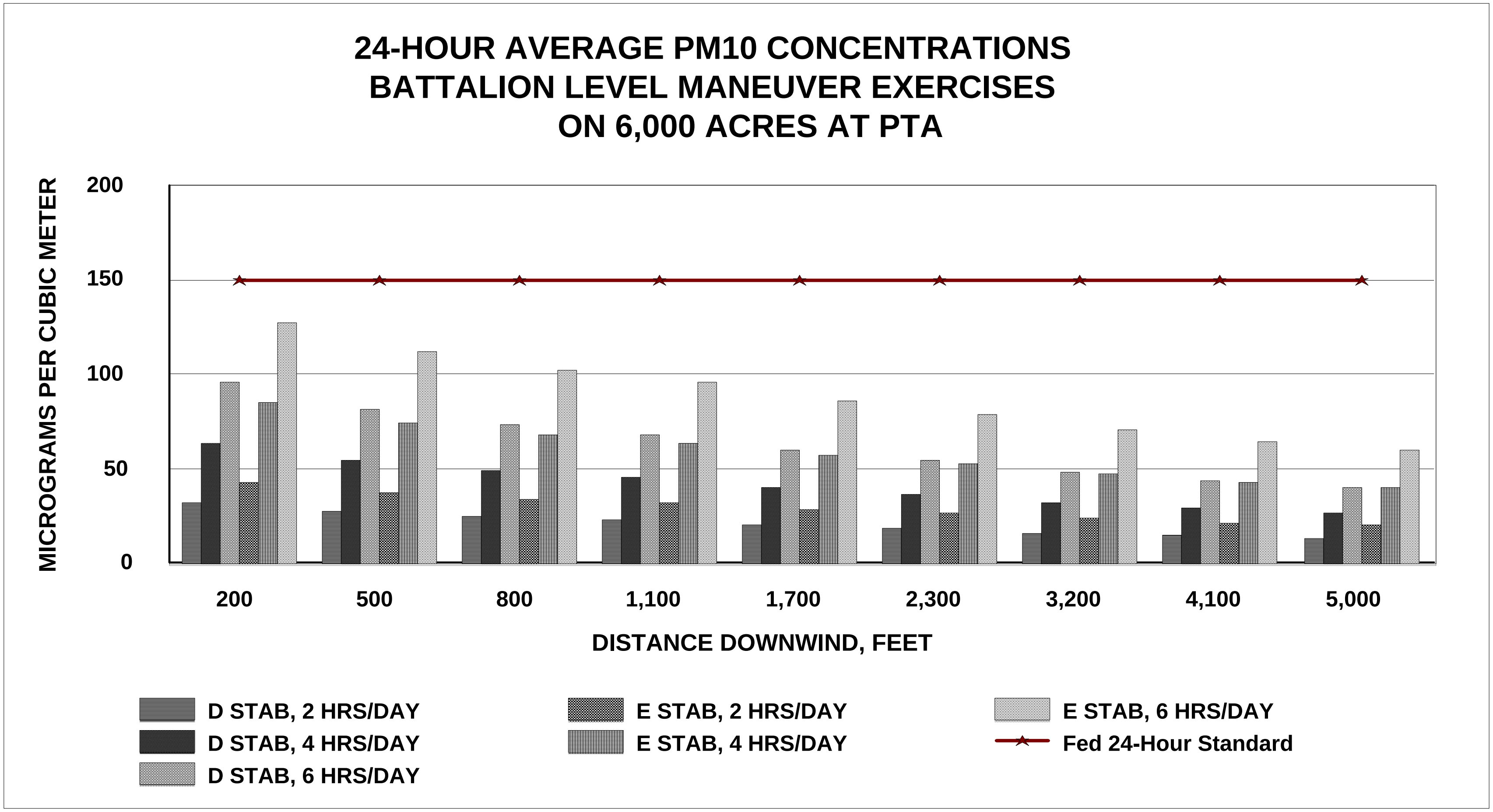



Chart shows potential $PM_{10}$ concentrations under two atmospheric stability conditions (neutral D stability and mild inversion E stability) and varied durations of vehicle maneuver activity during one or two battalion level exercise events in a single calendar day.

Figure 8-12. Potential $PM_{10}$ Concentrations Downwind of Battalion Level Vehicle Maneuver Exercise Activity at PTA

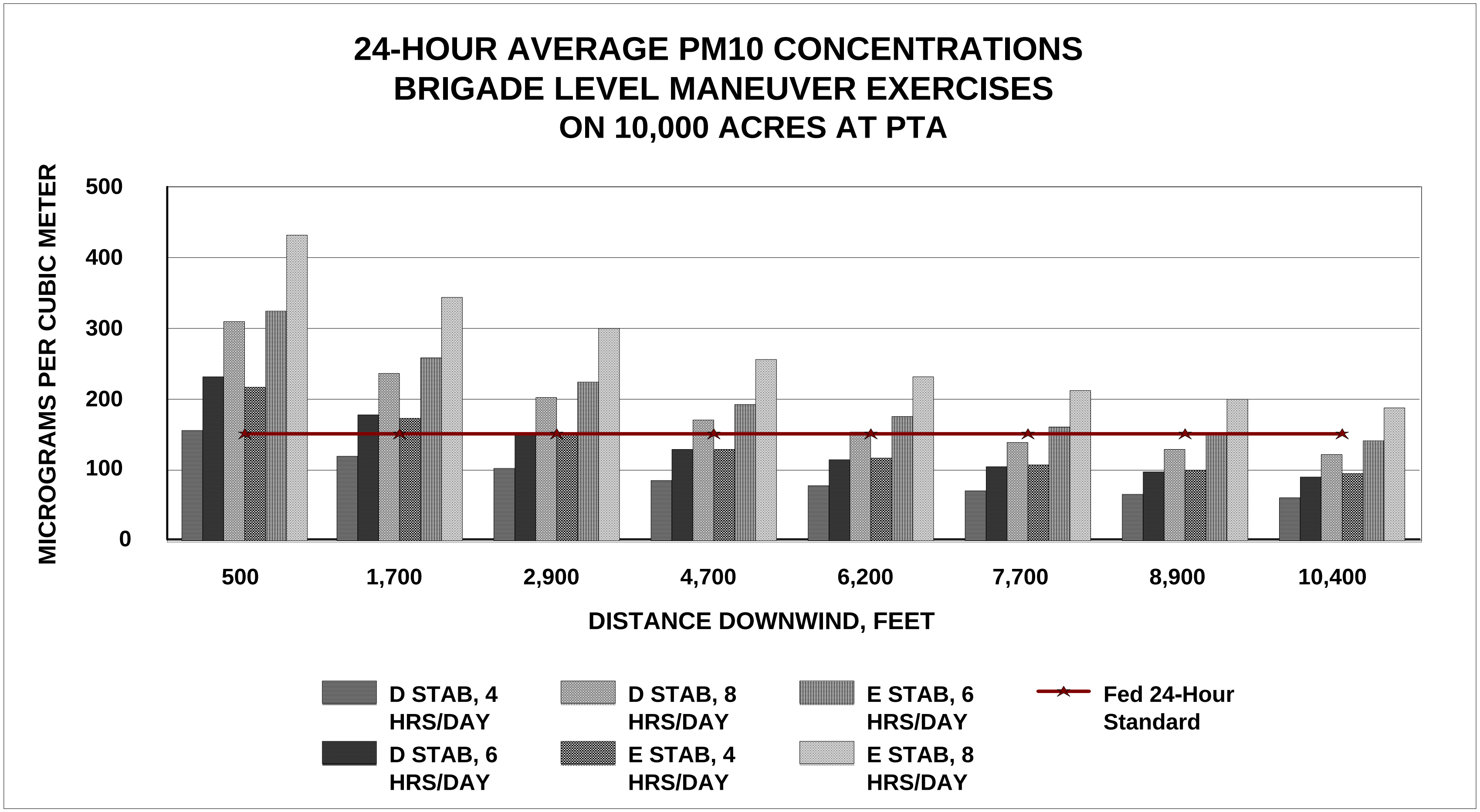



Chart shows potential $PM_{10}$ concentrations under two atmospheric stability conditions (neutral D stability and mild inversion E stability) and varied durations of vehicle maneuver activity during one or two brigade level exercise events in a single calendar day.

Figure 8-13. Potential $PM_{10}$ Concentrations Downwind of Brigade Level Vehicle Maneuver Exercise Activity at PTA

The Army will mitigate potential fugitive dust problems from brigade level vehicle maneuver exercises with development and implementation of the DuSMMoP. Through the development of DuSMMoP, brigade level maneuver exercises may be dispersed over most of the available maneuver area to avoid concentrating sources of fugitive dust emissions. Spreading a brigade level exercise over 20,000 acres (8,094 hectares) would reduce the expected downwind concentrations by 50 percent, compared to the scenario with activity concentrated on 10,000 acres (4,047 hectares). The Army prefers to train over large areas, so this requirement would have minimal effect on the planning for most brigade level exercise events. Implementing such a management program would reduce fugitive dust impacts from vehicle maneuver training exercises to a less than significant level.

Each type of maneuver exercise would use aviation support with varying amounts of low altitude helicopter and aircraft flight activity. The Army received comments expressing concerns over dust from helicopter flight activity. The Army reviewed this issue and determined that typical helicopter flight activity would not result in noticeable dust generation because the aircraft would be too high above the ground. Helicopter landings will generate dust, but landings will be brief and limited in number and the dust effects will be very localized (limited to 200 feet or less).

*Regulatory and Administrative Mitigation 2.* The Army will develop and implement a DuSMMoP for the training area. The plan will address measures such as, but not limited to, restrictions on the timing or type of training during high risk conditions, vegetation monitoring, dust monitoring, soil monitoring, and buffer zones to minimize dust emissions in populated areas. The plan will determine how training will occur in order to keep fugitive dust emissions below CAA standards for $PM_{10}$ and soil erosion and compaction to a minimum. The Army will monitor the impacts of training activities to ensure that emissions stay within the acceptable ranges as predicted and environmental problems do not result from excessive soil erosion or compaction. The plan will also define contingency measures to mitigate the impacts of training activities which exceed the acceptable ranges for dust emissions or soil compaction.

To reduce fugitive dust associated with the use of military vehicle trails, the Army will implement dust control measures such as dust control chemical applications, the use of washed gravel for surfacing, spraying water, or paving sections of trails. The extent of gravel washing would have to balance dust reduction goals with engineering requirements for achieving a stable roadway surface. Selection of the appropriate dust control products would be based on testing alternative products on dirt and gravel road segments. Based on general characteristics and performance elsewhere, environmentally friendly synthetic polymers (such as polyvinyl acetate and vinyl acrylic) and hygroscopic salt solutions (such as calcium chloride or magnesium chloride) appear to be the most promising groups of dust control agents. The Army will monitor road surface conditions and will apply palliatives as necessary. If moisture levels are adequate to suppress dust, than application of dust palliatives would not be necessary. To the extent possible, the Army would plan dust suppressant applications to be scheduled to immediately precede periods of significant convoy traffic.

PTA Trail already is planned as a gravel road, with paved sections where necessary to control erosion problems. The gravel surface has been taken into account in the fugitive dust emission estimates. Asphalt or concrete paving of the entire trail would further reduce dust generation from vehicle travel, but would involve unacceptable costs.

Synthetic dust control chemicals are widely used for ongoing dust control on unpaved roads. When properly matched to road surface, traffic, and weather conditions, synthetic dust control products can achieve high levels of dust control. Section 4.5 includes a summary of major categories of dust control chemicals and the general nature of their environmental risks.

### *Less than Significant Impacts*

*Emissions From Construction Activities.* The Proposed Action would include nine construction projects at PTA, with construction activities occurring from 2004 into 2007. Construction projects would include two training range facilities (a BAX and AALFTR), a tactical vehicle wash facility, an ammunition storage facility, a range maintenance facility, an upgrade and realignment of Bradshaw Army Airfield, a military vehicle trail between Kawaihae Harbor and PTA, a communications cable system, and 11 FTI towers. UXO clearance would be required prior to construction of the BAX and AALFTR ranges. Figure 8-14 summarizes estimated emissions from these construction projects according to current construction schedules. Maximum annual nitrogen oxide emissions from construction equipment would be 192 tons (174 metric tons) in 2005 and 184 tons (167 metric tons) in 2006. Nitrogen oxide emissions are of concern primarily as an ozone precursor. Even though construction emissions would increase substantially in 2005 and 2006, annual emissions of ozone precursors from construction activities associated with the Proposed Action would be too to have a measurable effect on ozone levels. Construction contractors will comply with the provisions of Hawaii Administrative Rules, Sec. 11-60.1-33 on Fugitive Dust as part of the requirements of construction contracts. Consequently, construction-related emissions under the Proposed Action would have a less than significant air quality impact and would not change the attainment status of the area.

*Emissions from Ordnance Use.* Overall ordnance use by the 25th ID(L) at PTA would increase by about 70 percent from about 3.4 million items per year to about 5.7 million items per year under the Proposed Action. About 96 percent of the ordnance use would be small arms ammunition; heavy weapons ordnance, demolition charges, smoke devices, and pyrotechnic devices would account for about 4 percent of the annual ordnance use. Emissions from ordnance use have not been quantified. However, as discussed for SBMR in Section 5.5.2, pollutant emission quantities from ordnance use are small (Mitchell and Suggs 1998). Based on the general nature of detonation processes and the very low emission rates that have been published in studies of munitions firing and open detonations, emissions associated with ordnance use at PTA pose very little risk of creating adverse air quality impacts. Consequently, air quality impacts from munitions use under the Proposed Action are considered less than significant.

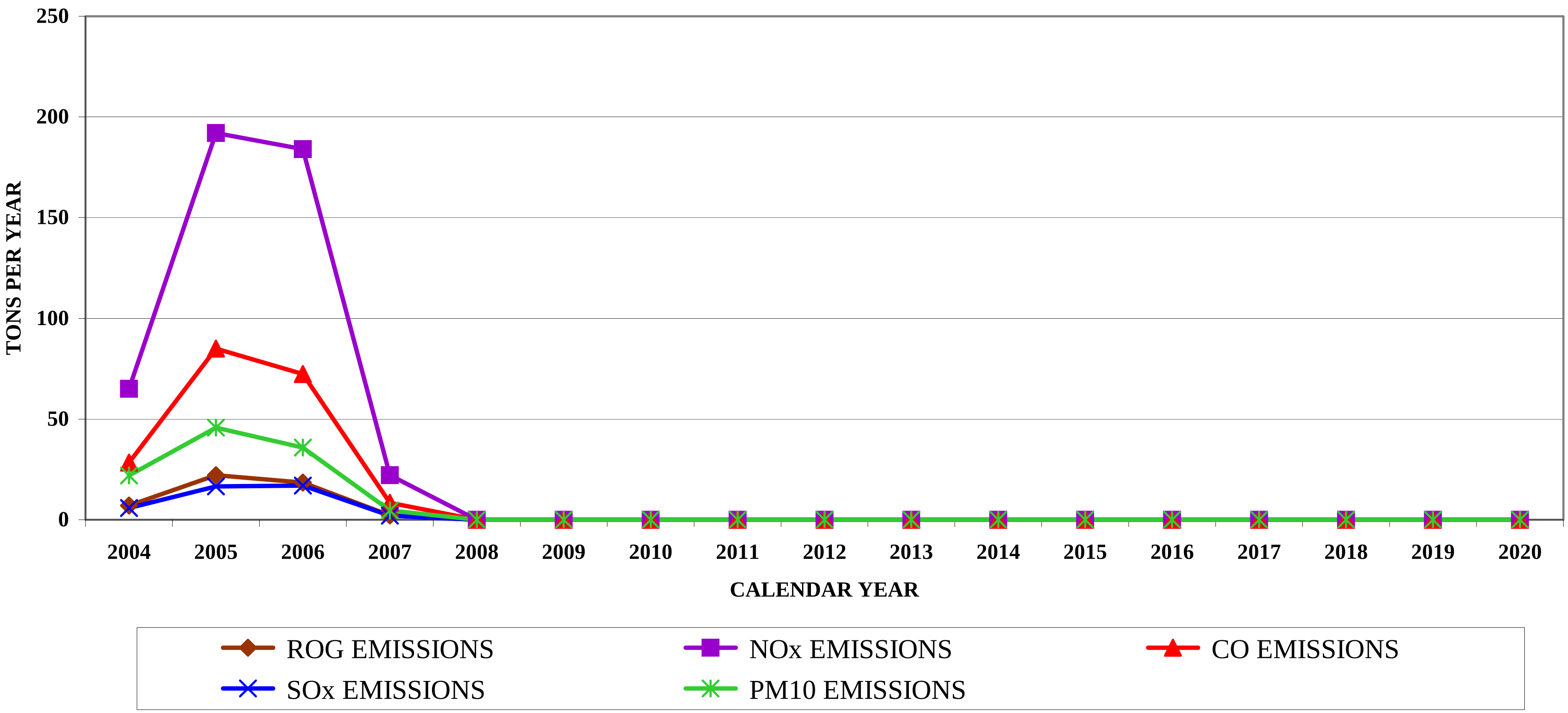



Figure 8-14 Annual Construction Emissions, Pōhakuloa Training Area, Proposed Action

Engine Emissions from Military Vehicle Use. Military vehicle use at PTA would increase appreciably under the Proposed Action, with an estimated 69 percent increase in vehicle mileage and an estimated 76 percent increase in vehicle operating hours. Annual emissions from military vehicle use would increase by 128 percent compared to No Action conditions. Figure 8-15 summarizes estimated net increase in annual engine emissions from military vehicle use at PTA under the Proposed Action. The net increase in military vehicle engine emissions would be 3.9 tons (3.5 metric tons) per year for reactive organic compounds, 37 tons (34 metric tons) per year for nitrogen oxides, 11.5 tons (10.5 metric tons) per year for carbon monoxide, 0.4 ton (0.4 metric ton) per year for sulfur oxides, and 3.3 tons (3 metric tons) per year for $PM_{10}$. Emissions from military vehicle use at PTA would be too small to have a measurable effect on ambient pollutant concentrations. Consequently, emissions from increased military vehicle use at PTA would be a less than significant impact under the Proposed Action.

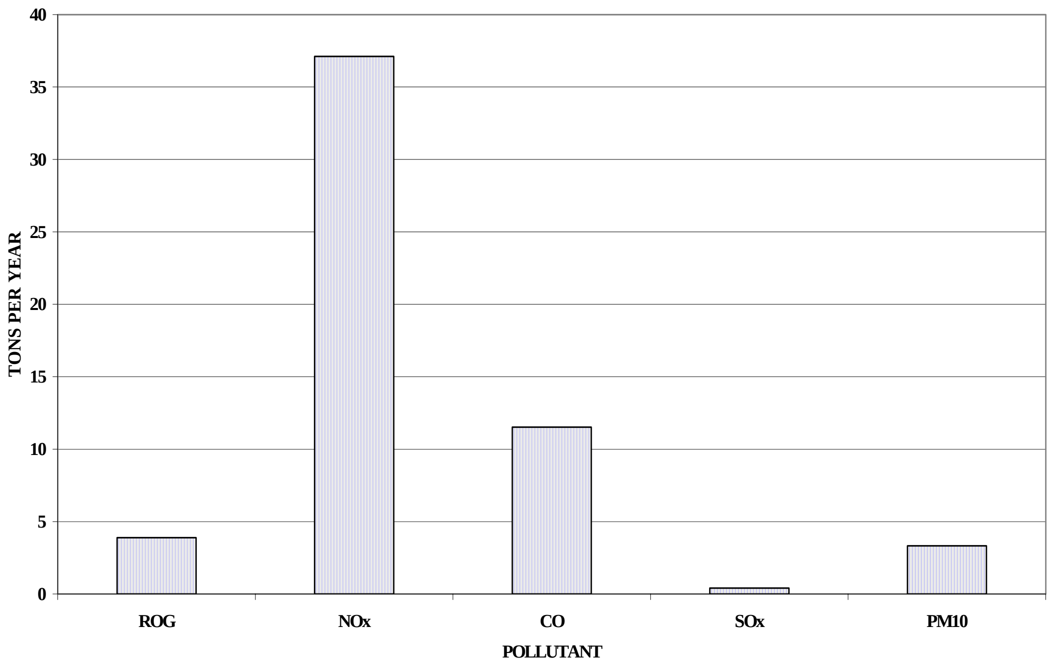



Figure 8-15. Net Change in Military Vehicle Emissions for the Proposed Action: Pōhakuloa Training Area

Emissions from Increased Aircraft Operations. The Proposed Action would not result in any substantial change to existing Army helicopter flight operations in Hawaiʻi. Airfield improvements at BAAF would accommodate increased use of fixed wing cargo aircraft (C-17 aircraft) for transporting troops and equipment to PTA. The Shadow 200 UAV would be used during many training exercises at PTA under the Proposed Action. However, current patterns of helicopter flight activity would continue to be the dominant flight activity at PTA. Because the net increase in emissions resulting from added cargo aircraft and UAV flight activity would be too small to have much effect on ambient pollutant concentrations, emissions from increased aircraft operations would be a less than significant impact under the Proposed Action.

*Emissions from Wildfires.* Tracers, flares, and pyrotechnics have the potential for starting wildfires on training range areas. The use of such munitions would increase somewhat under the Proposed Acton, with a corresponding increase in the potential for wildfires. For purposes of this EIS, wildfire emissions at PTA have been estimated by assuming 80 acres (32.4 hectares) burn each year, with a fuel density of 19 tons (17 metric tons) per acre. Resulting emissions would be as follows:

- 0.23 ton carbon monoxide (0.21 metric ton);
- 0.01 ton nitrogen oxide (0.01 metric ton); and
- 0.03 ton $PM_{10}$ (0.03 metric ton).

These emission quantities would not produce any significant air quality impacts in off-base areas. Consequently, emissions from wildfires on range areas would be a less than significant impact under the Proposed Action.

#### *No Impact*

*Other Emissions from Personnel Increases.* The Proposed Action would not alter the number of staff personnel based at PTA. Consequently, the Proposed Action would not result in any increase in emissions from personal vehicle use or any increase in emissions from fixed facilities at PTA.

### ***Reduced Land Acquisition***

#### *Significant Impacts*

*Impact 1: Wind erosion from areas disturbed by military vehicle use.* Wind erosion from vehicle maneuver areas would be the same under Reduced Land Acquisition as discussed for the Proposed Action. The Army considers wind erosion from the WPAA to be a significant air quality impact under the RLA Alternative.

*Regulatory and Administrative Mitigation 1.* The mitigation measures for wind erosion from areas disturbed by military vehicle use would be the same as those discussed for the Proposed Action.

#### *Significant Impacts Mitigable to Less Than Significant*

*Impact 2: Fugitive Dust from Military Vehicle Use.* Impacts and mitigation from fugitive dust emissions from military vehicle use would be the same as under the Proposed Action.

*Regulatory and Administrative Mitigation 2.* Mitigation measures for fugitive dust associated with off-road vehicle maneuver exercises use would be the same as those for the Proposed Action.

### *Less than Significant Impacts*

*Emissions From Construction Activities.* The RLA Alternative would include ten construction projects at PTA, with construction activities occurring from 2004 into 2007. Construction projects would include three training range facilities (a BAX, AALFTR, and QTR2), a tactical vehicle wash facility, an ammunition storage facility, a range maintenance facility, an upgrade and realignment of Bradshaw Army Airfield, a military vehicle trail between Kawaihae Harbor and PTA, a communications cable system, and 11 FTI towers. UXO clearance would be required prior to construction of the BAX, AALFTR, and QTR2 ranges. Figure 8-16 summarizes estimated emissions from these construction projects according to current construction schedules. Maximum annual nitrogen oxide emissions from construction equipment would be 213 tons (193 metric tons) in 2005 and 186 tons (169 metric tons) in 2006. Nitrogen oxide emissions are of concern primarily as an ozone precursor. Even though the construction emissions would drastically increase during those years, annual emissions of ozone precursors from construction activities associated with the RLA Alternative would be too small to have a measurable effect on ozone levels. Consequently, construction-related emissions under the RLA Alternative would have a less than significant air quality impact and would not change the attainment status of the area.

*Emissions from Ordnance Use.* Ordnance use by the 25$^{th}$ ID(L) at PTA would increase by 110 percent under Reduced Land Acquisition. Placement of the QTR2 range at PTA would result in higher quantities of small arms ammunition being used at PTA under the RLA Alternative than under the Proposed Action. Approximately 97 percent of the 7.1 million ordnance items used per year would be small arms ammunition. Emissions associated with ordnance use at PTA would pose very little risk of creating adverse air quality impacts. Consequently, air quality impacts from munitions use at PTA under the RLA Alternative are considered less than significant.

*Engine Emissions from Military Vehicle Use.* Military vehicle use at PTA under the RLA Alternative would be the same as discussed for the Proposed Action. As illustrated previously in Figure 8-15, the net increase in military vehicle engine emissions would be 3.9 tons (3.5 metric tons) per year for reactive organic compounds, 37 tons (34 metric tons) per year for nitrogen oxides, 11.5 tons (10.5 metric tons) per year for carbon monoxide, 0.4 ton (0.4 metric ton) per year for sulfur oxides, and 3.3 tons (3 metric tons) per year for $PM_{10}$. Emissions from military vehicle use at PTA would be too small to have a measurable effect on ambient pollutant concentrations. Consequently, emissions from increased military vehicle use at PTA would be a less than significant impact under the RLA Alternative.

*Emissions from Increased Aircraft Operations.* The RLA Alternative would have the same small effect on emissions from aircraft operations at PTA as discussed for the Proposed Action. Consequently, the increase in aircraft emissions at PTA under the RLA Alternative would be a less than significant impact.

*Emissions from Wildfires.* The RLA Alternative would have the same potential for wildfires at PTA as discussed for the Proposed Action. As noted for the Proposed Action, emissions from wildfires would be a less than significant impact under the RLA Alternative.

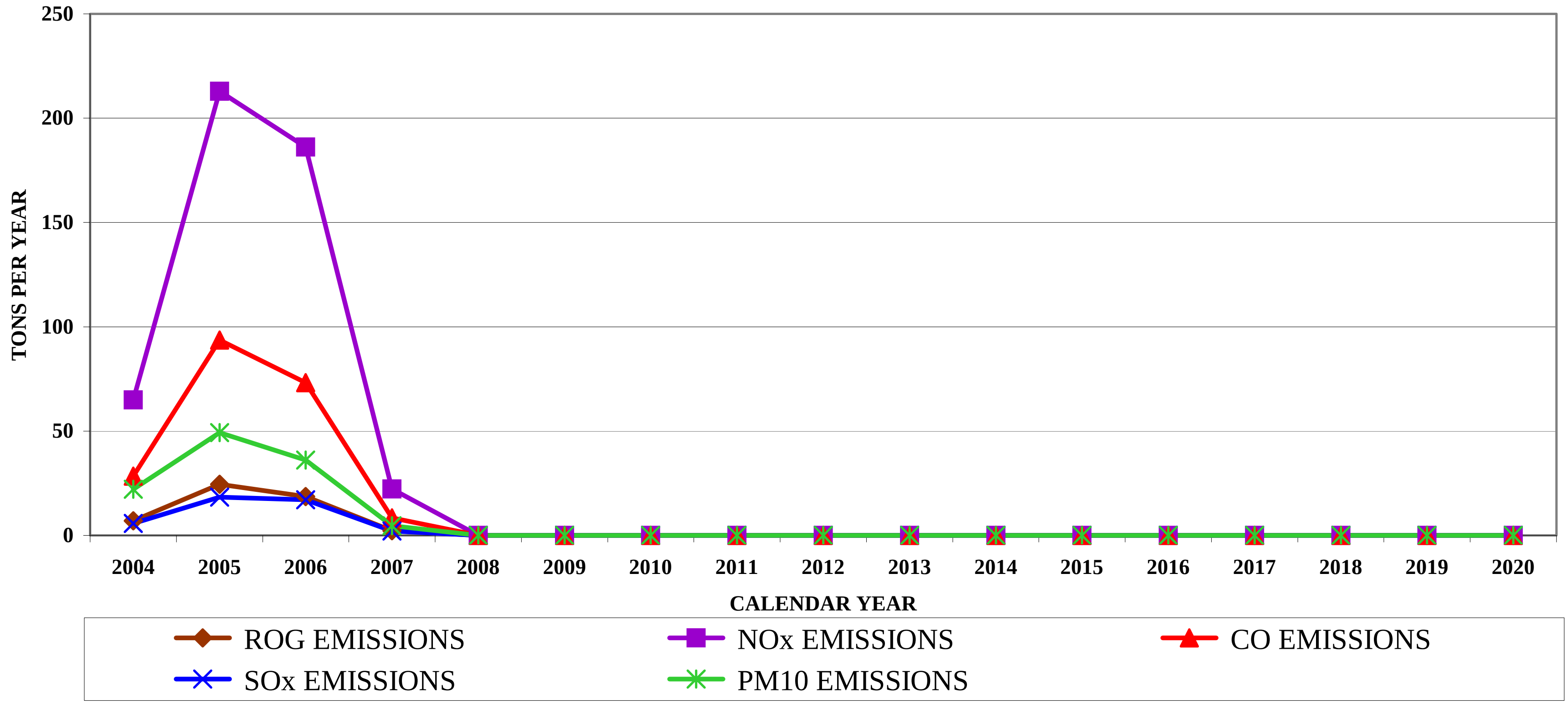



Figure 8-16 Annual Construction Emissions, Pōhakuloa Training Area, Reduced Land Acquisition

### No Impact

<u>Other Emissions from Personnel Increases.</u> The RLA Alternative would not alter the number of staff personnel based at PTA. Consequently, RLA would not result in any increase in emissions from personal vehicle use or any increase in emissions from fixed facilities at PTA.

## No Action

### Less than Significant Impacts

<u>Emissions from Ordnance Use.</u> Overall ordnance use under No Action would be less than under the Proposed Action or RLA. Based on the general nature of detonation processes and the very low emission rates that have been published in studies of munitions firing and open detonations, emissions associated with training ordnance use at PTA pose very little risk of creating adverse air quality impacts. Consequently, air quality impacts from munitions use under No Action are considered less than significant.

<u>Engine Emissions from Military Vehicle Use.</u> Vehicle use associated with PTA would remain at present levels under No Action. Estimated annual emissions from vehicle engine operations would be as follows:

- 3.0 tons (2.8 metric tons) per year of reactive organic compounds;
- 29 tons (26 metric tons) per year of nitrogen oxides;
- 9.0 tons (8.2 metric tons) per year of carbon monoxide;
- 0.32 ton (0.29 metric ton) per year of sulfur oxides; and
- 2.6 tons (2.4 metric tons) per year of $PM_{10}$.

Emissions from military vehicle use at PTA would be too small to have a measurable effect on ambient pollutant concentrations. Consequently, military vehicle engine emissions would have a less than significant impact under No Action.

<u>Fugitive Dust from Military Vehicle Use.</u> Vehicle numbers and estimated annual use levels would remain at current conditions under No Action. Fugitive dust $PM_{10}$ emissions from military vehicle use at PTA would remain at the current level of about 798 tons per year (724 metric tons per year). Because existing conditions at PTA have not led to any known violations of state or federal ambient air quality standards, the fugitive dust from military vehicle use at PTA would have a less than significant impact under No Action.

<u>Wind Erosion from Areas Disturbed by Tactical Vehicle Use.</u> Vehicle maneuver activity at PTA would remain the same as current conditions under No Action. An estimated 845 tons per year (766 metric tons per year) of $PM_{10}$ would be generated by wind erosion from the affected areas. Because existing conditions at PTA have not led to any known violations of state or federal ambient air quality standards, wind erosion from disturbed areas would be a less than significant impact under No Action.

<u>Emissions from Increased Aircraft Operations.</u> There would be no change in aircraft operations and no increase in aircraft emissions at PTA under No Action. Because there would be no

change from current conditions and because current conditions have not created any known violations of state or federal ambient air quality standards, emissions from aircraft operations under No Action would have a less than significant impact on air quality.

*Emissions from Wildfires.* The risk of wildfires at PTA would remain the same as for current conditions under No Action. Because the frequency and size of wildfires at PTA would not be expected to change, emissions from wildfires would be a less than significant impact under No Action.

#### No Impact

*Emissions from Construction Activities.* No construction projects are associated with No Action. Consequently, there would be no air quality impact from construction under No Action.

*Other Emissions from Personnel Increases.* There would be no change in personnel numbers under No Action. Consequently, No Action would not result in any emissions from added personal vehicle use or any increase in emissions from fixed facilities.

## 8.6 NOISE

### 8.6.1 Affected Environment

Limited noise data are available for PTA. The dominant noise sources at PTA include military aircraft (mostly helicopters), military vehicle traffic, and ordnance use during live fire and other training exercises. Figure 8-17 illustrates estimated annual average noise contours from heavy weapons firing at PTA under existing conditions. Zone III noise conditions are contained within the present boundaries of PTA. Zone II noise conditions affect BAAF and the western portion of the cantonment area. Zone II noise conditions extend beyond the boundaries of PTA from BAAF westward to the northwest corner of the post. Except for the cantonment area, no noise-sensitive land uses are affected by existing Zone II noise conditions. No troops are permanently based at PTA. All troop housing is used for troops who are visiting PTA to participate in training exercises.

The Army is developing an environmental noise management plan (ENMP) that will be used for exploring:

- Improvements in land use compatibility adjacent and proximal to USARHAW facilities;
- The feasibility of providing increased acoustical insulation to structures or areas where noise-sensitive receptors may reside, specifically in areas that are or may become exposed to Zone III and Zone II noise conditions, with a priority given to family and troop housing areas affected by Zone III conditions; and
- Ways to improve notification to surrounding communities about the scheduling and nature of nighttime training exercises, which are possible sources of complaints about noise and vehicle activity. While enhanced public information programs will not reduce actual noise levels, they can help reduce the frequency of noise complaints.

### 8.6.2 Environmental Consequences

#### *Summary of Impacts*

Noise sources associated with project alternatives at PTA would include construction activity, ordnance use, military vehicle traffic, and military aircraft operations. Noise from ordnance use would generate significant but mitigable impacts at the cantonment area and at the Mauna Kea State Park cabins under the Proposed Action or the RLA Alternative. In addition, noise from the use of blank ammunition and simulators in the WPAA may produce significant but mitigable noise impacts on the Waiki'i Ranch development and the Kilohana Girl Scout Camp. Noise impacts from construction activities, military vehicle use, and military aircraft operations would be less than significant under all project alternatives.

**Table 8-13**
**Summary of Potential Noise Impacts at Pōhakuloa Training Area**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Noise from construction activities | ⊙ | ⊙ | ○ |
| Noise from ordnance use | ⃠ | ⃠ | ⊙ |
| Noise from military vehicle use | ⊙ | ⊙ | ⊙ |
| Noise from aircraft operations | ⊙ | ⊙ | ⊙ |
| Noise from added personnel vehicle traffic | ○ | ○ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⃠ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
+ = Beneficial impact
N/A = Not applicable

Construction projects at PTA would be far enough from noise-sensitive areas to avoid significant noise impacts under both the Proposed Action and the RLA Alternative. There would be no construction noise impacts under No Action. The use of blank ammunition and SRTA would continue at PTA under all alternatives. The quantity of training ammunition used at PTA would increase somewhat under the Proposed Action or the RLA Alternative. Training activities at PTA would result in an increased number of vehicle convoys between Kawaihae Harbor and PTA under the Proposed Action or the RLA Alternative. Most convoy traffic on the proposed PTA military vehicle trail would occur as groups of 24 or fewer vehicles spaced at least 15 minutes apart. Consequently, vehicle convoy traffic on the proposed PTA Trail would involve no more than 100 vehicles per hour. Somewhat higher traffic volumes might occur on the section of the PTA Trail within the WPAA during maneuver training exercises. Resulting hourly average traffic noise levels along the PTA military vehicle trail would have less than significant impacts under all alternatives. Similarly, noise from vehicle maneuver activity at PTA would be a less than significant impact under all alternatives. Extensive helicopter flight operations would continue at PTA under all alternatives. The distribution of helicopter flight activity within PTA would be altered somewhat by the use of WPAA for maneuver training. Helicopter flight activity over the WPAA would increase under both the Proposed Action and the RLA Alternative. Noise levels associated with flight activity over the WPAA would be a less than significant impact. UAV flight operations also would occur at PTA under the Proposed Action and the RLA Alternative. Noise generated by the added UAV flight activity would be a less than significant impact under the Proposed Action and the RLA Alternative.

**Figure 8-17**
Existing Noise Levels at Pōhakuloa Training Area

### *Proposed Action*

The Army was concerned about the accuracy of significant adverse noise impacts that had been identified in the draft EIS. As such, the noise model input parameters that were used for the draft EIS were more closely evaluated, and it was found that certain incorrect assumptions had been made. Namely, it was found that the following noise model input parameter was incorrect:

- The blast noise modeling efforts were found to reference a slightly outdated and inaccurate equipment package; the input parameters were corrected to include the correct SBCT equipment package.

Correction of these blast noise model input parameters reduced the lateral noise contours slightly, subsequently resulting in a modification of the environmental impact determination to significant, but mitigable to less than significant.

#### *Significant Impacts Mitigable to Less Than Significant*

*Impact 1: Noise From Ordnance Use.* Noise levels from weapons firing and ordnance detonations are quite variable, with noise levels at long distances influenced in part by weather conditions. Small arms firing can produce relatively high peak noise levels at distances of up a few thousand feet when live ammunition is used and might remain audible at distances of up to 2 miles (3 kilometers). Peak unweighted noise levels for standard ammunitions used by 5.56 mm and 7.62 mm firearms are typically about 103 to 110 dB at 1,000 feet (305 meters), 93 to 96 dB at 2,500 feet (762 meters), and 72 to 79 dB at 5,000 feet (1,524 meters). Human hearing does not respond as rapidly to impulse noise as do noise meters; consequently, the 1/8 second Lmax value tends to be a more representative description of what people hear than the instantaneous peak noise level. The A-weighted Lmax noise levels for small arms firing are typically about 86 to 93 dBA at 1,000 feet (305 meters), 72 to 79 dBA at 2,500 feet (762 meters), and 55 to 62 dBA at 5,000 feet (1,524 meters).

Blank ammunition for small arms and machine guns generally has a smaller propellant charge than that used for live ammunition (US Army 1994), so noise from small arms blank ammunition typically generates noise levels about 4 to 5 dB below noise from live ammunition. The A-weighted Lmax noise levels for blank ammunition (such as that used in the WPAA) would typically be about 81 to 88 dBA at 1,000 feet (305 meters), 67 to 74 dBA at 2,500 feet (762 meters), and 50 to 57 dBA at 5,000 feet (1,524 meters).Army noise level criteria for Zone II exposure conditions typically correlate with annoyance ratings of 15 to 39 percent of people being highly annoyed (see Chapter 3, Section 3.6.3, Table 3-7). Based on data from Sorensen and Magnusson (1979), 1/8 second Lmax levels of 67 to 80 dBA would correlate with Zone II conditions. Noise sensitive land uses are generally not compatible with Zone II noise exposure conditions. Noise levels from the firing of blank small arms ammunition typically drops below levels that cause significant annoyance at distances of 2,500 to 3,000 feet (762 to 914 meters).

Firing of large caliber weapons can produce high noise levels at further distances, especially when weather conditions favor sound propagation. Detonations of high explosive ordnance can produce high noise levels at distances of several miles.

Future noise contours under the Proposed Action are illustrated in Figure 8-18, accounting for the latest proposed changes in firing points and range configurations. These noise contours (US Army CHPPM 2004) are based on artillery firing and other high explosives use. The Proposed Action noise contours reflect the following changes in munitions use at PTA:

- 5 percent decrease in 105mm high explosive artillery rounds (howitzer plus Stryker MGS);
- 1,428 percent increase in other types of 105mm artillery/weapons rounds (howitzer plus Stryker MGS);
- 90 percent increase in 155mm high explosive artillery rounds;
- 70 percent increase in other types of 155mm artillery rounds;
- 37 percent increase in high explosive mortar rounds;
- 11 percent increase in other types of mortar rounds;
- 1 percent decrease in grenades;
- 120 percent increase in mines;
- 39 percent decrease in rockets; and
- 23 percent increase in demolition charges.

Under the Proposed Action, Zone III conditions (with an Ldn above 70 dBC) would expand slightly but would remain within the boundaries of PTA. Zone II conditions (with an Ldn of 62 to 70 dBC) would expand slightly within the ordnance impact area at PTA but would contract slightly in the area north of Saddle Road. There would be a slight expansion of Zone II conditions in the cantonment area, but this change would not include most of the on-post housing units. The Zone II noise contour would not expand toward the Kilohana Girl Scout Camp or Waiki‘i Ranch and would actually contract slightly in the eastern portion of WPAA. The Zone II noise at Mauna Kea State Park would expand slightly to include a small amount of land on the west side of Saddle Road, but there would be very little change in the location of the Zone II noise contour near the picnic area and rental cabins east of Saddle Road. Changes in the SBCT equipment package, firing point locations, and range configurations collectively quantify the overall increase in munitions use and at the same time account for the limited changes in noise contours when compared to existing conditions.

Use of blank ammunition and simulator devices in the WPAA area may potentially create noise impacts within the Waiki‘i Ranch development and the Kilohana Girl Scout Camp, both of which share fence line boundaries with the WPAA. AR 200-1 uses an unweighted peak dB value of 87 dB for defining Zone II conditions for land use compatibility evaluations near small arms firing activities. The 87 dB unweighted peak dB value is

**Figure 8-18**
Proposed Action Noise Levels at Pōhakuloa Training Area

equivalent to a 1/8 second Lmax value of approximately 66.5 dBA. Noise from blank ammunition firing would fall below the Zone II threshold at approximately 3,500 feet (1,067 meters) for common types of small arms blank ammunition. Thus, noise from small arms firing with blank ammunition could have significant noise impacts at Waikiʻi Ranch and the Kilohana Girl Scout Camp when training occurs within a few thousand feet of these locations.

Substantial portions of WPAA are more than 1 mile (1.6 kilometers) from the Waikiʻi Ranch development. An even greater portion of the WPAA is more than 1 mile (1.6 kilometers) from the Kilohana Girl Scout Camp. Training exercises are expected to occur 40 to 60 times a year in the WPAA, and some training events might last several days. However, blank ammunition and weapons simulators would not be used during all training events in the WPAA. Given the large size of the WPAA, it is reasonable to expect that management actions could be taken to reduce the frequency of noise disturbance at Waikiʻi Ranch and Kilohana Girl Scout Camp to acceptable levels. Because appropriate management actions could be implemented to reduce small arms noise impacts at Waikiʻi Ranch and Kilohana Girl Scout Camp, noise from ordnance use at PTA would be a significant but mitigable impact under the Proposed Action.

*Regulatory and Administrative Mitigation 1.* None proposed.

*Additional Mitigation 1.*

The Army proposes to establish a minimum 1,000- foot (305-meter) noise buffer around the Waikiʻi Ranch property and the Kilohana Girl Scout Camp. In addition, the Army will consider training guidelines that minimize nighttime training activities that involve weapons fire or aviation activity within a minimum of 2,000 feet (610 meters) of those properties. The Army will continue to work with affected communities on noise buffers and may adjust the buffer size dependent upon these discussions.

### *Less than Significant Impacts*

*Noise from Construction Activities.* The Proposed Action would include nine construction projects at PTA, with construction activities occurring from 2004 into 2007. Construction projects would include two training range facilities (a BAX and AALFTR), a tactical vehicle wash facility, an ammunition storage facility, a range maintenance facility, an upgrade and realignment of BAAF, a military vehicle trail between Kawaihae Harbor and PTA, a communications cable system, and 11 FTI towers. UXO clearance would be required prior to construction of the BAX and AALFTR ranges.

Individual items of construction equipment typically generate noise levels of 80 to 90 dBA at a distance of 50 feet (15 meters). With multiple items of equipment operating concurrently, noise levels can be relatively high during daytime periods at locations within several hundred feet of active construction sites. The zone of relatively high construction noise levels typically extends to distances of 400 to 800 feet (122 to 244 meters) from the site of major equipment operations. Locations more than 1,000 feet (305 meters) from construction sites seldom experience significant levels of construction noise. Table 8-14 summarizes the estimated minimum distance between the sites for proposed construction projects and the nearest noise-sensitive land uses.

**Table 8-14**
**Estimated Minimum Distance Between Construction Sites and Noise-Sensitive Land Uses**

| Proposed Project | Distance to Closest Noise-Sensitive Receptor | Noise-Sensitive Land Use Type |
|---|---|---|
| P1. Battle Area Complex | 7,230 feet<br>10,750 feet<br>40,060 feet<br>44,500 feet | troop housing<br>Mauna Kea State Park cabins<br>Kilohana Girl Scout Camp<br>Waikiʻi Ranch |
| P2. Anti-Armor Live Fire & Tracking Range | 21,510 feet<br>23,540 feet<br>52,460 feet<br>56,900 feet | troop housing<br>Mauna Kea State Park cabins<br>Kilohana Girl Scout Camp<br>Waikiʻi Ranch |
| P5. Ammunition Storage | 4,960 feet<br>5,990 feet | troop housing<br>Mauna Kea State Park cabins |
| P6. Tactical Vehicle Wash | 2,690 feet<br>7,030 feet | troop housing<br>Mauna Kea State Park cabins |
| P8. Range Maintenance Facility | 390 feet<br>5,790 feet | troop housing<br>Mauna Kea State Park cabins |
| P9. Bradshaw Airfield Upgrade | 2,890 feet<br>8,270 feet<br>36,250 feet<br>40,690 feet | troop housing<br>Mauna Kea State Park cabins<br>Kilohana Girl Scout Camp<br>Waikiʻi Ranch |
| P10. Fixed Tactical Internet | not evaluated | construction activities too limited to create noise issues |
| P3. PTA Vehicle Trail | 9,540 feet<br>6,670 feet | Kilohana Girl Scout Camp<br>Waikiʻi Ranch |
| P11. Installation Information Infrastructure Architecture | not evaluated | minor construction noise from trenching along roadway shoulders in cantonment area |
| S10. Qualification Training Range 2 (QTR2) | 24,350 feet<br>22,730 feet<br>57,230 feet<br>61,680 feet | troop housing<br>Mauna Kea State Park cabins<br>Kilohana Girl Scout Camp<br>Waikiʻi Ranch |

Note: QTR2 would be built at PTA only under Reduced Land Acquisition.
Source: Tetra Tech staff analyses

Most construction activity would be too far from noise-sensitive land uses to create any noise problems. Troop housing in the cantonment area would be the only noise-sensitive land use within 1 mile (1.6 kilometers) of any construction project sites. The range maintenance facility would be constructed at a site within the cantonment area that is close to some of the troop housing facilities. Although further removed from the cantonment area troop housing, construction activities at BAAF would involve substantial pavement removal and repaving activities.

Figure 8-19 illustrates expected construction noise levels for the noisiest stage of construction activity for the proposed range management facility. Construction activities for the range maintenance facility would generate average daytime noise levels of about 71 dBA at the closest troop housing Quonsets huts. The Ldn increment generated by construction activities would be about 68 dBA at these housing units. No nighttime construction activity is expected. Because there would be no nighttime construction activity and occupants of the troop housing facilities are not at PTA for extended periods of time, noise from construction of the range maintenance facility would be a less than significant impact.

Figure 8-20 illustrates expected construction noise levels during the noisiest stage of construction at BAAF. The closest noise-sensitive land uses are more than 2,500 feet (762 meters) from the end of the proposed new runway at BAAF. As indicated in Figure 8-19, average daytime noise increments at the western side of the cantonment area would be less than 55 dBA during the noisiest stage of construction. Consequently, construction activities associated with modifications to BAAF would have a less than significant noise impact.

The proposed tactical vehicle wash facility at PTA would be slightly closer to the cantonment area than BAAF. As illustrated previously by Figure 5-19 in Chapter 5, construction activities for vehicle wash facilities would produce noise levels slightly lower than those generated at the cantonment area by the BAAF modifications. All other construction projects are either further away from noise-sensitive land uses or would require minimal construction equipment. Consequently, noise from construction projects at PTA would be a less than significant impact under the Proposed Action.

*Noise from Military Vehicle Use.* Military vehicle use at PTA would involve troop and equipment transport activities and vehicle maneuver activities. Troop and equipment transport activities would occur within PTA boundaries, between PTA and Kawaihae Harbor, and between PTA and other locations on the island of Hawai'i. Most military vehicle travel between Kawaihae Harbor and PTA would occur on the proposed PTA Trail, resulting in less military vehicle traffic on Saddle Road. Saddle Road would continue to provide access to other off-post areas.

Figure 8-21 illustrates typical hourly average noise levels along PTA Trail during hours when there is a relatively large volume of military vehicle traffic. Military vehicle convoys between Kawaihae Harbor and PTA would involve groups of up to 24 vehicles spaced at least 15 minutes apart to minimize traffic problems where the PTA Trail crosses public roadways. Consequently, convoy traffic generally would involve no more than 100 vehicles per hour. Total daily traffic volumes on the PTA Trail normally would be less than 500 vehicles per day. As indicated in Figure 8-17, normal military convoy traffic on the PTA Trail would produce hourly average noise levels of about 65 dBA at a distance of 100 feet (30 meters) from the trail, about 55 dBA at 500 feet (152 meters) from the trail, and about 50 dBA at 1,000 feet (305 meters). If five hours of convoy traffic were to occur during daytime hours, the resulting Ldn level (a 24-hour weighted average noise level) would be about 58.5 dBA at a distance of 100 feet (305 metersfrom the trail. Even in areas such as Kawaihae where residential development is close to PTA Trail, normal convoy traffic would not produce a significant noise impact.

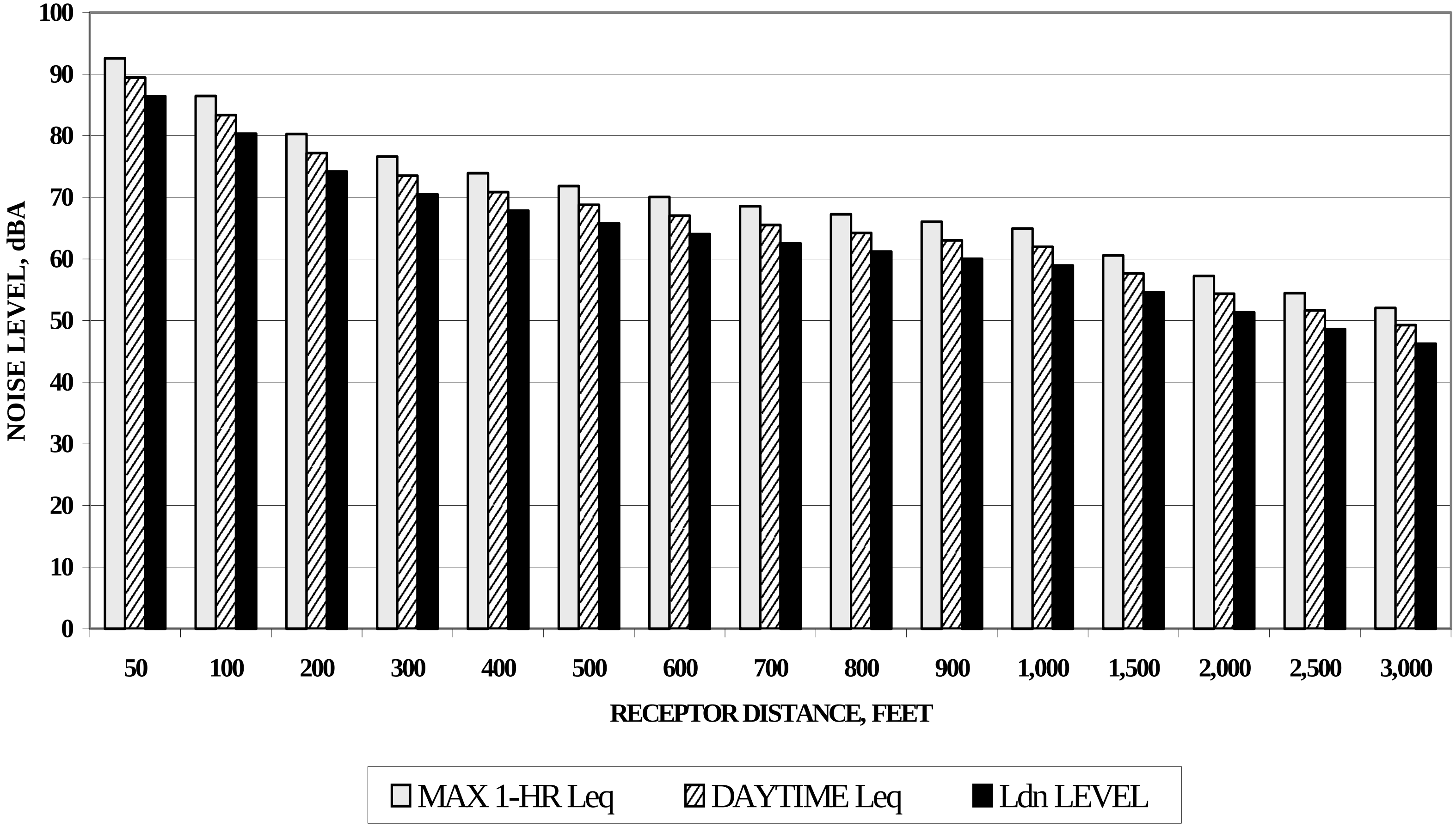



Figure 8-19 Construction Noise Impacts for PTA Range Maintenance Facility: Building Shells and Paving

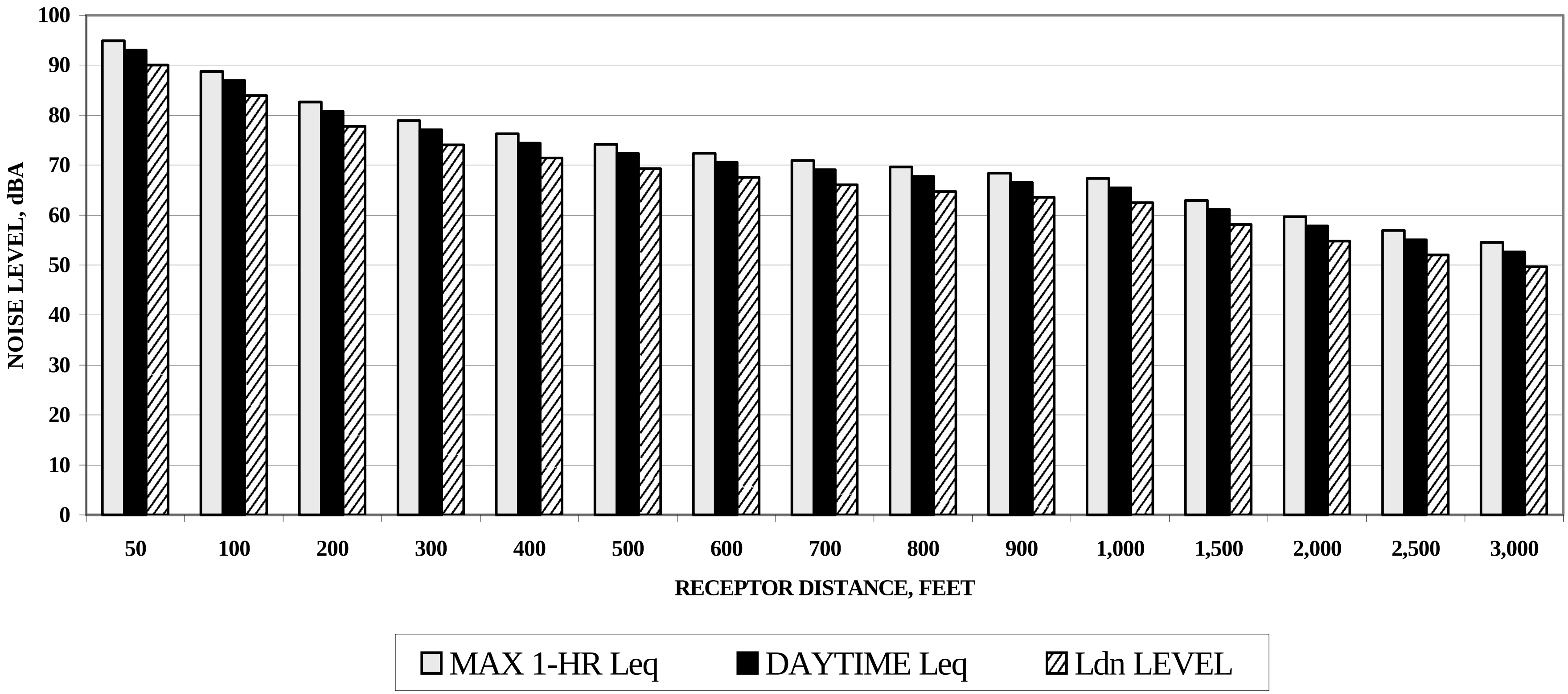



Figure 8-20 Construction Noise impacts for PTA Bradshaw Airfield Upgrade: Pavement Removal

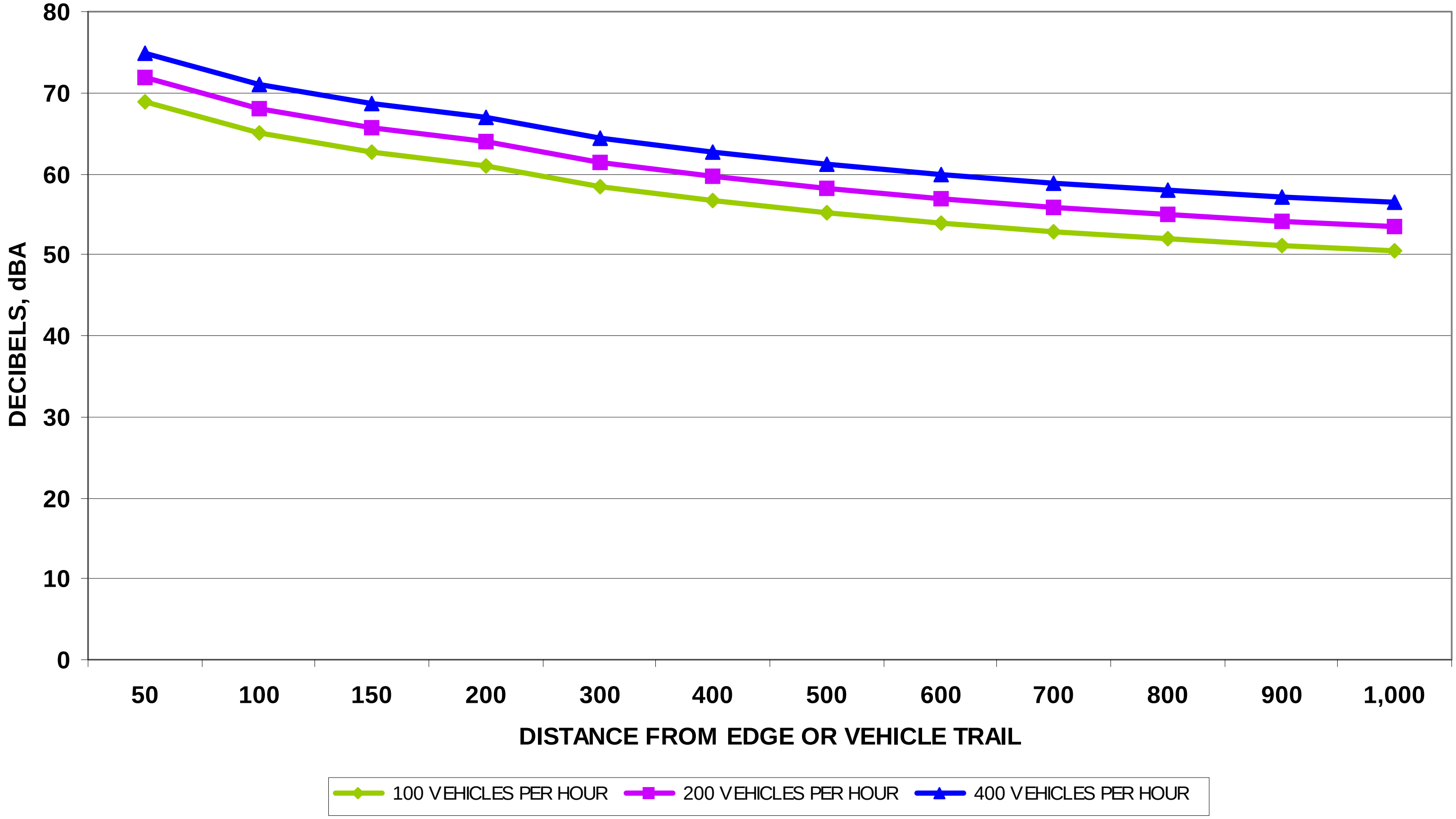



Figure 8-21 Hourly Average Noise Levels along Pōhakuloa Military Vehicle Trail

The closest segment of PTA Trail is about 1.25 miles (2 kilometers) from Waiki'i Ranch and about 1.8 miles (3 kilometers) from the Kilohana Girl Scout Camp. Noise from normal convoy traffic on PTA trail would be about 37 dBA at a distance of 1 mile (1.6 kilometers) and about 31 dBA at a distance of 2 miles (3.1 kilometers). Typical daytime background noise levels would be 35 to 45 dBA when winds are light, and perhaps up to 50 dBA during periods of strong winds. Normal military convoy traffic on PTA Trail would not produce any significant noise impacts at Waiki'i Ranch or the Kilohana Girl Scout Camp.

Training activities at WPAA normally would use PTA Trail as a major access corridor from the cantonment area. Vehicle traffic between the cantonment area at PTA and WPAA might not be limited to 100 vehicles per hour. But as a practical matter, it is unlikely that traffic volumes would exceed 400 vehicles per hour on the PTA Trail segment in WPAA. As indicated in Figure 8-21, if 400 vehicles traveled along PTA Trail in a single hour, the resulting hourly average noise level would be about 71 dBA at a distance of 100 feet (30 meters) from the vehicle trail, about 65 dBA at 300 feet (91 meters) from the vehicle trail, about 61 dBA at 500 feet (152 meters) from the trail, and about 56 dBA at 1,000 feet (305 meters) from the trail. This noise level would drop to about 43 dBA at a distance of 1 mile (1.6 kilometers) and to less than 37 dBA at a distance of 2 miles (3.1 kilometers). As indicated in Table 8-14, PTA Trail is about 1.25 miles (2 kilometers) from the Waiki'i Ranch development and about 1.8 miles (3 kilometers) from the Kilohana Girl Scout Camp. Even at a traffic level of 400 vehicles per hour, traffic on PTA Trail would not generate noise levels above typical daytime background conditions at Waiki'i Ranch or the Kilohana Girl Scout Camp. Consequently, vehicle traffic on PTA Trail would have a less than significant noise impact.

Vehicle maneuver activity at PTA would include use of unpaved roads and use of off-road maneuver areas. Unpaved roads used by military vehicles occur throughout the installation. Most off-road vehicle maneuver activity under the Proposed Action would occur in or close to the WPAA. Vehicle noise during these activities would include peak pass-by noise levels and average hourly noise levels as illustrated in Figure 8-17. Estimated peak pass-by noise levels and average traffic noise levels for military vehicles were discussed in Section 5.6.2 and were illustrated in Figure 5-23. Noise levels from individual vehicle pass-bys vary with vehicle type and speed. Vehicle speeds would be relatively low on unpaved roads and during off-road vehicle maneuvers. Noise levels generated by HMMWVs and two-axle military trucks would be comparable to noise from medium trucks (about 65 to 70 dBA at 50 feet [15 meters]). Multi-axle heavy trucks would generate noise levels comparable to other heavy duty trucks (about 78 to 80 dBA at 50 feet [15 meters]). The Stryker vehicle is expected to produce peak pass-by noise levels a few decibels higher than the noise generated by multi-axle heavy trucks (about 85 dBA at 50 feet [15 meters]). Peak pass-by noise levels would drop by 15 dBA at a distance of 500 feet (152 meters) from the travel path.

Vehicle maneuvers would occur during both daytime and nighttime hours, making vehicle maneuver activity noise an issue of concern for the Waiki'i Ranch development and the Kilohana Girl Scout Camp. Because vehicle speeds are low during most maneuver activities and because vehicles tend to be relatively dispersed during off-road maneuvers, maneuver activities would be expected to produce hourly average noise levels of less than 55 dBA at a distance of about 500 feet (152 meters), with brief peaks of 65 to 70 dBA. Such noise levels would not cause significant noise impacts at off-post noise-sensitive land uses during daytime hours. These noise levels would be more disturbing during nighttime hours. As long as nighttime vehicle maneuver activity is minimized within 1,000 feet (305 meters) of the Waiki'i Ranch and the Kilohana Girl Scout Camp, vehicle noise from training and maneuver activities would be a less than significant impact under the Proposed Action.

The Army will establish a minimum 1,000-foot (305-meter) noise buffer around the Waiki'i Ranch property and the Kilohana Girl Scout Camp. In addition, the Army will consider training guidelines that minimize nighttime training activities that involve weapons fire or aviation activity within a minimum of 2,000 feet (610 meters) of those properties. The Army will continue to work with affected communities on noise buffers and may adjust the buffer size dependent upon these discussions.

*Noise from Aircraft Operations.* The Proposed Action would result in three types of changes to current aircraft and helicopter flight operations at PTA: accommodation of a limited number of C-17 cargo aircraft flights to and from BAAF, addition of UAV flight operations over the main portion of PTA and WPAA, and changes in the geographic distribution of helicopter flight activity at PTA. As discussed further below, cargo aircraft flight operations and UAV flight operations are not expected to have significant noise consequences. While overall USARHAW helicopter flight activity would not change under the Proposed Action, there would be changes in the geographic distribution of flight operations due to changes in the locations and types of training conducted. A portion of helicopter flight operations at PTA would be shifted into WPAA to support maneuver training exercises. As noted in Section 8.4.1, BAAF had an average of 33 flight operations per day in 2001 (somewhat more than 900 flight operations per month), with 99 percent of the flight operations being made by helicopters.

The distribution of helicopter flight activity at PTA would change under the Proposed Action, with a portion of the existing helicopter flight activity shifting to the airspace over WPAA. Current estimates are that helicopter flight operations over WPAA would be up to 426 flight operations per month during major training events (totaling about 1,000 flight hours). Less than half of the flight activity would occur at night (US Army CHPPM 2004). The noise implications of this change in flight activity locations has been evaluated in a preliminary manner. Figure 8-22 illustrates average Ldn noise contours for helicopter activity over WPAA. The Ldn day-night average noise level is a 24-hour time-weighted measure that adds a 10 dBA penalty factor to noise generated during nighttime hours (10 PM to 7 AM). The noise modeling analysis assumed that fight operations would be concentrated over two centralized activity areas, with much less flight activity occurring over the outer portions of WPAA. In addition, the noise modeling assumed that helicopter flight activity would remain at least 1,000 feet from the property line of Waiki'i Ranch. The helicopter noise modeling analysis indicates that noise levels from helicopter activity over WPAA would result in Zone I noise exposure conditions at surrounding off-post locations, such as Waiki'i Ranch and the Kilohana Girl Scout Camp.

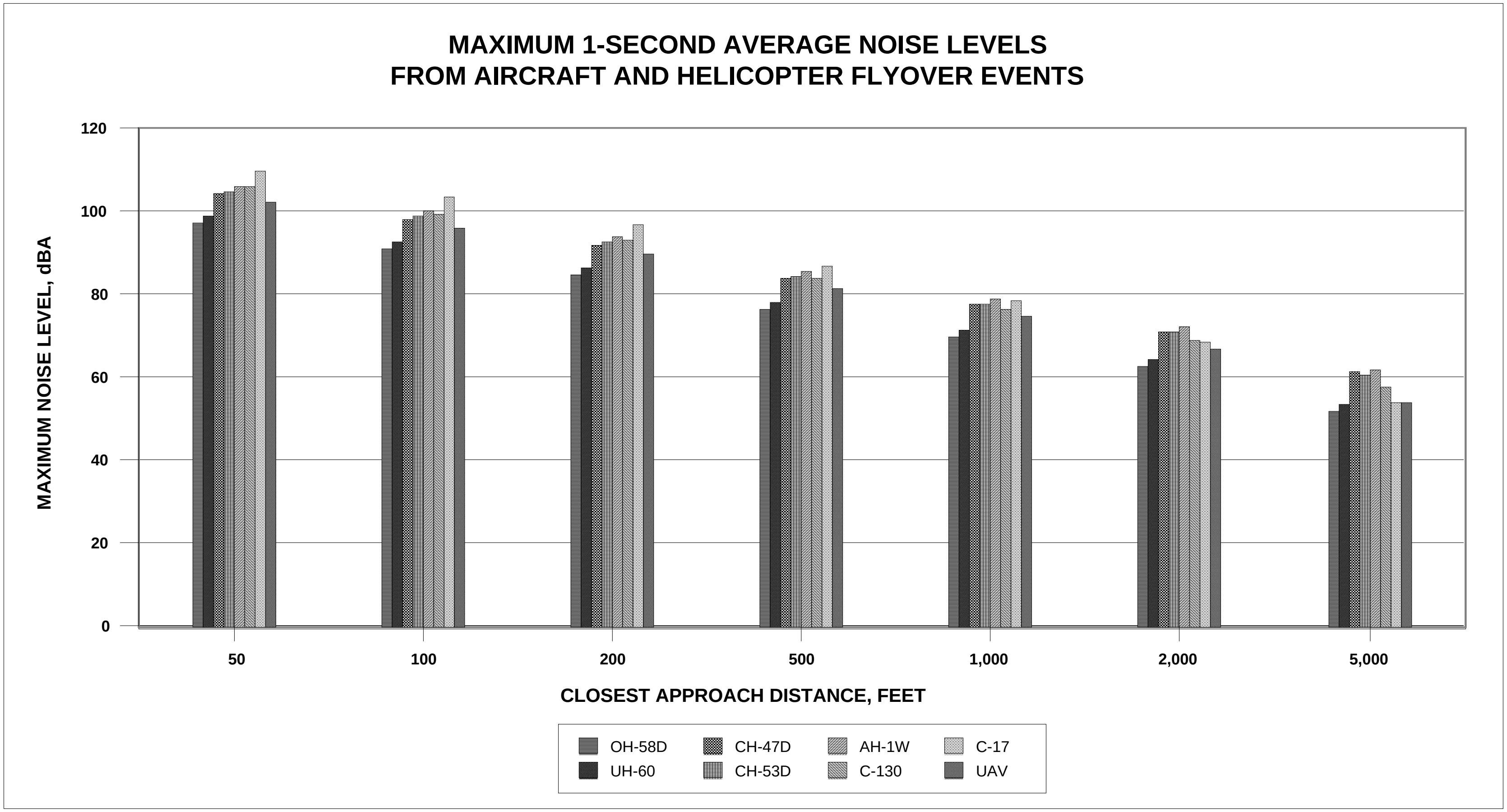
**Figure 8-22**
Proposed Helicopter Noise at the West Pōhakuloa Acquisition Area

While Figure 8-22 addresses overall average noise increments from helicopter flight activity over WPAA, Figure 8-23 summarizes maximum flyover or flyby noise levels from individual helicopters and aircraft. Smaller helicopters such as the OH-58 and UH-60, produce maximum noise levels of 75 dBA at distances of 500 to 700 feet (152 to 213 meters) from the flight path. Large helicopters, such as the CH-47, produce peak noise levels of 75 dBA at distances of about 1,300 feet (396 meters) from the flight path. Data summarized in US Army CHPPM (2001) indicate that annoyance with individual aircraft and helicopter flyover and flyby events can be correlated with maximum noise levels during the event. The percent of people highly annoyed by aircraft flyover events increases as maximum noise levels of the event increase above 65 dBA. Only about six percent of people are highly annoyed when maximum flyover or flyby noise is about 70 dBA. About 15 percent of people are highly annoyed by individual aircraft or helicopter flyover events when the peak noise level reaches 75 dBA. About 20 percent of people are highly annoyed when maximum flyover noise is 80 dBA. Most helicopter flight activity over WPAA would be well over 1,000 feet (305 meters) from the boundaries of Waiki'i Ranch and the Kilohana Girl Scout Camp.

The relatively gentle terrain of the WPAA suggests that most helicopter flight activity over WPAA would be visible from Waiki'i Ranch, and thus at least potentially audible. Helicopter flight activity may be less visible and less audible from the Kilohana Girl Scout Camp. Given the relatively low normal background noise conditions at WPAA, helicopter flight activity generally would be audible at distances of up to 2.5 miles (4 kilometers). Flight activity at greater distances may not be readily audible. Even though actual noise levels at off-post locations may not be very loud, the tonal characteristics of helicopter noise will make helicopter noise increments readily distinguishable from normal background noise conditions. Thus, the overall increase in helicopter flight activity over WPAA would be noticeable to residents of Waiki'i Ranch and probably would lead to an increase in the frequency of noise complaints. Overall noise levels at Waiki'i Ranch would remain within the Army's guidelines for noise levels compatible with residential land uses. Consequently, although the change in noise conditions would be readily noticeable, this impact is considered less than significant.

The Army will establish a minimum 1,000-foot (305-meter) noise buffer around the Waiki'i Ranch property and the Kilohana Girl Scout Camp. In addition, the Army will consider training guidelines that minimize nighttime training activities that involve weapons fire or aviation activity within a minimum of 2,000 feet (610 meters) of those properties. The Army will continue to work with affected communities on noise buffers and may adjust the buffer size dependent upon these discussions.

Modifications to BAAF would accommodate fixed wing cargo aircraft operations, allowing the use of C-17 aircraft for troop and cargo transport between O'ahu and PTA. A typical troop deployment from SBMR to PTA would involve two C-130 or C-17 aircraft. UAV flight operations also would be introduced at PTA under the Proposed Action. As noted in Section 2.3.4, the Proposed Action would include acquiring four UAVs, which are expected to make a combined total of 600 sorties per year, mostly in restricted airspace areas over




Approximately 15 percent of people are highly annoyed when the maximum flyover noise level is 76.5 dBA and approximately 27.5 percent are highly annoyed by a maximum flyover noise level of 85 dBA. Aircraft and helicopters are typically audible at distances of 1.5 to 2 miles.

Figure 8-23 Maximum Flyover Noise Levels from Aircraft and Helicopters Used in Army and Marine Corps Exercises

O'ahu and PTA. It is not yet clear what fraction of those sorties would occur at PTA versus the restricted airspace over O'ahu. Most UAV sorties at PTA would occur in the R-3103 restricted airspace area over PTA, but some would also occur outside the R-3103 airspace. UAV flight operations outside the R-3103 area would be conducted in accordance with FAA requirements and procedures.

Figure 8-23 illustrates peak flyover event noise levels for various helicopters, fixed-wing aircraft, and the UAV. Maximum flyover event noise levels vary with aircraft type and flight altitude. Fixed-wing cargo aircraft produce maximum noise levels of about 85 dBA at distances of about 500 to 600 feet (152 to 183 meters) from the flight path. The Shadow 200 UAV would produce peak noise levels of 85 dBA at distances of about 300 feet (91 meters) from the flight path. Maximum flyover noise levels for fixed-wing cargo aircraft would be about 75 dBA at distances of about 1,250 feet (381 meters) from the flight path. Maximum flyover noise levels from the Shadow 200 UAV would be about 75 dBA at distances of about 1,000 feet (305 meters) from the flight path.

Helicopters normally operate at low flight altitudes, often within 300 feet (91 meters) of ground level. C-130 and C-17 cargo aircraft would be at low flight altitudes during the final landing approach to and the early stages of departures from BAAF. In most cases, the UAV would be expected to operate at relatively high altitudes to avoid conflict with other helicopter and aircraft flight activity. UAV takeoffs and landings normally would occur within the R-3103 area at PTA, rather than at BAAF. Overall aircraft activity at PTA would continue to be dominated by helicopter operations. The number of added cargo aircraft and UAV flight operations would be relatively small in comparison to continuing helicopter flight operations. In addition, the noise buffers proposed as mitigation under Impact 1 would apply to helicopter training activities. The Army will continue to work with affected communities on noise buffers and may adjust the buffer size dependent upon these discussions. Consequently, noise from aircraft operations at PTA and BAAF would be a less than significant impact under the Proposed Action.

### *No Impact*

*Noise from Added Personal Vehicle Traffic.* None of the personnel added under the Proposed Action would be based at PTA. Consequently, there would be no noise from added personal vehicle traffic at PTA under the Proposed Action.

## ***Reduced Land Acquisition***

### *Significant Impacts Mitigable to Less Than Significant*

*Impact 1: Noise From Ordnance Use.* Noise levels from weapons firing and ordnance detonations under the RLA Alternative would be essentially the same as under the Proposed Action. Small arms firing at QTR2 would not alter overall noise contours, which are dominated by heavy weapons firing. Future noise contours from heavy weapons use would be the same as illustrated in Figure 8-18. As under the Proposed Action, Zone II conditions (with an Ldn of 62 to 70 dBC) would expand slightly within the ordnance impact area at PTA but would contract slightly in the area north of Saddle Road. There would be a slight expansion of Zone II conditions in the cantonment area, but this change would not include most of the on-post housing units. The Zone II noise contour would not expand toward the Kilohana Girl Scout Camp or Waiki'i Ranch and would actually contract slightly in the eastern portion of WPAA. The Zone II noise at Mauna Kea State Park would expand slightly to include a small amount of land on the west side of Saddle Road, but there would be very little change in the location of the Zone II noise contour near the picnic area and rental cabins that are east of Saddle Road. Changes in firing point locations, range configurations, and the distribution of daytime versus nighttime firing compensate for the overall increase in munitions use for the limited changes in noise contours compared to existing conditions.

As discussed for the Proposed Action, use of blank ammunition and simulator devices in the WPAA have the potential to create noise problems in the Waiki'i Ranch development and the Kilohana Girl Scout Camp. Given the large size of the WPAA, it is reasonable to expect that management actions could be taken to reduce the frequency of noise disturbance at Waiki'i Ranch and Kilohana Girl Scout Camp to acceptable levels.

Because appropriate management actions would be able to reduce heavy weapons noise impacts at Mauna Kea State Park and small arms noise impacts at Waiki'i Ranch and Kilohana Girl Scout Camp, noise from ordnance use at PTA would be a significant but mitigable impact under the RLA Alternative.

*Additional Mitigation 1.* The Army will establish a minimum 1,000-foot (305-meter) noise buffer around the Waiki'i Ranch property and the Kilohana Girl Scout Camp. In addition, the Army will consider training guidelines that minimize nighttime training activities that involve weapons fire or aviation activity within a minimum of 2,000 feet (610 meters) of those properties. The Army will continue to work with affected communities on noise buffers and may adjust the buffer size dependent upon these discussions.

### *Less than Significant Impacts*

*Noise from Construction Activities.* Reduced Land Acquisition would require the same new facilities as the Proposed Action. In addition, QTR2 would be constructed at PTA instead of at SBMR. As noted in the discussion for the Proposed Action, noise-sensitive land uses would be far enough from construction sites to avoid significant noise impacts. Consequently, construction activities would have a less than significant noise impact under the RLA Alternative.

*Noise from Military Vehicle Use.* Military vehicle use associated with PTA would be the same under the RLA Alternative as previously discussed under the Proposed Action. As would be the case for the Proposed Action, military vehicle use at PTA would have a less than significant noise impact under the RLA Alternative.

*Noise from Aircraft Operations.* Aircraft, helicopter, and UAV use associated with PTA would be the same under the RLA Alternative as previously discussed under the Proposed Action. Although residents of areas near PTA would continue to file occasionally complaints about low flying aircraft and helicopters, the complaints generally would be about discrete flyover events rather than overall average noise levels. As noted in the discussion of the Proposed

Action, aircraft operations at PTA would have a less than significant noise impact under the RLA Alternative.

### No Impact

*Noise from Added Personal Vehicle Traffic.* None of the personnel added under RLA would be based at PTA. Consequently, there would be no noise from added personal vehicle traffic at PTA under the RLA Alternative.

## No Action

### Less than Significant Impacts

*Noise from Ordnance Use.* Existing training exercises would continue at PTA under No Action. The PTA West acquisition would not occur, so there would be no added small arms firing near Waiki'i Ranch or the Kilohana Girl Scout Camp. Noise contours from heavy weapons firing would remain as illustrated in Figure 8-17. While individual detonation events would continue to produce occasional events of high noise levels in the cantonment area and at off-post noise-sensitive areas, overall noise conditions would remain acceptable for current land use patterns. Consequently, noise from ordnance use under No Action would be a less than significant impact.

*Noise from Military Vehicle Use.* Military vehicle use associated with PTA would be less under No Action than under the Proposed Action or the RLA Alternative. No Stryker vehicles would be used under No Action. Noise levels produced by a continuation of existing vehicle use patterns at PTA would have a less than significant noise impact under No Action.

*Noise from Aircraft Operations.* Existing patterns of aircraft and helicopter use of airspace over PTA would continue under No Action. Although residents of areas near PTA would continue to file occasionally complaints about low flying aircraft and helicopters, the complaints generally would be about discrete flyover events rather than overall average noise levels. Noise levels produced by a continuation of existing aircraft operations at PTA would have a less than significant noise impact under No Action.

### No Impact

*Noise from Construction Activities.* No specific construction projects are proposed under No Action. Consequently, there would be no construction noise impacts under No Action.

*Noise from Added Personal Vehicle Traffic.* There would be no personnel based at PTA under No Action. Consequently, there would be no noise impact from added personal vehicle traffic.

## 8.7 TRAFFIC

### 8.7.1 Affected Environment

#### *Region of Influence*

The ROI for traffic and transportation resources is the travel corridor between Kawaihae Harbor and PTA, which generally follows Saddle Road, Māmalahoa Highway, and Queen Ka'ahumanu Highway. During the field reconnaissance, convoys were observed using Waikoloa Road and Queen Ka'ahumanu Highway rather than Kawaihae Road, which would require the convoy to travel through Waimea. However, the proposed road also may affect a section of Kawaihae Road, depending on the alignment selected.

#### *Regional Transportation System*

The major urban areas on the island of Hawai'i are Hilo, which is on the eastern side of the island, and Kailua-Kona, which is on the western side. Air service to these centers is provided by Hilo International Airport and Kona International Airport, respectively.

Generally, state highways around the island link the major population centers. The only roadway across the central part of the island is Saddle Road. With minor exceptions within the urban areas, the major roads are two-lane roadways.

The major roadways on the island are Queen Ka'ahumanu Highway, Māmalahoa Highway, Hawai'i Belt Road, Volcano Highway, Kawaihae Road, and Waikoloa Road (Figure 8-24).

The LRLTP was completed in May 1998 (Fredric R. Harris, Inc. 1998) and identified several locations where the highway system was over capacity. The deficient sections affecting this project are along Kawaihae Road, east of Māmalahoa Road, and Queen Ka'ahumanu Highway between Kona International Airport and Keauhou.

#### *Accident History*

The most recent accident data available are found in the LRLTP and are based on 1992 statistics. The plan identified the intersection of Queen Ka'ahumanu Highway and the Kona Airport Access Road as one of the top 12 accident locations on the island; all the remaining high accident locations are on the east side of the island. The intersection of Queen Ka'ahumanu Highway and the Kona Access Road has since been signalized.

#### *Public Transportation*

Public transportation is provided by the Hele-on bus system. The system does not provide service along Saddle Road and thus does not provide service to PTA.

**Figure 8-24**
Approximate Alignment and Crossing Locations at Pōhakuloa Training Area

### *Local Transportation System*

*Saddle Road*

Saddle Road (SR 200) is a two-lane, two-way roadway that connects PTA with Māmalahoa Highway. The posted speed limit is 45 mph (72 kph); however, a more practical speed limit is 30 to 35 mph (48 to 56 kph) because of the deteriorated pavement conditions, constrained alignment, and several one-lane bridges. Advisory speed limits are as low as 25 mph (40 kph). The ADT is approximately 400 vpd.

*Māmalahoa Highway*

Māmalahoa Highway (SR 190) is a two-lane undivided state highway connecting Kailua-Kona with Waimea. The posted speed limit is 55 mph (89 kph) between Waikoloa Road and approximately one mile (1.6 kilometers) south of Waimea; the remaining section is 35 mph (56 kph). The ADT between Waikoloa Road and south of Waimea is 5,200 vpd; within Waimea, the ADT is approximately 7,000 vpd.

*Waikoloa Road*

Waikoloa Road runs between Queen Ka'ahumanu Highway on the west and Māmalahoa Highway on the east. It is a two-lane undivided roadway, except for a short section midway that is a four-lane divided roadway. This section is posted for a 35 mph (56 kph) speed limit; west of this section, the speed limit is 45 mph (72 kph). The speed limit to the east is 55 mph (89 kph). No traffic volume data were available for Waikoloa Road.

*Queen Ka'ahumanu Highway*

Queen Ka'ahumanu Highway (SR 19) is a two-lane state roadway connecting Kailua-Kona with Kawaihae. The posted speed limit is 55 mph (89 kph). The ADT between Waikoloa Road and Kawaihae Road is 10,400 vpd.

*Kawaihae Road*

Kawaihae Road runs east-west between Waimea and Kawaihae. East of Waimea, the speed limit varies between 35 and 55 mph (56 and 89 kph) with speed limits reduced to 25 mph (40 kph) near schools and at the intersection of Kawaihae Road at SR 250, which is a congested area. The ADT varies from approximately 17,000 vpd in Waimea to 8,000 vpd just east of Queen Ka'ahumanu Highway.

## 8.7.2 Environmental Consequences

### *Summary of Impacts*

A summary of traffic impacts at PTA is shown in Table 8-15. Construction and use of PTA Trail would result in less than significant impacts on intersection operations, roadway segment operations, and construction traffic. There would be no parking impacts. There would be no traffic impacts under No Action.

**Table 8-15**
**Summary of Potential Traffic Impacts at PTA**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Intersection operations | ⊙+ | ⊙+ | ○ |
| Roadway segment operations | ⊙+ | ⊙+ | ○ |
| Construction traffic | ⊙ | ⊙ | ○ |
| Parking | ○ | ○ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | | | |
|---|---|---|---|---|---|
| ⊗ | = | Significant | + | = | Beneficial impact |
| ⊘ | = | Significant but mitigable to less than significant | N/A | = | Not applicable |
| ⊙ | = | Less than significant | | | |
| ○ | = | No impact | | | |

### *Proposed Action (Preferred Alternative)*

Strykers would be used, up to one brigade level, for off-road training. Troops would continue to be transported via aircraft or marine vessel from SBMR to PTA. Troops would be transported from Kawaihae Harbor to PTA by Strykers or trucks up to one brigade level plus support vehicles. There would be up to 10 trucks and 24 Strykers per trip.

A perpetual easement of 132 acres (53.4 hectares) would be acquired for the proposed PTA Trail. The proposed alignment for the new road is shown on Figure D-19. The road is proposed on existing, private plantation roads between PTA and Kawaihae Harbor. After the Proposed Action is implemented, users of those plantation roads would use other roads to access their agricultural lands. The new road is a proposed two-lane gravel road. It would be 24 feet (7 meters) wide and 30 miles (55 kilometers) long, connecting Kawaihae Harbor to PTA. The public would not use this proposed military vehicle trail.

#### *Less than Significant Impacts*

*Intersection operations*. PTA Trail would cross state highways at Kawaihae Road north of Queen Kaʻahumanu Highway, at Kawaihae Road east of Queen Kaʻahumanu Highway, and at Māmalahoa Highway north of Saddle Road. The initial segment of construction will realign the portion of Saddle Road that passes through PTA to a location north of the installation. The proposed alignment for Saddle Road through WPAA is currently not funded. If the Army decides to implement the Proposed Action, it will coordinate with DOT to minimize impacts on traffic crossings on the new Saddle Road from the PTA military vehicle trail.

Using the most recent traffic counts taken in May 2000 from Hawaiʻi Department of Transportation, an LOS analysis was performed for the crossings using the following assumptions:

- The maximum number of vehicles was used for calculations (four convoys of 24 vehicles sequenced at 15-minute intervals;
- The convoys would stop for traffic along the state highways, so there would be a two-way stop sign-controlled intersection; and
- The convoys would be scheduled for non-peak hours; however, this analysis assumes that they would approach the state highways during the peak hour of traffic, and, by assuming peak-hour conditions, a worst-case condition was analyzed.

According to the LOS analysis, the state highway crossings would operate at LOS C under worst-case conditions (Figure 8-25). Table 8-16 summarizes the LOS analysis. Very few delays would be experienced by highway traffic. This is because the convoys would yield to traffic along the state highways, so there would be no impact on the LOS on public highways, and no mitigation would be required.

**Table 8-16**
**Levels-of-Service Analysis for PTA**

| Intersection | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|
| | **Delay[1]** | **LOS[2]** | **Delay** | **LOS** |
| Trail at Kawaihae Road, North of Queen Kaʻahumanu Highway | 15.2 | C | 17.6 | C |
| Trail at Kawaihae Road, East of Queen Kaʻahumanu Highway | 22.8 | C | 24.1 | C |
| Trail at Māmalahoa Highway | 16.1 | C | 16.9 | C |

[1]Delay is in seconds per vehicle.
[2]LOS calculated using the operations method described in the *Highway Capacity Manual* (Transportation Research Board 2002); LOS is based on delay.

The above levels of service result for existing two-lane highway crossings. The LRLTP (HDOT 1998) recommended the following:

- Widen Waikoloa Road and Queen Kaʻahumanu Highway from two to four lanes;
- Realign the western section of Saddle Road to the intersection with Māmalahoa Highway at Waikoloa Road; and
- Construct a new roadway parallel to and east of Queen Kaʻahumanu Highway, between Waikoloa Road and Kawaihae Road.

All of these improvements may affect operations of the military vehicle trail crossing by creating a wider roadway to be crossed and a new crossing. The proposed schedule for these improvements is not available, but the Saddle Road improvement was designated as "critical."

There would also be beneficial impacts on intersection operations. Because military vehicles would use PTA Trail, there would be fewer military vehicles on public roadways that could adversely affect intersection operations.

**Figure 8-25**
Peak Hour Volumes Worst Case Scenario at Pōhakuloa Training Area

While no mitigation is required for project impacts on traffic congestion, the Army will operate a public Internet Web site that lists a schedule of upcoming USARHAW activities, including training and public involvement projects. Subject to force protection measures and other security measures, the site would contain USARHAW training and convoy schedules, community projects the USARHAW is involved in, any USARHAW activity or function that the public could attend, any general USARHAW news that might be of interest to the public, and USARHAW services available to the public.

*Roadway segment operations.* The number of military vehicles using PTA Trail would be minimal. The maximum number of vehicles per convoy would be 24, and convoys would be sequenced at 15- to 30-minute intervals, so the maximum hourly volume would be 96 vehicles per hour. Convoys would be scheduled during non-peak traffic hours, thus reducing potential impacts on peak-hour traffic conditions. Because the increase of military traffic on public roadways would be minimal, the LOS would not change, so there would be no impact and no mitigation would be required.

There would also be beneficial impacts on roadway segment operations. Because military vehicles would use PTA Trail, there would be fewer military vehicles on public roadways that could adversely affect roadway segment operations.

However, before the PTA trail is constructed all SBCT military vehicles would use public roadways to access PTA. Because convoys would still operate with a maximum hourly volume of 96 vehicles, as described above, the short-term elevated use of the roadways would operate at LOS C under worst-case conditions. While there would be noticeable delays, the impacts would be less than significant.

*Construction traffic.* The construction associated with the Proposed Action would generate additional traffic from worker vehicles and trucks, but the construction traffic would be temporary and less than significant.

To minimize traffic impacts on the surrounding community during construction, a construction traffic management program would be implemented. The program would stagger work hours to reduce impacts from construction workers during peak hours, would identify truck routes to limit truck traffic to major streets, and would designate parking for construction workers. Because project traffic does not significantly affect operations at the intersections and street segments in the project vicinity and traffic is generally free flowing, the interim construction worker traffic impacts would not be significant. No mitigation would be required.

#### *No Impact*

*Parking.* No parking impacts would result, and no mitigation would be required.

### ***Reduced Land Acquisition Alternative***

Traffic impacts in the PTA ROI under Reduced Land Acquisition would be the same as under the Proposed Action, however there could be a slightly greater level of military traffic on the island of Hawai'i generated by the construction and use of QTR2 at PTA rather than at SBMR.

### *No Action Alternative*

#### No Impact

*Intersection operations.* The current baseline for traffic would continue under the No Action Alternative. Under the status quo of No Action, use of the facility and operations would remain the same as under existing conditions. Impacts on intersection operations would not occur, and no mitigation would be required.

*Roadway segment operations.* Under No Action, impacts on roadway segment operations would not occur, and no mitigation would be required.

*Construction traffic.* Under No Action, no traffic would be generated from construction activities, and no mitigation would be required.

*Parking.* Under No Action, no parking impacts would occur, and no mitigation would be required.

# 8.8 WATER RESOURCES

## 8.8.1 Affected Environment

### *Climate*

The climate at PTA is classified as cool and tropical (upper montane to alpine). Figure 8-26 shows the average annual rainfall contours over the island of Hawai'i. The 29-year average annual precipitation at BAAF on the northern portion of the installation is 14.7 in (37.3 centimeters), ranging from 10 to 16 in (25 to 41 centimeters) across the installation. Most of PTA is above the thermal inversion layer and is not influenced by the trade wind-orographic rainfall regime. Moisture carried by the summer easterly trade winds is lost as precipitation with an increase in elevation and rarely reaches PTA (USARHAW and 25th ID[L] 2001b).

The highest monthly precipitation generally occurs in winter in conjunction with Kona storms. Occasionally, moist air trapped below the inversion layer will rise into the Saddle Region in the later afternoon. Precipitation from condensation then can occur and may equal that from rainfall. The area is also subject to "vog," a local term used to describe "foggy" or "smoggy" conditions caused by emissions of volcanic dust and gases such as hydrogen sulfide that mix with atmospheric moisture to form a cloud close to the ground that can affect respiration and health (USARHAW and 25th ID[L] 2001b; USGS 2000a).

The annual average temperature is about 60° Fahrenheit (16° Celsius) in lower elevations and about 50° Fahrenheit (10° Celsius) at higher elevations. Diurnal temperature fluctuations are greater than the seasonal variations (USARHAW and 25th ID[L] 2001b).

### *Surface Water*

*Surface Water Drainage*

Figure 8-27 shows the watersheds and principal drainage features at PTA. PTA lies within the Northwest Mauna Loa and the West Mauna Kea watersheds, which drain to the northern Hualālai and southern Kohala coasts, respectively (Mink and Lau 1993). The WPAA and the PTA Trail are mainly within the West Mauna Kea watershed. The two watersheds are underlain by aquifer "sectors" of the same name.

There are no surface streams, lakes, or other bodies of water within PTA boundaries due to low rainfall, porous soils, and lava substrates. There are no perennial streams within 15 miles (24 kilometers) of PTA. However, there are at least seven intermittent streams that drain surface water off the southwestern flank of Mauna Kea and lie within the same drainage area as the PTA. Popo's Gulch is the closest stream to PTA boundaries. The stream converges with 'Auwaiakeakua Gulch to drain surface water toward the Waikoloa community to the west of PTA. There are three intermittent streams located within two miles (3 kilometers) of the cantonment area (Waikahalulu Gulch, Pōhakuloa Gulch, and an unnamed gulch, which collect runoff from the southern flank of Mauna Kea) (USACE 1997).

**Figure 8-26**
Average Annual Precipitation on the Island of Hawai'i

**Figure 8-27**
Watershed Boundaries and Drainage Features Pōhakuloa Training Area

Intermittent stream channels quickly dry after rainfall stops. Rainfall, fog drip, and occasional frost are the main sources of water that sustain plants and animals in the dryland habitat of PTA and WPAA. Lake Waiau, near the summit of Mauna Kea, is the nearest known surface water body. There are three freshwater springs in Pōhakuloa Gulch, on the slope of Mauna Kea at 8,850 feet (2,697 meters) above mean sea level, known as Hōkūpani Spring, Waihū Spring, and Liloe Spring (USARHAW and 25th ID[L] 2001b; 1996). The springs are owned by the State of Hawai'i, but the Army has nonexclusive rights to the springs through a formal lease agreement (see Section 8.14 for more details). The water yield from the springs varies seasonally depending on precipitation on Mauna Kea. Daily yield reportedly ranges from about 6,000 gallons (22,712 liters) to 100,000 gallons (378,541 liters) (USARHAW and 25th ID[L] 1996). Due to past problems with the sand filtration system used to treat the water, the springs are not currently used to supply potable water to PTA, and all of the water used at PTA is trucked in.

### *Flooding*

The cantonment and airfield areas of PTA, north of Saddle Road, are on land that slopes gently to the west. Under some circumstances, the runoff from the south slope of Mauna Kea could exceed the drainage capacity of the area and result in temporary flooding or localized ponding. However, the soils in the area are permeable, and the underlying lava flows contain sufficient secondary permeability (fractures and large openings related to cooling and emplacement of the lava) that infiltration to the subsurface is rapid.

The civil defense tsunami evacuation map in the area of Kawaihae Harbor shows the evacuation area as extending inland beyond the Kawaihae-Mahukona Road (Highway 270) to an elevation of about 50 feet (15 meters) msl (PDC 2001, Map 10). The area west of the highway and north of the road to Spencer Beach Park, including the harbor, lies within the evacuation zone.

### *Surface Water Quality*

According to Hawai'i's 1998 305(b) report, most of the state's water bodies have variable water quality that declines when stormwater runoff carries pollutants into surface waters. The most significant surface water pollution problems in Hawai'i are siltation, turbidity, nutrients, organic enrichment, toxins, pathogens, and pH from nonpoint sources, including agriculture and urban runoff (USEPA 1998). Few data on surface water quality are available for the PTA watersheds. As stated above, there are no perennial streams within PTA. Waikoloa Stream flows across Mauna Kea near the northern boundary of the West Mauna Kea watershed (described below). According to the US EPA 305(b) list, Waikoloa Stream water quality is impaired, although not threatened, due to the presence of nutrients (nitrogen- and phosphorous-containing compounds), pathogens (coliform bacteria), and turbidity (USEPA 2000c).

### *Coast Water Quality*

Marine waters north of Wai'ula'ula Point are considered to be Class A waters, rather than Class AA. As described above, Pelekane Bay is considered to be an impaired waterbody due to turbidity from erosion on overgrazed lands in the watershed above it.

Construction of the Kawaihae Harbor in 1995 resulted in changes in coastal current patterns, increased sediment concentrations, and diverted stream channels that discharge to Kawaihae Bay (Makahuna and Makeāhua streams). Construction involved placing fill on the alluvial fan of the Makahuna Stream and disturbing offshore sediments. The breakwater was constructed in such a way as to make use of the existing coral reef, and the area inside the reef/breakwater was deepened by dredging. Studies performed afterward that focused on Pelekane Bay, just south of the new facility, indicated that these activities had an adverse impact on coral growth and water quality, in part because of changes in sediment inputs (Tissot 1998).

### Groundwater

#### Groundwater Occurrence and Flow

Rainfall is the primary source of groundwater recharge on the island of Hawai‘i. The geology of the island is characterized by highly permeable lavas from which little or no runoff occurs. These lavas are exposed over about five-sixths of the surface of the island. Most of the rain falling onto the island percolates relatively quickly to the underlying groundwater body and then moves seaward, discharging into the coastal waters (Stearns and MacDonald 1946). The island of Hawai‘i has the highest recharge rate among the Hawaiian Islands, with a rate of 188.4 cubic meters per second (Lau 1983). Sustainable yields for each of the island’s aquifers are considerably less and are described below for each aquifer system underlying PTA.

According to the classification scheme proposed by Mink and Lau (1993), PTA lies above two aquifer systems—the Northwest Mauna Loa Sector and the West Mauna Kea aquifer sectors. The northern portion of PTA and PTA Trail lie within the Waimea aquifer system of the West Mauna Kea aquifer sector. The Waimea aquifer system includes the entire West Mauna Kea aquifer sector, which has an area of 270 square miles (699.25 sq kilometers). The southern boundary from Puakō Point to the Humu‘ula Saddle is the trace of the Mauna Loa/Mauna Kea geologic contact. The northern boundary from Kawaihae to Waimea follows the Mauna Kea/Kohala contact. From Waimea the boundary strikes southeasterly along a weak rift zone to the summit of Mauna Kea (Mink and Lau 1993).

The West Mauna Kea aquifer system is dry, but Waikoloa Stream, which rises in the Kohala Mountains, flows across Mauna Kea lavas near the northern boundary. A basal lens reaches to about 4 miles (6 kilometers) inland. Beyond this point the water becomes high-level groundwater, although the mode of occurrence is not understood. Wells at about 1,200 feet (366 meters) elevation develop freshwater. Near Waiki‘i and Waimea the groundwater level stands about 1,500 feet (457 meters) above sea level. Slightly thermal basal water is found along the Kawaihae to Waimea road below an elevation of 1,000 feet (305 meters). At the coast, basal springs discharge brackish water (Mink and Lau 1993). The Waimea aquifer system has an estimated sustainable yield of approximately 24 MGD (HDLNR 1995).

The majority of PTA lies within the Northwest Mauna Loa aquifer sector, which has an estimated sustainable yield of 30 MGD (HDLNR 1995). The ‘Anaeho‘omalu aquifer system comprises the entire Northwest Mauna Loa aquifer sector and has a total area of 291 square miles (754 square kilometers). The sector boundaries reach from the 7-mile (11-kilometer) length of coast to the summit of Mauna Loa and the saddle between Mauna Loa and Mauna Kea. All rocks within the aquifer sector belong to Ka‘ū Basalt. The total length of the sector is 37 miles (60 kilometer) from the coast to the saddle, the first 18 miles (29 kilometer) of which is a narrow corridor between the Hualālai and Mauna Kea volcanoes. The width of the corridor is about 5 miles (8 kilometer). High-level groundwater likely occurs at elevations greater than 1,200 feet (366 meters), although this has not been shown yet (Mink and Lau 1993). The basal lens, extending about 4 to 5 miles (6 to 8 kilometers) inland, is brackish except possibly near the inland periphery. Basal springs and anchialine ponds are common along the coast (Mink and Lau 1993).

Few data are available to evaluate groundwater conditions at PTA. Most of the USGS groundwater sampling and observation wells on the island are located along the coast. Groundwater has not been found at levels lower than 1,000 feet (305 meters) below ground level on the island of Hawai‘i (USARHAW and 25th ID[L] 2001b). The island of Hawai‘i contains high water levels in the rift zones of Kilauēa and Kohala volcanoes. High-level groundwater (perched groundwater) is groundwater that is held at levels above the basal water table by rocks that are relatively impermeable, including intrusive rocks, ash beds, dense lava flows, soil, alluvium, and ice. High water levels, possibly associated with a buried rift zone of Hualālai Volcano or fault scarps draped with lava flows, are present along the western coast of the island of Hawai‘i. Areas of high water levels also are found along the northern and eastern flanks of the Mauna Kea and on the southern flank of Mauna Loa (USGS 2000b). There is evidence of perched groundwater within the aquifer sectors underlying and adjacent to PTA (Stearns and McDonald 1946). The highest perched water in the Hawaiian Islands is Lake Waiau on Mauna Kea, at an altitude of 13,007 feet (3,965 meters). It is thought that the lake is perched on ground ice (Stearns and MacDonald 1946).

Based on regional hydrogeological information, it is believed that the groundwater beneath PTA occurs primarily as deep basal water within the older Pleistocene age basalts (USACE 1997). Exploratory well drilling was conducted in March 1965 by the Department of Land and Natural Resources near the PTA cantonment area. A test hole, (Pōhakuloa test hole T-20) located half a mile west of Mauna Kea State Park at an elevation of 6,375 feet (1,943 meters) msl, was drilled to a depth of 1,001 feet (305 meters) below ground surface (bgs). No groundwater was encountered in this test hole (USACE 1997).

#### *Groundwater Quality*

There are limited data for groundwater quality for PTA due to the absence of a significant number of monitoring wells in the inland area of the island. In general, the quality of the natural fresh water in Hawai‘i's basaltic aquifers is considered to be good (Lau 1983). Groundwater quality is threatened by saltwater encroachment and contamination from agricultural and other land uses. Fertilizers and pesticides applied to crops can move downward through the unsaturated zone to an aquifer and affect the quality of the water in the aquifer. Wastes from septic tank systems, sewers, industry, and storm runoff also can introduce undesirable constituents into the aquifers (USGS 2000b). Since the early 1980s, organic chemical contaminants associated with agricultural, industrial, and urban activities have been detected in water samples taken from wells on the island of Hawai‘i. The herbicides atrazine and ametryn, which are associated with sugercane cultivation, have been detected in wells within or downgradient of past and present sugercane cultivation operations on the island of Hawai‘i (USGS 2000b).

Salt water intrusion, particularly along the coast, also threatens groundwater quality. Groundwater withdrawals induce upward and landward movement of saltwater. Wells pumped in the freshwater lens near the coast are particularly likely to induce brackish water or saltwater to move into the well as pumping continues. Larger islands such as Hawai‘i are less affected by saltwater intrusion than the smaller islands due to larger quantities of rainfall for recharge (USGS 1999b).

Since August 1989, the State Department of Health has issued the “Groundwater Contamination Maps” for Hawai‘i. These maps identify locations where groundwater contaminants have been detected and confirmed. The maps identify the locations of current and historic contaminated wells and wellfields (an area where many wells in proximity share the same groundwater source) on each island. According to these maps, most of the well locations where contamination is detected on the island of Hawai‘i are located along the eastern coast of the island. Groundwater quality on the island generally diminishes towards the coasts due to increased saltwater intrusion. Detected contamination levels reported in the State DOH maps are below existing federal and state drinking water standards established for the protection of public health and do not pose a significant risk to humans (HDOH 1999b). Groundwater quality beneath PTA is likely of higher quality due to its distance inland from the coast.

### 8.8.2 Environmental Consequences

#### *Summary of Impacts*

Under the Proposed Action, there would be less than significant impacts on surface water quality at Kawaihae Harbor, on surface and groundwater quality at PTA, and on surface water quality from construction of PTA Trail. Additionally, there would be less than significant impacts on surface water or groundwater from maneuver training at the WPAA or construction of stream crossings as part of PTA Trail. Without the project, training would continue to disturb soils and result in residues of explosives in soils. However, due to lack of permanent surface water resources, and the great depth to groundwater, water quality impacts, if any, are not expected to be significant.

Under the Proposed Action, RLA Alternative, and No Action Alternative there would be less than significant impacts to water resources. These impacts are described in Table 8-17.

#### *Proposed Action (Preferred Alternative)*

*Less than Significant Impacts*

*Impact on surface water quality at Kawaihae Harbor.* The loading and unloading activities planned under the Proposed Action would be similar to the activities that currently take place as part of the current force training and that would continue under the No Action Alternative. The Army and the operator of the harbor are responsible for preventing spills and for cleaning

**Table 8-17**
**Summary of Potential Water Resources Impacts at PTA**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Impacts on surface water quality | ⊙ | ⊙ | ⊙ |
| Impacts on groundwater quality | ⊙ | ⊙ | ○ |
| Increased flooding | ○ | ○ | ○ |
| Groundwater supply | ○ | ○ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | |
|---|---|---|---|
| ⊗ | = Significant | + | = Beneficial impact |
| ⦸ | = Significant but mitigable to less than significant | N/A | = Not applicable |
| ⊙ | = Less than significant | | |
| ○ | = No impact | | |

them up if they occur, according to standard spill prevention and response procedures. Therefore, these activities are not expected to result in any significant impacts on the water quality in Kawaihae Harbor. Similarly, construction and use of the PTA Trail are not expected to result in significant impacts on surface water in or water adjacent to the harbor because spills and erosion would be addressed by implementing construction BMPs and standard spill prevention and response procedures.

*Impacts on surface water and groundwater quality at PTA.* The Proposed Action may increase the amount of explosives residues in soils. It also may result in dispersion of these residues by wind and water erosion. However, due to lack of any permanent streams or water bodies, impacts on surface water would be of short duration, if they occurred, and are not expected to be significant. Due to the depth of groundwater beneath the PTA and the relatively low concentrations of explosives residues in soils, groundwater beneath the PTA is not expected to be affected.

*Impacts on surface water quality from use of dust control palliatives.* Applying calcium, magnesium chloride, calcium lignosulfonates, or other environmentally friendly materials or measures to control dust could affect surface water quality, either by increasing the biological oxygen demand or by increasing total dissolved solids concentrations. These impacts are expected to be less than significant because the chemicals would be applied according to industry standards (Parametrix, undated) and because the amount of runoff is expected to be low in most of the areas where dust suppression would be needed.

*Impacts on surface water quality from construction of PTA Trail.* During construction of the PTA Trail, soils may be exposed to stormwater runoff, which may enhance erosion. However, using construction BMPs to control runoff would minimize erosion, and the impacts would not be significant on surface water because there are no perennial streams in the project area. Under natural conditions, the intermittent streams carry large amounts of sediment, and a small amount of additional sediment, if it were present because of construction activities, would not be significant.

*Impacts on surface water quality and groundwater quality from maneuver training on the WPAA.* Maneuver training activities in the WPAA may introduce explosives residues in these soils. However, as described above for the rest of PTA, no significant impacts on surface water or groundwater are expected.

*Impacts on surface water quality from stream crossings.* The construction of PTA Trail could potentially impact waters of the US via the crossing of Waikoloa Stream near the rock wall, about six miles east of Kawaihae Harbor, and about one-half mile south of Highway 19. All stream crossings would be reviewed by the Corps of Engineers prior to construction to determine if the activity is regulated under Section 404 of the Clean Water Act (CWA) (Section 404). In accordance with Section 404 of the CWA, any dredge or fill activities in these streams associated with the crossings may require a Department of the Army permit. If a Department of the Army permit is required, then a CWA Section 401 Water Quality Certification issued by Hawai'i also may be required. The Army would design the stream crossings to minimize any dredge or fill impacts on the stream to the fullest extent practicable in compliance with Section 404. If the Corps determines that a Department of the Army permit is required, the Army would abide by all appropriate CWA regulations and permit processes administered by the Corps and Hawai'i.

*Impacts on groundwater quality from spills on PTA Trail.* The proposed route of the PTA Trail would take it close to some potable wells at lower elevations. Spills of fuels or other chemicals could occur. The impacts on groundwater quality are expected to be less than significant because bulk fuel would not be transported on the PTA Trail, but on the paved state and county roads. The Army will implement the existing spill prevention and response plan to all new lands and activities under the Proposed Action. All convoys using the PTA Trail would carry spill response equipment and personnel trained in the use of the equipment.

In addition, the Army proposes to place bollards around the wellheads in coordination with the utility and property owners to protect the structures from potential damage., If the coordination results in a change in alignment, which might cause environmental impacts not analyzed in the EIS, the Army would conduct all appropriate NEPA, ESA, and NHPA consultations before making a final decision on a new alignment.

### Reduced Land Acquisition Alternative

Under the RLA Alternative most of the impacts identified under the Proposed Action also would occur. However, under the RLA Alternative, the QTR2 range would be sited at PTA instead of at the SBMR. Construction of QTR2 would result in soil disturbance that could affect surface water quality. However, due to lack of perennial streams at PTA, and the use of construction BMPs to prevent storm water pollution from migrating from the construction area, these impacts are not expected to be significant.

### *No Action Alternative*

*Less than Significant Impacts*

*Impacts on surface water quality.* Current training activities have resulted in soil contamination at firing points and ranges within the boundaries of the PTA. Section 8.9 includes a discussion of the results of recent soil sampling at the PTA. The most significant explosive constituent found in soils was RDX. Several metals, including iron and aluminum, occur naturally at concentrations above USEPA PRGs for soils. The concentrations of some other metals, including zinc and lead, which were found above soil PRGs, may be attributable in part to training activities.

Under natural conditions, explosives would be expected to degrade over time with exposure to atmospheric oxygen, moisture, sunlight, and microbes in the soil. The fate and transport of metals depends on chemical reactions in the soil that determine whether the metals form compounds that precipitate or dissolve in water or bind to the surface of soil particles.

While complex chemical speciation models and chemical transport models can provide estimates of the rates of migration of metals from soils to surface water or groundwater, direct measurement of concentrations in surface or groundwater are nearly always needed to verify the model results.

At PTA, no surface water samples have been collected, and there are no perennial streams, so the ultimate result of the interaction of chemicals in soils with intermittent surface water runoff would be to transport the chemicals with the intermittent stream flows and sediment and deposit them downslope. No significant impacts on surface water quality are expected, as described above, because surface water is present only intermittently, following large storms.

Infiltration and percolation of surface water could dissolve and transport chemicals deposited in surface soils to the subsurface. However, with a few exceptions, most of the mass of chemical residues are expected to dissolve relatively slowly in water and would remain in shallow soils. It would require large volumes of recharge to carry dissolved contaminants to the great depths at which groundwater may occur beneath the PTA and relatively long time periods for the chemicals to be transported. Even if relatively soluble compounds, such as perchlorate, were transported with the recharge, the concentrations would be very dilute when they arrived at the depth of basal groundwater (provided it is present beneath the PTA). There are no groundwater wells in the area, and therefore no groundwater monitoring has been performed to confirm that groundwater beneath the PTA has not been affected by chemical contaminants. However, groundwater is not used locally as a source of drinking water, so there are no receptors in the area who would be impacted if trace constituents were to reach the groundwater aquifer. For these reasons, no significant impacts are expected on groundwater resources from chemicals generated by current force training or construction activities under the No Action Alternative.

Plants and animals may be affected by explosives residues in ponded water or in moisture retained in soils. Thus, explosives residues in the stormwater, even if not considered a significant impact on surface or groundwater used by humans, may have an effect on other environmental receptors. The potential effects on flora and fauna are described further in the discussion of biological impacts in Section 9.10.

No water quality impacts are expected from continued Army use of facilities at Kawaihae Harbor under the No Action Alternative.

# 8.9 GEOLOGY, SOILS, AND SEISMICITY

## 8.9.1 Affected Environment

### *Physiography*

PTA is in the Humuʻula Saddle between the two major peaks on the island of Hawaiʻi; Mauna Kea lies to the northeast, and Mauna Loa lies to the south. The cantonment area, which is adjacent to Saddle Road that traverses the northeast corner of PTA, is at an elevation of 6,400 feet msl (1,950.7 meters). The slope of the Mauna Kea volcano rises steeply (about a 26 percent slope) from Saddle Road to an elevation of 13,796 feet msl (4,207 meters) over a distance of about 6 miles (14.5 kilometers). The slope of Mauna Loa, by contrast, rises to the southwest at about a 4 percent slope to an elevation of 13,678 feet msl (4,169 meters) over a distance of about 20 miles (32.2 kilometers). To the west of these two peaks is the Hualālai volcano (about 8,690 feet msl, 2,650 meters). Elevations within PTA range from 4,030 to 8,650 feet msl (1,228 to 2,637 meters).

The military vehicle trail from Kawaihae Harbor to PTA runs south inland of Highway 270 and rises to an elevation of about 250 feet (76.2 meters) near the junction with Highway 19. The trail continues east, paralleling Highway 19 along the foot of the Kohala Mountains to the western edge of Waimea (Kamuela). This segment rises to an elevation of about 2,500 feet (762 meters) over a distance of about 10 miles (16.1 kilometers). Near Waiʻaka, on the outskirts of Waimea, the trail turns south and runs west of Highway 190 approximately following the 2,400-foot (731.5-meter) elevation contour until the junction with Saddle Road (Route 200). The trail crosses Highway 190 west of a small volcanic cone called Nahonaoahe and continues upslope, roughly parallel to Saddle Road, until it reaches PTA at a point near the Puʻu Keʻekeʻe cinder cone.

### *Geology*

Figure 8-28 is a geologic map of the northern portion of the island of Hawaiʻi, showing the locations of PTA and PTA Trail. PTA is on the saddle between the Mauna Loa and Mauna Kea volcanoes. Most of PTA is on lava flow deposits erupted from Mauna Loa, the largest active volcano in the world. Lava from Mauna Loa's last eruption, in 1984, covered 16 square miles (41.4 square kilometers) of land in three weeks. The lava erupted from the Northeast Rift Zone, which extends northeast from the Mauna Loa crater and skirts the southeast boundary of PTA. The lava flowed within 4 miles (6 kilometers) of Hilo (USGS 1997).

PTA is underlain by overlapping basalt flows erupted from Mauna Loa and Mauna Kea. The three most recent flows responsible for the surface deposits at PTA are Hāmākua flows from Mauna Kea that occurred during the Pleistocene, Laupāhoehoe flows from Mauna Kea that occurred during the Holocene, and Kaʻū flows from Mauna Loa that have occurred as recently as 1935 (USARHAW and 25th ID[L] 2001b ). The more recent flows have not entered the PTA boundary.

**Figure 8-28**
Geologic Map of Pōhakuloa Training Area

The lower half of the WPAA is within the Waimea Plains, which were formed by lava flows from Mauna Kea that butted up against the older Kohala Mountains. The Kohala Mountains are now covered with a blanket of volcanic ash soils. The lava is predominantly pāhoehoe and ʻaʻā basalt flows, scoria (cinder), and ash deposits of the Hāmākua Volcanics Series (Wolfe and Morris 1996). Hawaiian basalts have a high iron content, and the composition of many basalts is over 40 percent iron-containing minerals (Wolfe and Morris 1996). In some cases, the high iron content makes it difficult to discriminate ordnance from rock, and weathered basalt cobbles can look similar to oxidized ordnance (Earth Tech 2002). The parcel is dotted with cinder cones associated with the Mauna Kea volcano. The cinder cones are deposited on the upper layer of the Hāmākua Volcanic Series, which is covered by a layer of up to about 3 feet (0.9 meter) of Pahala ash erupted about 39,000 years ago.

The term "Pahala Ash" has been widely used to describe nearly all the thick soils on Hawaiʻi, although it technically refers to ashes erupted from Mauna Loa or Kīluea that were deposited mainly on the southern flanks of the island. Ash deposits along the Hāmākua coast are mainly from older explosive eruptions of Mauna Kea.

### *Geomorphic Features*

The terrain underlying PTA is dominated by the recent basalt lava flows from the Moana Loa shield volcano. These flows have gradually built up a broad, relatively gently sloping surface that appears smooth from a distance but is actually very rough and highly variable in texture close up. There is little woody vegetation, due to a number of factors, including elevation, climate, wind, thin soil, and soil chemistry. Soil forms or accumulates in low areas, on older volcanic flow surfaces, and in areas overlain by volcanic ash deposits. The relatively smooth terrain is broken in places, such as along the western edge of PTA, by small cinder cones. Some of the cinder cones have been quarried for material used in construction or to surface roads.

During volcanic flows, the surface of the lava cools and forms a hard crust, while the lava below the crust continues to flow. Under some circumstances, the molten lava may run out, leaving behind an empty tubular shell of hardened lava. Some lava tubes are hundreds of feet long and tend to become filled over time by subsequent flows, collapse, or sedimentation. Some tubes may become plugged at both ends, leaving a subsurface cavity with no manifestation at the surface. Such cavities are often encountered during drilling in basaltic lava terrain. Some lava tubes can be conduits for water. Lava tubes represent a recreational resource for people who enjoy exploring them, and a number of large lava tubes on the island of Hawaiʻi are set aside as visitor destinations. Lava tubes are recognized as a valuable national resource in some areas, such as Lava Beds National Monument in northern California. There are probably many lava tubes underlying PTA , but they have not been mapped and are not accessible to the public.

### *Soils*

#### *Pōhakuloa Training Area*

Soils are thin and poorly developed on PTA. Recent lava flows cover about 80 percent of the land surface. The low precipitation, rapid runoff, and high altitude reduce the rate of weathering, and the high slope and wind tend to prevent soils from accumulating.

Figure 8-29 shows the soil types within PTA. About 88,000 acres of PTA are classified by the US NRCS as lava flows, of which about half are ʻaʻā flows and half are pāhoehoe flows. An additional 1,400 acres (567 hectares) are classified as cinder land. About 12,500 acres (5,059 hectares) are classified as either rock land or very stony land. The remaining approximately 10,000 acres (4,047 hectares), almost all of which is along the northern boundary of PTA near Saddle Road within training areas 1 through 17 and 22, are classified as soils formed on volcanic deposits.

The predominant soil is Keekee loamy sand on 0 to 6 percent slopes, which accounts for nearly 7,500 acres. This is a mildly to strongly alkaline soil consisting of stratified sand developed in alluvium from volcanic ash and cinders. Permeability is rapid, and runoff is slow. The hazard of wind erosion is moderate to severe. Similar sandy soils developed on slightly steeper slopes are found in the same general vicinity, including Huikau extremely stony loamy sand on 12 to 20 percent slopes, and Kilohana loamy fine sand on 12 to 20 percent slopes.

Training Area 22 contains two areas covering about 1,000 acres (405 hectares) underlain by Kekake extremely rocky muck on 6 to 20 percent slopes. These soils are described as well-drained thin organic soils overlying pāhoehoe lava. The soils are strongly acidic and have rapid permeability, but the underlying pāhoehoe lava has low permeability. These soils appear to be associated with a Mauna Loa lava flow that occurred in 1859.

#### *West PTA Acquisition Area*

The WPAA is underlain primarily by very fine sandy loam soils developed on volcanic ash deposits. The soils belong to the Puu Pa-Pakini-Waiaha soil association (USDA 1973). The predominant soils are Waikaloa very find sandy loam and Puu Pa extremely stony very fine sandy loam on the lower two-thirds of the parcel, and Kilohana loamy fine sand and very stony land on the upper third of the parcel.

Shallow gulches dissect the parcel; the largest of these are Waikiʻi Gulch and ʻAuwaiakeakua Gulch. The soft, permeable soils form thicker deposits in some areas. The Puu Pa soils contain a calcium carbonate cemented layer in some areas that impedes percolation of water. Although there are no perennial streams, rainfall keeps the subsoils moist along the gulches. There are areas of peat soil, where rapid cycles of vegetation growth and a moist, temperate environment have caused organic material to accumulate. The Waikaloa and Puu Pa soils are easily eroded by wind and water.

**Figure 8-29**
Soils Map Pōhakuloa Training Area

*Kawaihae to PTA Trail*

Figure 8-30 shows the soils along PTA Trail. From Kawaihae Harbor to about midway to Waimea, PTA follows the route of an existing military vehicle trail. The Kawaihae Harbor area is built on imported fill and is paved over. The foot of the slope just east of Kawaihae Harbor is composed of Kawaihae very rocky very fine sandy loam (KOC). The trail continues upslope over Kawaihae extremely stony very fine sandy loam on slopes of 6 to 12 percent (KNC). Kawaihae soils are moderately deep, somewhat excessively drained soils that formed in material weathered from volcanic ash. The soils have a very weak structure and are very friable (crumble easily). The soil occurs at elevations up to 1,500 feet (457.2 meters) on the leeward side of Hawai'i, where rainfall is 5 to 20 inches (12.7 to 50.8 centimeters). These soils are used mainly for grazing.

About three miles (five kilometers) from Kawaihae Harbor, and just east of Kemole Falls, the trail turns south from the highway and approximately follows the 1,200-foot (366-meter) elevation contour. The route crosses the former Lalamilo Firing Range, just downslope of a rock wall, following the western boundary of the Pu'u Pā Military Maneuver Area (Earth Tech 2002). The underlying soil on this traverse is still the Kawaihae extremely stony very fine sandy loam.

About 4 miles (6 kilometers) south of the highway, near Kamakoa Gulch and about 1 mile (1.6 kilometers) northeast of Waikoloa, the trail turns nearly straight upslope in the direction of the Saddle Road Junction, continuing along the southern boundary of the Pu'u Pā Maneuver Area, and rising about 800 feet (244 meters) in 3 miles (5 kilometers). A road from here crosses the rock wall and ends at a water tank and two wells. The lower portion of this upslope segment is underlain by Kawaihae extremely stony very fine sandy loam, which lines the gulch. Just beyond the water tank, the road crosses the gulch and continues on very stony land (rVS) from an elevation of about 1,400 feet (427 meters) to about 1,600 feet (488 meters).

At about the 1,600-foot (488-meter) elevation contour, the trail crosses about 1 mile (2 kilometers) of Puu Pa extremely stony very fine sandy loam on 6 to 20 percent slopes (PVD). Like the Kawaihae soils, Puu Pa soils are moderately deep, well-drained soils that formed in material weathered from volcanic ash, have a weak structure, and are very friable. They are distinguished from Kawaihae soils mainly by occurrence at elevations between 1,000 to 2,500 feet (305 to meters), where slopes range from 6 to 100 percent and annual rainfall is 20 to 35 inches (51 to 89 centimeters). Permeability is moderately rapid, and runoff is medium. The soils are used mainly for pasture. At an elevation of about 1,900 feet (579 meters), the trail turns abruptly south again for about 4 miles (6 kilometers), following an existing unpaved track for about 2 miles (3 kilometers), and then continues above the 1,800-foot (549-meter) contour, where there is no existing track, until it intercepts a paved road. The trail continues upslope along the paved road for a distance of about 4 miles (6 kilometers), alongside 'Auwaiakeakua Gulch, to the 'Auwaiakeakua Water Tank at Highway 190.

**Figure 8-30**
Soils Map Pōhakuloa to Kawaihae Trail

The soil along about the last 7 miles (11 kilometers) of this segment is mainly Waikaloa very fine sandy loam on 6 to 12 percent slopes (WLC). The Waikaloa soil is interspersed with Puu Pa and Kamakoa very fine sandy loam on 6 to 12 percent slopes (KGC). Waikaloa soils are deep to very deep, well-drained soils that formed in basic volcanic ash. Slopes range from 2 to 20 percent. The mean annual rainfall is about 15 inches (38 centimeters). The soil has weak structure throughout the profile and is friable. Depth to bedrock is greater than 5 feet (1.5 meters). A strongly cemented layer containing calcium carbonate occurs in most locations at a depth of about 4 feet (1 meters)

Highway 190 marks the western boundary of the WPAA. The rest of the route, through the WPAA, is generally straight up the slope. The route passes over approximately equal amounts of Waikaloa and Puu Pa soils, encountering a short segment underlain by Kaimu extremely stony peat on 7 to 25 percent slopes (rKED). The Kaimu soil occurs south of Popoo Gulch and east of Ke‘āmuku, at an elevation of between 3,200 and 3,400 feet (975 and 1,036 meters). The Kaimu soil is moderately deep, somewhat excessively drained, and highly organic. This soil formed in organic material mixed with minor amounts of basic volcanic ash in ‘a‘ā lava. The soil occurs in areas where the mean annual rainfall is about 35 inches (89 centimeters).

About 3 miles (5 kilometers) downslope from the 1010 Parcel, at an elevation of about 4,300 feet (1,311 meters), the trail encounters Kilohana loamy fine sand on 12 to 20 percent slopes (KZD), interspersed with very stony land. The Kilohana soil is deep, somewhat excessively drained, and forms in material weathered from volcanic ash. Kilohana soils are on uplands, generally at elevations of 5,000 to 6,500 feet (1,524 to 1,981 meters) with slopes of 12 to 20 percent. Mean annual rainfall is about 30 inches (76.2 centimeters), and depth to bedrock is more than 6 feet (2 meters). The soils are very highly permeable and runoff is slow. Outcrops of ‘a‘ā lava flows are common. In the 100 Parcel, the trail intercepts Ke‘eke‘e Road, an unpaved road that runs along the northwest side of Pu‘u Ke‘eke‘e cinder cone, where the soils are classified as cinder land.

### *Chemical Constituents in Soils at Pōhakuloa Training Area*

The US Army Corps of Engineers, Sacramento District, conducted a surface soil and surface water investigation at PTA from November 12 to November 14, 2002. Objectives were to get a snapshot of current conditions on ranges at PTA in order to predict the potential for exposure to munitions constituents on the planned range areas for this EIS. A total of 46 soil samples were collected from Range 5 (the Grenade Range), Range 9 (the Engineering Demolition Range), Range 10 (temporary impact area), Range 11 (impact area), various firing points (firing points 309, 311, 420, 802, and 804), and Range Control (considered to be an ambient background site). No surface water was observed, so no water samples were collected. A summary report of the investigation is included in Appendix M-1. The results are summarized and briefly discussed below.

As with the investigation conducted at SBMR (See Section 5.9), the data from the investigation of surface soils at PTA are intended to support the description of current conditions and to provide evidence of the effects of past training activities on surface soils and surface water. The investigation was not intended to be a comprehensive study of the distribution of contaminants on the ranges.

Figure M1-2 in Appendix M1 shows the locations of the sample points (some points are not labeled, but the locations are close to other labeled points from the same range). Thirty-two of the sample locations were near Training Area 21, either in the impact area just west of there or at firing points or just downrange from firing points near the western edge of the area. Eight samples were collected at firing points FP309 and FP311 in Training Area 8. Four samples were from firing point FP420 in Training Area 12, next to Saddle Road. Two samples were from near the Range Control office in the cantonment area.

*Semi-volatile Organics.* As discussed in Section 5.9 for samples collected at SBMR, metals, explosives, and several semi-volatile organic compounds (phthalate esters and polynuclear aromatic hydrocarbons) were detected. The phthalate esters are plasticizers and are ubiquitous in the environment. They may have been present because of plastic parts in munitions. PAHs are also common in the environment at low concentrations. They are a product of combustion of heavy organic compounds, including wood, oils, and tars. None of the semi-volatile organics exceeded industrial soil PRGs, although benzo (a) pyrene was detected in one sample from the Range 9 Demo Area at 0.190 mg/kg, which is close to the industrial soil PRG of 0.211 mg/kg.

*Explosives.* The sampling detected six explosives included 2,4,6-TNT (TNT); 2,4-DNT (a degradation product of TNT); RDX, HMX, nitroglycerin, and perchlorate. With the exception of 2,4-DNT and perchlorate, these are the same compounds that were detected in samples from SBMR.

Four of the 46 samples had detectable concentrations of TNT, ranging from 0.8 to 1.5 mg/kg. None exceeded the industrial soil PRG of 57 mg/kg. The detections were in three samples from the Range 9 Demo Area and in one sample from Range 5. Three samples contained 2,4-DNT, at concentrations ranging from 0.18 to 2.0 mg/kg. The industrial soil PRG for 2,4-DNT is 1,200 mg/kg. Perchlorate was detected in one sample, from firing point FP309 in the northwest corner of Training Area 8. The concentration was below the industrial soil PRG. Of these six explosives, five samples of RDX exceeded its industrial PRG of 15.6 mg/kg.

*Metals.* As discussed in Section 5.9, metals occur naturally in soils, and Hawaiian soils are no exception. However, human activities may also contribute to the background levels of metals in soils. Even in natural conditions, metals concentrations are expected to vary. One reason for different concentrations of metals in soils from different areas of PTA is that different lavas may have different compositions and concentrations of metals. Soils at PTA are relatively thin, poorly developed, and have not had much time to be mixed or redeposited. Therefore, the metals concentrations in soils developed on different flows of different ages may vary. Frequency distribution plots can be used to help identify the normal ranges of metals in soils and to identify unusually high concentrations. The high concentrations may be from natural sources, too, but if the concentrations are very different from the "typical" range of concentrations, then it is more likely that the metals are from human sources.

Among the metals that were analyzed for in the samples, the most abundant metals in basalt minerals are aluminum, barium, chromium, iron, nickel, and zinc. Other metals would generally be expected to be present at lower concentrations. Except for iron, none of these metals were detected at concentrations above the industrial soil PRGs. Chromium, nickel, and zinc were detected in one sample from Range 11 at much higher concentrations than in the other samples but still less than the industrial soil PRGs. Iron did not exceed the industrial PRG in any samples. Zinc showed a clustered distribution in the range of 100 to 200 mg/kg, with a few much higher detections. The highest detected concentrations were in samples from Range 5 and Range 11.

Looking at other, less abundant metals, most were detected at concentrations below their respective industrial soil PRGs. The highest concentrations were generally detected in a single sample from Range 11 (R11TANK-01), or in samples from Ranges 9 or 10. Exceptions to this were beryllium and selenium, higher concentrations of which seem to be randomly distributed. In fact, the highest concentrations of these seemed to be in the "background" samples from near the Range Control office.

The highest lead concentrations were detected in samples from Ranges 9, 10, and 11. Two samples (one from Range 10, and sample R11TANK-01) contained concentrations above the industrial soil PRG.

Based on these results, it appears that both elevated metals concentrations and detectable explosives concentrations were generally found in the impact areas of Ranges 5, 9, 10, and 11. Few of the concentrations exceeded industrial soil PRGs.

The combined noncancer occupational health risk associated with exposure to the observed metals concentrations from the soil investigation is 0.9, or just below the threshold of 1 for no further action. Excluding the calculated values for iron, aluminum, and manganese, i.e., known naturally occurring metals, the combined risk would be 0.29, which mainly results from lead. The combined carcinogenic risk from metals is $7.0 \times 10^{-6}$. This is above the one in one million cancer risk threshold, but within the range of $10^{-4}$ to $10^{-6}$, which is considered acceptable under some circumstances.

### *Volcanism, Seismicity, and other Geologic Hazards*

As shown in Figure 8-31, areas with slopes greater than 30 percent are primarily limited to the slopes of Mauna Kea, north of Saddle Road, and to the southern portion of PTA, on the north-facing slope of Mauna Loa.

#### *Volcanic Eruption Hazards*

The USGS has divided the island of Hawai'i into Lava Hazard Zones based on the probability of coverage by lava flows. Other hazards from volcanic eruptions are not classified in this system. Zone 1 has the highest risk and Zone 9 has the lowest. PTA overlies areas categorized as zones 2, 3, and 8 (County of Hawai'i 2002a). Zone 2 includes areas in which 15 to 25 percent of the land area has been covered by flows since 1800; the

**Figure 8-31**
Steep Slopes at Pōhakuloa Training Area

eastern margin and northeastern corner of PTA are in Zone 2. Zone 3 has had 1 to 15 percent coverage by lava flows since 1800; most of PTA is in Zone 3. Zone 8 has had no lava coverage over the past 750 years, and only a few percent of the area was covered in the past 10,000 years. Zone 8 represents areas near or north of Saddle Road that are underlain by lava erupted from Mauna Kea. PTA Trail is entirely within Zone 8.

Infrequently, Hawaiian volcanoes erupt explosively. In 1790, Kīlauea erupted explosively, creating a surge of hot gases and fine dust that killed a group of Hawaiian warriors and their families near the summit.

Another hazard of Hawaiian volcanoes is emission of sulfur dioxide gas and other toxic constituents. The gas forms a strong acid, hydrogen sulfide, when it reacts with moisture in the atmosphere or in peoples' lungs. The particulates and gases form a mixture called "vog," meaning volcanic smog, that can range from a dispersed atmospheric haze resembling smog to a ground-hugging cloud resembling fog (USGS 2000a).

### *Earthquake Hazards*

The island of Hawai'i is the locus of most of the earthquake activity that occurs in the Hawaiian Islands. A magnitude 7.2 earthquake in 1975 that originated beneath Kīlauea was the largest earthquake to originate in Hawai'i during the past century. Hazards associated with earthquakes include ground shaking, liquefaction, landslides, and tsunamis. The 1975 earthquake generated a tsunami that killed two people and damaged property along the coast (USGS 1997).

The USGS has prepared maps showing the horizontal ground acceleration in firm rock, as a percentage of the acceleration of gravity, for a given probability of exceedance within a given number of years. Acceleration is the rate of change in speed or direction of an object, and it is what makes buildings come apart in a strong earthquake. A 10 percent probability of exceedance in the next 50 years means that there is a 10 percent chance that a larger event will occur in the next 50 years. PTA is in an area in which there is a 10 percent probability that an earthquake will cause a ground acceleration of more than 40 to 60 percent of gravity in the next 50 years, with the likely size of the earthquake increasing to the south, in the direction of Kīlauea and the south coast.

The severity of ground shaking depends on the local geologic conditions. Seismic waves may be amplified by soft sediments, for example, while wave energy tends to be transmitted efficiently through hard rock. Most of PTA is underlain by hard rock with thin or no soils, so seismic waves would not be amplified. The intensity of an earthquake is another measure of earthquake severity. Earthquake intensity is a qualitative way of comparing earthquakes on a scale of I to XII. Intensity is estimated at points where the shaking is felt, while magnitude is measured at the source of the earthquake. In August 1951, an earthquake with a magnitude of 6.9 and a maximum intensity of IX on the Modified Mercali Scale damaged structures on the Kona Coast and caused a 12-foot tsunami. The earthquake also initiated a number of destructive landslides and caused cracks in the coastal highway (USGS 2001a).

### 8.9.2 Environmental Consequences

***Summary of Impacts***

Table 8-18 summarizes the impacts of the three alternatives. Soil erosion from construction and training activities has been identified as a potentially significant and unmitigable impact. Four other types of geologic impacts have been identified as potentially significant but mitigable, including soil erosion and loss from wildfires, increased soil compaction, exposure to soil contaminants, and slope failure.

**Table 8-18**
**Summary of Potential Geologic Resources Impacts at PTA**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Soil loss from training activities | ⊗ | ⊗ | ⊙ |
| Soil erosion and loss from wildland fires | ⃠ | ⃠ | ⃠ |
| Increased soil compaction | ⃠ | ⃠ | ⊙ |
| Exposure to soil contaminants | ⊙ | ⊙ | ⊙ |
| Slope failure | ⊙ | ⊙ | ⊙ |
| Volcanic and seismic hazards | ⊙ | ⊙ | ⊙ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

<u>LEGEND:</u>

⊗ = Significant
⃠ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact
N/A = Not applicable

The effect of enhancing soil erosion during or because of construction of PTA Trail is not expected to be significant because the potential effects would be mitigated through the implementation of standard management practices.

Volcanic hazards, while potentially significant in this area, are not expected to be significant over the life of the project because there is a low probability that erupted lava would flow onto PTA, based on distribution of past lava flows. Also, most Hawaiian eruptions would provide some warning and adequate time for evacuation, if necessary. Seismic hazards are not expected to result in significant impacts because seismic energy is not amplified in the geologic materials beneath PTA and because new structures would be designed to resist the lateral forces expected from most earthquakes generated in the region.

### *Proposed Action (Preferred Alternative)*

#### Significant Impacts

*Impact 1: Soil loss from training activities*. Increased soil erosion may result from mounted and unmounted maneuver training, from construction and use of PTA Trail, and from construction (site preparation) of new facilities at PTA.

*Impact 1a: Soil loss from mounted and unmounted maneuver training in PTA*. The intensity of off-road vehicle use within the current boundaries of PTA will increase with implementation of the Proposed Action. ATTACC modeling was used to estimate the effects of mounted maneuver training on land condition at PTA. The model assumed an increase in the number of MIMs, from 13,659 under existing conditions to 30,900 for the Proposed Action. ATTACC modeling assumed that about 56,661 acres (22,930 hectares), or about 50 percent of the total land area within PTA, is maneuverable, but that only about 12,000 acres (4,856 hectares) (11 percent of the total area) are being used. As shown in Figure 2-6, much of this area is located adjacent to Saddle Road. The ATTACC model distributed the total MIMs over the available land area, resulting in an average of 1.14 MIMs per maneuverable acre under existing conditions, and about 2.6 MIMs per acre under the Proposed Action. Under existing conditions, it was assumed that the MIMs result in "mild" impacts on land condition in the PTA boundaries, meaning that relatively little restoration is needed to sustain the land. This may be reasonably accurate on average, but it is not accurate when applied to specific locations. For example, the INRMP identifies denudation of vegetation, major soil erosion, and severe windblown dust problems associated with maneuver training in Range 10. ATTACC modeling found that the Proposed Action would result in degradation of land condition to a "severe" condition on average, meaning that it would be much more difficult to restore and sustain the land over the long term than under existing conditions. The threshold for "severe" was assumed to occur at about 29,000 MIMs. The impact on soils is considered to be significant because it could result in additional major soil erosion, such as described for Range 10. The mitigation measures below will substantially reduce the impact but not to less than significant.

*Regulatory and Administrative Mitigation 1a.* The Army will develop and implement a DuSMMoP for the training area. The plan will address measures such as, but not limited to, restrictions on the timing or type of training during high risk conditions, vegetation monitoring, soil monitoring, and buffer zones to minimize dust emissions in populated areas. The Army will use the plan to determine how training will occur in order to keep fugitive dust emissions below CAA standards for $PM_{10}$ and soil erosion and compaction to a minimum. The Army will monitor the impacts of training activities to ensure that emissions stay within the acceptable ranges as predicted and environmental problems do not result from excessive soil erosion or compaction. The plan will also define contingency measures to mitigate the impacts of training activities that exceed the acceptable ranges for dust emissions or soil compaction.

The Army will implement land management practices and procedures described in the ITAM annual work plan to reduce erosion impacts (US Army Hawai'i 2001a). Currently these measures include implementing a TRI program; implementing an ITAM program;

implementing an SRA program; developing and enforcing range regulations; implementing an Erosion and Sediment Control Management Plan; and continuing to implement land rehabilitation projects, as needed, within the LRAM program. Examples of current LRAM activities at KTA include revegetation projects involving site preparation, liming, fertilization, seeding or hydroseeding, tree planting, irrigation, and mulching; a CTP; coordination through the TCCC on road maintenance projects; and development of mapping and GIS tools for identifying and tracking progress of mitigation measures.

*Impact 1b: Soil loss from mounted and unmounted maneuver training in the WPAA*. For the WPAA, the ATTACC modeling estimated that new mounted maneuver training would result in a total of 61,894 MIMs. There is now no mounted maneuver training there. Uses that could affect soil erosion include cattle grazing, civilian vehicle traffic, cinder cone quarrying operations, and periodic burning by wildfires. Also, the parcel has been used for military maneuver training in the past (it is part of the Waikaloa Military Maneuver Area), and those past uses may have already had long-term effects on land condition, which is considered part of the baseline for this evaluation. Therefore, current conditions should not be assumed to reflect "natural" or undeveloped conditions.

The results of the ATTACC modeling for the WPAA indicate that the Proposed Action would result in degradation to a "severe" land condition. The threshold for "severe" was estimated to occur at about 50,000 MIMs, and the number of projected MIMs on the parcel would be about 24 percent more than this threshold. Based on a total maneuverable land area of 22,675 acres (9,176 hectares), the Proposed Action would result in about 2.7 MIMs per acre on WPAA.

Land condition would be reduced primarily due to damage to vegetation cover from by off-road Stryker vehicle use. When vegetation is damaged, underlying soils are exposed to erosion by wind and water. Vehicles will also directly disturb soils and create tracks. These tracks then become conduits for storm runoff. In the ATTACC modeling, it was assumed that nearly all of the land in the WPAA is maneuverable by Strykers. Therefore, the MIMs were distributed over the entire area of the parcel. In practice, however, it is likely that Strykers would follow routes that are neither over rock outcrops (which would be more difficult to traverse) nor over thick soft deposits but would follow routes that skirt the margins of outcrops where the soils are relatively thin and firm. Thus, in practice, the effective maneuverable area may be less than modeled, and the effects on land condition may be more focused than assumed in the modeling. Despite lack of perennial streams, soil erosion by water during short duration storm events could result in significant local redistribution of eroded soil. Wind erosion of exposed soil would likely result in gradual removal of soils from areas where vegetation is damaged, such as in wheel tracks. Loss of soils in areas where soils are already thin could reduce the effectiveness of reseeding efforts, and seeding may not be effective in areas compacted by vehicle wheels. Over the long term, soil erosion could alter the terrain, making it more rugged, further reducing the maneuverable area, and causing MIMs to be increasingly focused on smaller areas. Due to the projected severity of the average effects of maneuver training based on ATTACC modeling, the impact on erosion and soil loss is considered significant. Although the average

MIMs per acre would be similar to those within the current PTA boundary, the Keʻāmuku Parcel is steeper and the hazard of erosion is greater than within the current PTA boundary.

*Regulatory and Administrative Mitigation 1b.* The mitigation measures in Impact 1a address this issue as well and would substantially reduce the impact but not to less than significant.

*Impact 1c: Soil loss from construction and use of PTA Trail.* Construction of PTA Trail would remove existing vegetation and disturb soils. As proposed, much of the trail would be on steep slopes and would be nearly straight up the fall line of the slope. The road would be a 24-foot wide (3-meter wide) gravel bed with 3-foot wide (1-meter wide) shoulders, for a total of 30 feet (9.14 meters) width. The road may use existing road alignments and would be paved with asphalt on slopes greater than 10 percent. In effect, nearly all uphill segments would be paved with asphalt, and traverses along elevation contours would be paved with gravel. During construction, erosion by both wind and water could occur. The largest impacts are likely to be in steep slope areas containing fine loam soils, such as Waikaloa and Puu Pa sandy silt loams. This impact is considered potentially significant. After construction, the road could affect surface drainage, both by focusing drainage collected from impermeable surfaces onto adjacent lands and by interfering with natural drainage patterns. Large runoff events could result in soil accumulation in culverts at gulch crossings, resulting in flooding and possible washouts of the roadway. Each of these could result in severe soil erosion or sedimentation on lands adjacent to the road. This is considered a significant impact. The mitigation below would substantially reduce the impact but not to less than significant.

*Additional Mitigation 1c.* The Army proposes to minimize and avoid cut slopes, where practicable. Cut slopes would be blended into the landscape by rounding the edges of the slope and differentially orienting the slope and the roadbed alignments where practicable. Use of these techniques would be varied, based on the specific conditions, including depth of the cut, orientation of the slope, and type of material (e.g., dirt slope and rock slope). In accordance with Army design standards, potential mitigation measures for this impact also include, where practicable, selecting the least failure-prone route, geotechnically testing soils where necessary along the route to identify problems, designing the roadbed, slope and surface to avoid slope failure, properly sizing drainage systems, designing storm drainage outfalls for efficient performance, and properly monitoring and maintaining the road.

### *Significant Impacts Mitigable to Less than Significant*

*Impact 2: Soil erosion and loss from wildland fires.* Although wildland fires, particularly grass fires, could occur at PTA or on the adjacent WPAA, the effects on soil loss would be localized because much of the land contains shallow soil or exposed rock outcrops. Many areas with soils are somewhat protected from water erosion because they are surrounded by rock outcrops. Removing grassland vegetation by fire would temporarily expose soils to enhanced water erosion, but perhaps even more so to wind erosion. Soil erosion by water would lead to soil moving and redepositing downslope. Due to lack of continuity of stream flows, soils would probably not migrate far from their upslope origins, but wind erosion could transport soil further from its original location. Under natural conditions, wildland fires occur infrequently in Hawaiʻi, partly due to lack of lightning. Thus, native plant species are not well adapted to fire. Fire and loss of soil could reduce native plant species and encourage fast-growing nonnative species that recover quickly after fires. Some of these species may be more susceptible or even dependent on fire so that the occurrence of wildland fires may help to increase the chance of future wildland fires. Under the Proposed Action, training in the WPAA may increase the potential for wildland fires because it would introduce such ignition sources as the heat of engine exhaust systems coming into contact with grasses, sparks from live and nonlive munitions, and smoking. Because of the potential for soil loss if wildland fires were to spread over a large area, this is considered a significant impact. The mitigation below would reduce the impact to less than significant.

*Regulatory and Administrative Mitigation 2.* The IWFMP for Pōhakuloa and Oʻahu Training Areas was updated in October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts associated with wildland fires. The plan is available upon request.

*Impact 3: Soil compaction.* Soil compaction may be caused by driving vehicles off roads on compressible soil. Moist soils with a high content of fine materials (silt and clay) are most likely to compact. The Waikaloa and Waimea soils in WPAA are vulnerable to compaction because they contain a high percentage of fine materials. However, soils throughout PTA tend to have a low moisture content. Therefore, the Waikaloa and Waimea soils are likely to be moderately vulnerable to compaction except shortly after storm events. Once compacted, the soils may remain compacted for a long time. Compaction of vehicle tracks may introduce increased roughness to the ground surface, leading to increased wind and water erosion. Compaction also may affect vegetation by changing soil permeability, porosity, and water content and by affecting root penetration. Significant soil compaction is expected to occur in WPAA because this area has not been previously subjected to a high degree of vehicle use. The mitigation below would reduce the impact to less than significant.

*Regulatory and Administrative Mitigation 3.* Mitigation for compaction is the same as that described for mitigating soil loss, discussed under Impact 1a.

### *Less than Significant Impacts*

*Exposure to contaminants in soils.* An important factor in evaluating risk due to exposure to contaminated is soils is the fact that munitions are fired from firing points down range and into the range impact areas. These areas are not accessible to or entered by Soldiers or members of the public because of the safety explosive risk they represent. Therefore, it is unlikely that human beings, either military personnel or off-post residents, would come into contact with the constituents of these munitions in the downrange or impact area soils. The only area that presents a potential opportunity for contact with contaminated soils is in the area of the proposed BAX. The construction of the BAX will require the conversion of a portion of Training Area 12 to a training area where Soldiers could be exposed to the soils. However, their exposure would be limited to training for a period of days or weeks. The level of chemical compounds present Range 12 are all below their respective PRGs. Considered together, the potential duration of exposure to the chemical concentrations on the training ranges at PTA, including Range 12, represent a low risk to personnel who them.

Exposure to chemical contaminants in soils at training area 12 could occur through several pathways, including direct contact with contaminated soils, ingestion of soils, or through inhalation of windblown dust. Exposure estimates are based on assumptions about the amount of soil that might be ingested by a person who works in an area with contaminated soils. It is a generally accepted principle of risk assessment that not all exposures result in unacceptable health risks and that there are certain thresholds of exposure below which the health risks are so low that they cannot be distinguished from background risks.

As discussed in the Affected Environment section, composite soil sampling at selected ranges within PTA revealed the presence of metals, explosives, and semi-volatile organic compounds. The observed concentrations were generally less than industrial PRGs. One explosive compound, RDX, was detected in samples from Ranges 5 and 9 at concentrations above the industrial PRG while Training Area 12 was below. The risks from multiple chemical exposures are additive, and similar calculations can be done for each of the contaminants to which people may be exposed at PTA. The risks from HMX, nitroglycerin, and TNT are very small compared to the risk from RDX, and the sum of their risks is less than $0.74 \times 10^{-6}$. The risks associated with each of the metals can be calculated similarly, and the results would be similar. The highest risks are associated with the iron and aluminum in the soil, both of which occur naturally at high concentrations.

Maneuver training conducted in the WPAA would not result in significant exposures to high explosives residues in soils, either from past or proposed activities, because the training there under the Proposed Action would involve simulated rather than live artillery fire.

Overall, the sum of the carcinogenic and non-carcinogenic risks, based on the available soil sampling data and using the PRGs to estimate risk, is less than the USEPA threshold for worker exposure. It is unlikely that troop exposures to RDX or other chemicals on the ranges would be similar to worker exposures in an industrial setting. For example, workers are assumed to ingest 100 mg of soil per day, 250 days per year for 25 years. This assumption over-estimates troop exposures, because troops are likely to be exposed only temporarily, and only for short durations. No public contact with these soils will occur. Based on the conservative analysis described above, this represents a less than significant impact.

*Soil loss from training activities - construction of new facilities.* Site clearing and grading for construction of new facilities would expose soils to enhanced erosion by water or wind. This impact is expected to be less than significant because the new facilities would be constructed on relatively level land using standard erosion control practices and because the impacts would be temporary.

*Slope failure*. Although there are many steep slopes within PTA and the WPAA, most slopes are underlain by shallow bedrock or exposed rock outcrops, so there is little potential for slope failure.

*Volcanic and seismic hazards.* The discussion of impacts related to volcanic and seismic hazards can be divided into two broad types of impacts: those that may be caused by the project, and those that are the result of the project being constructed in an area in which hazards exist.

The impacts discussed below are mainly of the later type, but the former is discussed briefly first.

At first glance, the use of high explosives at PTA might be thought to increase the potential for volcanic eruptions or earthquakes. In reality, there is virtually no risk that this would occur because the amount of energy released in the detonation of a high explosive munition, such as a 105mm mortar round, is very small relative to the kinetic energy released in an earthquake or the heat energy contained in the magma chamber of a volcano. Most of the energy from the detonation of a mortar at the ground surface is expended in the atmosphere or in moving loose rock or soil. Only a small percentage of the energy is transferred to the rock. (Otherwise, the explosive would not be an effective weapon.) Studies have shown that even underground testing of nuclear devices did not trigger earthquakes on existing faults, although these tests have produced ruptures in the ground surface (USGS 2002a). Thus, the use of explosives at PTA is not expected to have any effect on the frequency of volcanic eruptions or earthquakes. The discussion below focuses on the effects of implementing the Proposed Action in the volcanic and seismic environment that exists at PTA, and the potential for hazards to personnel or structures and facilities because of this environment.

PTA is subject to periodic eruptions of lava from the Mauna Loa volcano. The risk of any particular site being inundated by a lava flow is small because flows tend to be narrow and occur relatively infrequently. If it were to occur in a developed area, however, a lava flow could potentially destroy or damage structures, roads, or other facilities; could endanger lives; and could have the potential indirect effect of causing releases of hazardous materials or explosions of munitions.

PTA lies on the edge of the northeast rift zone, which last erupted in 1984. At that time, lava flowed northeastward, in the direction of Hilo. Since lava flows by gravity, its path would be determined by the location of the vent (most likely to be within a rift zone and initially near the summit, although Mauna Loa eruptions tend to develop into flank eruptions, as the vent migrates downslope along the rift). Some isolated vents are also present on the slopes of Mauna Loa, so that the location of vents cannot be predicted. Eruptions from Mauna Loa tend to be voluminous, and the lava can move quickly (up to about 5 miles per hour [8 kilometers per hour]). Therefore, if the flow is initiated in an area upslope from PTA, it is likely that PTA would be affected and that quick evacuation would be needed. Potential hazards include hazards to human safety, loss of property, detonation of stored munitions, and loss of useable land and facilities for training.

Most Hawaiian eruptions are relatively nonexplosive and involve a steady oozing or flow of lava rather than sudden violent eruptions such as occur in eruptions of many continental volcanoes. Very infrequently, explosive eruptions occur. Such eruptions have the potential to eject extremely fast-moving gas and small particles of molten rock in a pyroclastic surge. Such eruptions are impossible to outrun and can be devastating to everything in their path. It is unlikely that such an eruption would occur on Mauna Loa, but such eruptions have occurred during historic time from Kīlauea, outside the project area, and explosive eruptions are also possible from Moana Loa. Volcanic eruptions also may involve release of toxic gases, typically sulfur dioxide, which is converted to sulfuric acid by contact with water or atmospheric moisture. Sulfuric acid is an irritant to skin, eyes, lungs, etc., and in high airborne concentrations could be life-threatening.

Earthquakes are common on the island of Hawai‘i, but most earthquakes are relatively small. PTA is in an area that has about a 10 percent chance of experiencing horizontal ground acceleration greater than 40 percent of gravity in the next 50 years. The island of Hawai‘i is in Zone 4 of the Uniform Building Code. Forty percent of gravity is about the upper limit for standard structural design criteria used in the Uniform Building Code. Designs to resist larger forces require additional strengthening elements, and design to withstand very large forces can be cost prohibitive.

Some earthquakes are the result of movement of molten rock (magma) deep in the earth’s crust as it rises along openings in the crust. Others are the result of shifts in the crust along large fractures. In both cases, either as a result of expansion of the surface or as a result of settling, surface ruptures, cracks, or depressions may appear in the ground surface. These disruptions of the surface can create hazards by damaging roads, utility lines, and buildings.

Implementation of standard procedures and engineering practices is expected to reduce the volcanic and seismic hazards to acceptable levels, although these measures cannot eliminate the hazards. Most of the measures to address hazards involve implementing timely warning systems, appropriate planning and training, and appropriate engineering design. The proposed structures at PTA would be designed to meet all federal, state, and local building code requirements. The Hawaiian Volcano Observatory provides warnings to local officials and the public of volcanic hazard conditions. The Army prepares and implements volcanic and seismic hazard plans and training, including evacuation plans for personnel and munitions in the event of an emergency.

### *Reduced Land Acquisition*

All of the impacts identified under the Proposed Action would also occur under Reduced Land Acquisition. The addition of the QTR2 firing range could increase the intensity of land use at PTA because other training activities, which may have more impact on soils and erosion processes than those at QTR2, would be limited to a smaller area than under the Proposed Action. However, this is not expected to occur to any significant extent because the QTR2 would use land that is already proposed for use as an anti-armor live-fire and tracking range. Therefore, the impacts on geological resources of the RLA Alternative are not expected to differ from the impacts of the Proposed Action.

### *No Action*

#### *Significant Impacts Mitigable to Less than Significant*

*Impact 1: Soil erosion and loss from wildland fires.* Although wildland fires, particularly grass fires, could occur at PTA, the effects on soil loss would be localized because much of the land contains shallow soil or exposed rock outcrops. As with the Proposed Action, many areas with soils are somewhat protected from water erosion because they are surrounded by rock outcrops. Removing grassland vegetation by fire would temporarily expose soils to enhanced water erosion, but perhaps even more so to wind erosion. Under natural conditions, wildland fires occur infrequently in Hawai'i, partly due to lack of lightning. Thus, native plant species are not well adapted to fire. Fire and loss of soil could reduce native plant species and encourage fast-growing nonnative species that recover quickly after fires. Some of these species may be more susceptible or even dependent on fire so that the occurrence of wildland fires may help to increase the chance of future wildland fires. Current force training may increase the potential for wildland fires because it would introduce such ignition sources as the heat of engine exhaust systems coming into contact with grasses, sparks from live and nonlive munitions, and smoking.

*Regulatory and Administrative Impact 1.* The implementation of the IWFMP as discussed under the Proposed Action would reduce the impact to less than significant.

### *Less than Significant Impacts*

*Soil loss from continued use of the military vehicle trail from Kawaihae Harbor to PTA.* The existing military vehicle trail would continue to be used. Without pavement or drainage improvements, dust erosion impacts would continue, as would potential impacts from erosion by surface runoff. The impacts are not considered to be significant relative to long-term soil loss or erosion because the trail occupies a relatively small amount of acreage. Use of the trail would not significantly alter the rate of erosion. The trail would continue to be maintained as needed to ensure that it remains passable.

*Volcanic and seismic hazards.* The impacts would be the similar to those described for the Proposed Action and are considered less than significant for the same reasons described above.

*Exposure to contaminated soils.* The impacts would be the similar to those described for the Proposed Action and are considered less than significant for the same reasons described above.

# 8.10 BIOLOGICAL RESOURCES

## 8.10.1 Affected Environment

### *Introduction/Region of Influence*

Biological resources include plant and animal species and the habitats or communities in which they occur. This section is divided into discussions of general wildlife, vegetation, and habitat types common to PTA, including sensitive species and habitats known to occur or with the potential to occur in this area. Federal, state and locally regulated species are included in this report, along with rare species, identified by rapid population decline or whose habitat has markedly decreased in recent years.

The terrestrial portion of the PTA ROI (Figure 8-32) was based largely on the potential for damage from fires during training and, in the case of the military vehicle trail, damage due to the expansion of and increased activity on the trail. Fire has been evaluated to be the most far-reaching impact on PTA, with the exception of PTA Trail, because of its ability to affect a large area. Degradation of habitat due to physical activities around PTA Trail would have the greatest potential impact on the area due to the nature of activities proposed and allowed in their vicinity. The terrestrial portion of the PTA ROI also includes a 164-foot (50-meter) buffer on either side of the proposed trail, as well as a portion of the coast over which aircraft maneuvers may occur.

The marine portion of the PTA ROI (Figure 8-32 and Figure 3-13) involves the nearshore and offshore Pacific waters between O‘ahu and the island of Hawai‘i, the Pearl Harbor area of O‘ahu, the Kawaihae Harbor area of the island of Hawai‘i, and adjacent coastlines to the harbors. Marine habitat was considered because there will be continuing and slightly increased vessel transport of troops back and forth from O‘ahu and the island of Hawai‘i. Portions of this area are within the Hawaiian Islands Humpback Whale National Marine Sanctuary waters. Also, the construction of a fixed tactical tower at the Kawaihae Harbor area could potentially impact marine habitat. No harbor construction work is considered as part of this project action as impact analyses of that action would occur under separate NEPA documentation. The location and sensitivity of these marine ecosystems were taken into account when determining the marine portion of the PTA ROI for the Proposed Action.

Biological data were collected from numerous sources, including the USFWS, NMFS, HDLNR, HBS, HINHP, US Army PTA, and various biological surveys and environmental documents that are cited throughout this document. For details on pertinent regulations see Appendix N.

### *Recovery Plans*

Thirteen plant and six animal species with recovery plans are known to or have the potential to occur within the PTA ROI. These species are listed in Appendix I-1a.

**Figure 8-32**
Terrestrial and Aquatic Biological Region of Influence at the Pōhakuloa Training Area

### *Vegetation*

PTA is on the island of Hawaiʻi, on the west side of Humuʻula Saddle, a plateau formed by Mauna Kea and Mauna Loa. The surrounding lands are mostly designated as conservation district and are managed or leased by a variety of private landowners and the State of Hawaiʻi. Studies of the vegetation communities in the saddle region of Hawaiʻi date from 1861. The next study was in 1888, and these continued through the 1930s. A 1977 EIS by Environmental Impact Survey, Inc., provided a baseline vegetation listing, and the floristic inventory of PTA by CEMML began in 1988 and continues today. Approximately 38 percent of the plants found on PTA are indigenous or endemic and thousands of hours have been spent collecting information on their location and distribution. Endangered and threatened species and species of concern (all defined according to federal guidelines) are found on PTA. Vegetation communities occurring in the PTA ROI are identified in Figure 8-33 and described below.

Though PTA is the largest military training area outside of the continental US, almost one-third of the land has been deemed unsuitable for training. The impact area accounts for almost 50 percent of PTA, and no troop movement is permitted in this area. Additionally some of the terrain is inhospitable and unusable for training. Twenty-three separate training areas at PTA support a variety of military exercises. Outside of the PTA boundaries are grassy rangelands and pastures dominated by introduced vegetation (Figure 8-33). Mature native plants are rarely found in these communities disturbed by cattle though they can be found in rocky areas where cattle movement is unlikely. There is a unique vegetation community in the lower south end of the parcel, specifically *Leptecophylla-Ostomeles-Dubautia* shrubland, a lowland mesic shrubland community.

The Army uses the Kawaihae Military Reservation as its port facility for shipping equipment and ammunition from Oʻahu. A trail stretches from the Kawaihae Harbor to the installation, but it is seldom used. This trail is heavily weeded and described as extremely stony with a very fine sandy loam that is prone to erosion if not vegetated.

There are 24 vegetation communities on PTA (Shaw and Castillo 1997). It is important to note that numerous introduced plant species make up a significant portion of many of these habitats, and, additionally, introduced plants are components in all habitats on PTA. About 62 percent of the plants found at PTA are introduced species. Barren lava covers 25 percent of the installation. Lichens, such as *Stereocoulon vulcani,* and ferns, such as *Pella ternifolia,* are the first colonizers of these flows, though fountain grass *(Pennisetum setaceum)* is invading barren areas.

There are four types of *Metrosideros* treeland, ranging from sparse to mixed intermediate. The dominant canopy vegetation in these areas is generally ʻōhiʻa. The mixed intermediate treeland has a second canopy layer made up of primarily *Myrsine lanaiensis* and naio (*Myoporum sandwicense).* Understory species include different densities of ʻaʻaliʻi, *Leptecophylla tameiameiae,* and, in some instances, *Osteomeles anthyllidifolia.* Fountain grass is invading all of these communities.

**Figure 8-33**

Vegetation Communities at the Pōhakuloa Training Area Terrestrial Biological Region of Influence

There are three types of *Dodonaea* shrubland: open, dense, and mixed. ʻAʻaliʻi *(Dodonaea viscosa)* is the dominant plant in each community, along with other native species, including ʻilima *(Sida fallax),* ʻāheahea *(Chenopodium oahuense),* and naio. Fountain grass is invading all of these communities.

*Leptecophylla* occurs either as a mixed shrubland community or as a component of *Leptecophylla-Dodonaea* shrubland. No rare plants are associated with these communities, though natives like *Leptecophylla tameiameiae*, naio, ʻaʻaliʻi, and *Sophora chrysophylla* are common.

*Chamaesyce* treeland is generally found hosting native species of *Chamaesyce olowaluana* (a species of concern), ʻilima, ʻāheahea, and ʻaʻaliʻi. *Chenopodium* shrubland and *Eragrostis aptopioides* grassland are similar communities with different dominant species. ʻĀheahea occurs sparsely as shrubs in the grassland, and *Eragrostis aptopioides* is the dominant native grass in the shrubland.

The remainder of the native natural communities is a combination of *Chamaesyce, Myoporum,* and *Sophora* species, with divisions based on the densities of species.

Kīpuka Kalawamauna Endangered Plants Habitat encompasses 7,869 acres (3,185 hectares) in the northwestern area of PTA. The endangered plants documented there are *Haplostachys haplostachya, Stenogyne angustifolia, Asplenium fragile* var. *insulare, Hedyotis coriacea, Silene lanceolata, Tetramoloipum arenarium* var. *arenarium,* and *Zanthoxylum hawaiiense*. Much of the area is fenced and allows limited vehicle access.

The Kīpuka ʻAlalā fenced unit is approximately 5,000 acres (2,023 hectares) and includes the former Multi-Purpose Range Complex in Training Area 23. Training in this area is restricted to small-scale dismounted maneuvers, but it has never been used (Gleason 2003). No SBCT training is planned for the 1,500 acres (607 hectares) containing the MPRC, though dismounted maneuver training would occur at the remaining sections Training Area 23. Rare species in this management area are *Hedyotis coriacea, Stenogyne angustifolia*, *Silene hawaiiensis*, *Zanthoxylum hawaiiense*, *Chamaesyce olowaluana*, *Hesperocnide sandwicensis*, *Tetramolopium humile* var. *sublaeve,* and *Haplostachys haplostachya.*

Other special status areas within the training area include palila critical habitat and emergency exclosures for individual or small groups of rare plants. Emergency exclosures currently protect *Hedyotis coriacea, Neraudia ovata, Portulaca sclerocarpa, Schidea hawaiiensis, Silene lanceolata, Solanum incompletum, Tetramolopium arenarium* var. *arenarium,* and *Zanthoxylun hawaiiense*.

### *West PTA Acquisition Area*

Adjacent to the northwest corner of PTA is the 22,675-acre (9,176-hectare) WPAA. Biological surveys in spring 2002 and 2003 (Palmer 2003) showed federally listed endangered plant species within the ROI: *Isodendrion hosake, Lipochaeta venosa, Haplostachys haplostachya, Stenogyne angustifolia,* and *Vigna o-wahuensis*. The plant communities are similar to those within PTA and include native and nonnative dominated shrublands and drainages of varying density and composition. Fountain grass is the dominant member of several grassland communities that can include a proportion of native shrubs, herbs, and trees. The highly disturbed communities are identified as *Eucalyptus* woodlots, nonnative forb lands, and pastureland, all of which contain native plants scattered through the area. No critical habitat for plants occurs within this portion of the ROI but Palmer (2003) noted several Significant Botanical Sites within the boundary at pu'u Nohona o Hae and pu'u Papapa. These significant areas support native vegetation communities that support numerous endangered species. There are no documented aquatic natural communities on PTA.

The Army seeks to preserve and stabilize the populations of federally listed plants on lands under their management. The Endangered Species Management program and the installation pest management activities combine and reduce the negative impacts of introduced species on the landscape (USARHAW and 25th ID[L] 2001a). Control of noxious weeds is required by the State of Hawai'i Noxious Weed Rules (USDA, no date) and is supported by AR 200-5, *Pest Management* (HQDA 1999).

PTA has federal and state listed noxious weeds. Though kikuyu grass *(Pennisetum clandestinum)* is included in this category, it is exceptional at PTA and is not invasive at high elevation dry ecosystems (Gleason 2003). Invasive and noxious weeds that are targeted for control on PTA include banana poka *(Passiflora mollissima),* Fountain grass (*Pennisetum setaceum)* and Russian thistle *(Salsola kali).* Other widespread weed species are controlled where they threaten native plants and communities.

Native plants are directly affected by populations of feral pigs *(Sus scrofa),* goats *(Capra hircus),* sheep *(Ovis aries),* and mouflon *(O. musimon),* which contribute to numerous ecological problems (Atlas 1998). The effects of these wild animals include trampled and grazed native plants and advanced erosion (HIHNP 1994). Browsing and otherwise destroying the native vegetation encourages nonnative plants to become established, severely affecting the habitat for native plants (Atlas 1998). Shooting of game mammals was suspended in 2000 and replaced with non lethal control efforts. Often areas are fenced and the individual animals lured out through one-way gates. Live-trapping is also used. These animals are then tagged and re-located to hunting areas. Aerial driving of sheep and goats was deemed largely unsuccessful as a removal method (USARHAW and 25th ID(L) 2001b).

Rats *(Rattus rattus* and *R. exulans hawaiiensis)* also are known to eat the fruit from certain species of native plants, seriously affecting the plants' reproduction (Atlas 1998; Shaw 1997; PCSU 2001, 87). An additional concern with rats on PTA is that they could eat newly found native snail populations. Proposed measures to control rats, cats and other small vertebrates include baiting and trapping (USARHAW and 25th ID(L) 2001b).

Human habitat disturbance on PTA includes disturbance by military training and construction activities. Trampling and dust associated with training activities could also adversely affect populations of rare plants and communities (Shaw 1997). Fire threat is high on PTA. Many of the native plant communities are interspersed with highly flammable introduced species. Additionally, the rugged terrain and vastness of the training area limit access for fire suppression and control. The Army has SOPs that reduce the potential for fire from training at PTA and on the lands leased from the neighboring ranch. The SOPs for the leased lands prohibit smoking and ensure vehicle traffic is confined as much as possible to roads and trails.

In 1989, PTA was the first Army location in Hawaiʻi to implement the LCTA component of the ITAM program (described in Chapter 2, Section 2.2.4). Through this program and the other ITAM components, PTA has developed a GIS database that includes data on landing zones, impact areas, firing points, soils, vegetation, and firebreaks, just to name a few. This information supports LCTA land use planning and decision-making and is instrumental in prioritizing potential LRAM projects. The SRA component of ITAM educates the troops and provides installation-specific guidance for maneuvers at PTA as some areas of PTA have significant restrictions on training.

### *Wildlife*

Zoological field surveys that have been made on PTA include those by Shallenberger (1977), David (1995), and Freed (1991). More recent surveys targeting native rare invertebrates, mammals, and birds were also conducted (Gon et al. 1993; HINHP 1998; USARHAW and 25th ID[L] 2001b), as were entomology surveys of the PTA lava tubes (Garcia and Associates 2003). There have been no specific reptile surveys on PTA because there are no native terrestrial reptiles and amphibians on the Hawaiian Islands. Surveys of PTA were made by the University of Hawaiʻi, the Bishop Museum Hawaiian Heritage Program, and the HINHP (1994), which are cited in the following section. These natural resource surveys have been used for the resource assessments in the *Biological Inventory and Management Assessment on the PTA for USARHAW* (HINHP 1994a), as well as the more recent PTA INRMP (USARHAW and 25th ID[L] 2001b). The following section describes the general presence of invertebrate, mammal, bird, and fish species.

#### Invertebrates

Native and endemic invertebrates on PTA include the Hawaiian helicoverpa moth (*Helicoverpa confusa)* and the Giffards rhyncogonus weevil (*Rhyncogonus giffardi*). Snails documented at PTA are *Letachatina* spp., *Euconulus gaetanoi*, *Nesopupa subcentralis*, *Nesovitrea hawaiiensis*, *Striatura* spp., and *Vitrina tenella.* The helicarionid land snail *(Philonesia* spp.*)* and succineid land snail *(Succinea konaensis)* were also observed on PTA (HINHP 1994; R. M. Towill Corp. 1997b; USARHAW and 25th ID[L] 2001b). Three endemic caterpillar species, *Schrankia* sp., were noted during recent surveys for native invertebrates at PTA lava tubes (Ganda 2003).

Surveys of PTA by HHP in 1993 detected the following nonnative snails: giant African snail *(Achatina fulica),* bradybaenid land snail *(Bradybaena similaris),* cannibal snail *(Euglandina rosea),* and the zonitid land snail *(Hawaiia minuscula)*. Humans have purposely or accidentally introduced these species to the island of Hawaiʻi. They now threaten the native snail species through competition for resources, predation, and the spread of disease (PCSU 1999, 155).

#### Amphibians

There are no native terrestrial amphibians on the Hawaiian Islands. Nonnative amphibians found on the island of Hawaiʻi include bullfrog *(Rana catesbeiana),* wrinkled frog *(R. rugosa),* giant toad *(Bufo marinus),* and Cuban tree frog *(Osteopilus septentrionalis)*. These species were introduced into Hawai'i from other countries and have inhabited areas where adequate aquatic habitat and surrounding vegetation exist. While these species have not been documented in PTA, they could occur in the general PTA ROI, which includes the proposed PTA Trail.

### *Reptiles*

There are no native terrestrial reptiles on the Hawaiian Islands. Nonnative reptiles found on the island of Hawai'i include the green anole *(Anolis carolinenesis),* mourning gecko *(Lepidodactylus lugubris),* stump-toed gecko *(Gehyra mutilata),* tree gecko *(Hemiphyllodactylus typus),* Indo-Pacific gecko *(Hemidactylus garnotii),* house gecko *(H. frenatus),* metallic skink *(Lampropholis delicata),* and gold dust day gecko *(Phelsuma laticauda laticauda)*. The only known terrestrial snake occurring on the Hawaiian Islands is the island blind snake *(Ramphotyphlops braminus)*. While these species have not been documented in PTA, they could occur in the general PTA ROI, which includes the proposed PTA Trail.

### *Terrestrial Mammals*

The Hawaiian hoary bat *(Lasiurus cinereus semotus)* is known to_occur on PTA (USARHAW and 25th ID[L] 2001b; Cooper et al. 1996). It is the only native terrestrial mammal in the Hawaiian Islands. The following nonnative species have been documented as occurring on PTA: feral pig *(Sus scrofa scrofa),* feral goat *(Capra hircus hircus),* feral cat *(Felis catus),* feral dog *(Canis familiaris),* Norway rat *(Rattus norvegicus),* black rat *(R. rattus),* feral sheep *(Ovis aries)*, mouflon sheep *(O. musimon)*, mongoose (*Herpestes auropunctatus*), and house mouse *(Mus musculus)*. The Polynesian rat *(Rattus exulans hawaiiensis)* may occur in the ROI. Cows *(Bos taurus)* presently graze in the Keamuku Parcel.

### *Birds*

Endemic species fairly common to PTA are 'apapane *(Himatone sanguines)* and Hawaiian 'amakihi *(Hemignathus virens virens)*. Endemic species with declining populations less common to but identified on PTA are 'i'iwi *(Vestiaria coccinea),* 'elepaio *(Chasiempis sandwichensis s.),* and 'ōma'o *(Myadestes obscurus)* (USARHAW and 25th ID[L] 2001b). The dark-rumped petrel *(Pterodroma phaeopygia sandwichensis)* is a federally listed endangered species known to occur on PTA. Nonnative bird species known to occur on PTA include Erchel's francolin *(Francolinus erckelii),* black francolin *(F. francolinus),* California quail *(Callipepla californica),* and Japanese quail *(Coturnix japonica)*. The house finch *(Carpodacus mexianus)* and Eurasian sparrow *(Paser domesticus)* are also species that have been introduced by humans on the island of Hawai'i.

### *Fish*

No natural aquatic systems occur on PTA (USARHAW and 25th ID[L] 2001b). Although Waiulaula Gulch and Makeahua Stream cross the proposed PTA Trail alignment, no fish data is available for the PTA ROI.

### *Marine Biological Resources*

The marine portion of the PTA ROI is shown in Figures 8-32 and 3-13. The nearshore and offshore Pacific waters between O'ahu and the island of Hawai'i, the Pearl Harbor area of O'ahu, the Kawaihae Harbor area of the island of Hawai'i, and coastlines adjacent to the harbors are included in the ROI. As part of the Proposed Action, there would be a slight increase in vessel transit activity between O'ahu and the island of Hawai'i. Boats would launch from Pearl Harbor with troops and equipment and would land at Kawaihae Harbor, and then return at the end of the training action. The 25th ID(L) units would offload and transit from Kawaihae Harbor to PTA. Some of the transit areas for the vessels between the two islands are within or in close proximity to the Hawaiian Islands Humpback Whale National Marine Sanctuary waters (composed of five separate areas abutting six of the major islands; see Figure 3-13). Designated sanctuary waters encompass the entire western portion of the island of Hawai'i and include waters just outside and surrounding Kawaihae Harbor. Designated sanctuary waters also occur outside of O'ahu at Penguin Banks which would be part of the transit route for crew-transporting vessels. Any adjacent coastline areas in the ROI may provide shore habitat for some marine wildlife, such as sea turtles and monk seals.

There is a coral reef area of management concern (known as a "hot spot") in the PTA ROI. Located at Kawaihae Harbor, this reef is identified as at risk both from extensive development at the commercial harbor and from recent and continued development at the small boat harbor. While the main issue affecting this reef is harbor construction, other causes of decline for this reef system include interruption of long-shore transport due to harbor development, consequent siltation of Pelekane Bay, and close proximity to important cultural sites (i.e. Pu'u Kohola Heiau) that causes increased recreational use and human presence (CRAMP 2003). Any harbor construction impacts would be addressed in a separate NEPA document. In addition to this reef identified as a management concern, there are other coral reefs in the coastal waters of the PTA ROI. One that is well known is Puako reef, approximately 8 to 10 miles (13 to 16 kilometers) from Kawaihae Harbor. There are no coral reef areas of management concern outside Pearl Harbor on O'ahu (CRAMP 2003).

Marine wildlife occurs in the PTA ROI in both the nearshore and offshore regions of Pacific waters. The harbor areas and adjacent coastline areas also provide habitat for marine wildlife. Kawaihae Harbor is on the leeward side of the island where waters are calmer and more protected. These waters provide good habitat for humpback mother and calf pods and for resting dolphin pods as well as sea turtles, potentially monk seals, and other marine wildlife.

Distributions and abundance of marine mammals and sea turtles in Pacific waters vary seasonally and spatially; that is, numbers and types of animals may vary in the nearshore versus offshore regions, as well as by the time of year (Calambokidis et al. 1997; Leatherwood et al. 1982; Mobley et al. 1999, 2000; NMFS 2000a-2000bb). Many marine mammal species occur year-round in Pacific waters. All marine mammal species are protected under the MMPA, regardless of whether they have additional protection under the ESA. Informal consultation with NOAA Fisheries has been initiated for marine mammals in the SBCT ROI. Both MMPA and ESA protected marine wildlife species that may occur in the PTA ROI either seasonally, permanently, or as transients, are listed in Table 8-19.

**Table 8-19**
**Sensitive Marine Wildlife Occurring or Potentially Occurring in Waters of PTA ROI**

| Scientific Name | Common Name | [1]Federal Status | [2]State Status | Habitat | Date Last Observed | Likelihood of Occurrence | Notes |
|---|---|---|---|---|---|---|---|
| ***Cetaceans and Pinnipeds*** | | | | | | | |
| *Balaenoptera acutorostrata* | Minke whale | * | - | May occur in nearshore or offshore waters | Known Currently | P | Most common northwest of the main seven-island chain or on leeward side of islands. May be incidentally sighted in waters adjacent to or between O'ahu and Hawai'i. |
| *B. Borealis* | Sei Whale | E* | - | Most likely in deeper offshore waters | Known currently | U | Rarely sighted in Hawaiian waters. |
| *B. edeni* | Bryde's whale | * | - | May occur in nearshore or offshore waters | Known Currently | P | Most common northwest of the main seven-island chain. May be incidentally sighted in waters adjacent to or between O'ahu and Hawai'i. |
| *B. musculus* | Blue whale | E* | - | Most likely in deeper offshore waters | Known currently | U | Heard in Hawaiian waters. |
| *B. physalus* | Fin whale | E* | - | Most likely in deeper offshore waters | Known currently | U | Heard but rarely sighted in Hawaiian waters. |
| *Berardius bairdii* | Baird's beaked whale | * | - | Most likely in deeper offshore waters | Known Currently | P | Expected to occur as transients in waters of the PTA ROI. |
| *Delphinus Delphis* | Common dolphin | * | - | Most likely in deeper offshore waters | Known Currently | U | May be incidentally sighted in waters between O'ahu and Hawai'i. |
| *Eubalaena glacialis* | Pacific right whale | E* | - | Unknown if depth is a criteria | Known currently | U | Most likely stray individuals from more northern population. |
| *Feresa attenuate* | Pygmy killer whales | * | - | May occur in nearshore or offshore waters | Known Currently | C | Known in the channels between the main islands. Has been documented off the coast of O'ahu. May occur in waters adjacent to or between O'ahu and Hawai'i. |
| *Globicephala macrorhynchus* | Short-finned pilot whale | * | - | May occur in nearshore or offshore waters | Known Currently | C | Known in the channels between the main islands. Common in nearshore or offshore areas in waters adjacent to or between O'ahu and Hawai'i. |
| *Grampus griseus* | Risso's dolphin | * | - | Most likely in deeper offshore waters | Known Currently | P | Most commonly sighted in offshore waters. May be seen in offshore areas in waters adjacent to or between O'ahu and Hawai'i. |
| *Kogia breviceps* | Pygmy sperm whale | * | - | Most likely in deeper offshore waters | Known Currently | P | Prefers deeper waters but occasionally seen in the channels between the main islands. May be seen in offshore waters between O'ahu and Hawai'i. |

**Table 8-19**
**Sensitive Marine Wildlife Occurring or Potentially Occurring in Waters of PTA ROI** *(continued)*

| Scientific Name | Common Name | [1]Federal Status | [2]State Status | Habitat | Date Last Observed | Likelihood of Occurrence | Notes |
|---|---|---|---|---|---|---|---|
| *K. simus* | Dwarf sperm whale | * | - | Most likely in deeper offshore waters | Known Currently | P | Prefers deeper waters but occasionally seen in the channels between the main islands. May be seen in offshore areas in waters adjacent to or between O'ahu and Hawai'i. |
| *Monachus schauinslandi* | Monk seal | E*, CH, D | - | More common in nearshore waters or hauled out on the coast. | Known currently | C | Most common northwest of the main seven-island chain. Incidental individuals known to haul out along main seven island shorelines. Anecdotal sighting on Kawaihae Beach. |
| *Megaptera novaeangliae* | Humpback whale | E* | - | May occur in nearshore or offshore waters | Known currently | C | Occurs throughout the main seven-island chain January through April. Occurs in all nearshore and offshore waters to the 100 fathom line adjacent to or between O'ahu and Hawai'i. |
| *Mesoplodon densirostris* | Blainsville's whale | * | - | Most likely in deeper offshore waters | Known Currently | C** | Prefers deeper offshore waters. Has been sighted off coast of O'ahu. May be seen in offshore areas in waters adjacent to or between O'ahu and Hawai'i. |
| *Orcinus orca* | Killer whale | * | - | May occur in nearshore or offshore waters | Known Currently | C** | Occasionally seen, especially in the channels between the main islands and at the northwest island chain. May be incidentally sighted in nearshore or offshore waters adjacent to or between O'ahu and Hawai'i. |
| *Peponocephala electra* | Melon-headed whale | * | - | May occur in nearshore or offshore waters | Known Currently | C** | Occurs especially in the channels between the main islands and at the northwest island chain. May also occur in nearshore or offshore areas adjacent to or between O'ahu and Hawai'i. |
| *Physeter macrocephalus* | Sperm whale | E* | - | Most likely in deeper offshore waters | Known currently | C | Most common off the north and eastern shores of the main seven islands. May be sighted in waters adjacent to or between O'ahu and Hawai'i. |
| *Pseudorca crassidens* | False killer whale | * | - | May occur in nearshore or offshore waters | Known Currently | C** | Occasionally seen in the channels between the main islands. May be sighted in nearshore or offshore waters adjacent to or between O'ahu and Hawai'i. |
| *Stennella attenuata* | Spotted dolphin | * | - | Most likely in nearshore, leeward coastal waters | Known Currently | C | Common along the coastline, especially on the leeward sides of the island. Occurs in both nearshore or offshore areas in waters adjacent to or between O'ahu and Hawai'i. |

**Table 8-19**
**Sensitive Marine Wildlife Occurring or Potentially Occurring in Waters of PTA ROI** *(continued)*

| Scientific Name | Common Name | [1]Federal Status | [2]State Status | Habitat | Date Last Observed | Likelihood of Occurrence | Notes |
|---|---|---|---|---|---|---|---|
| *S. coeruleoalba* | Striped dolphin | * | - | May occur in nearshore or offshore waters | Known Currently | P | More strandings sighted than live individuals. May be sighted in nearshore or offshore waters adjacent to or between O'ahu and Hawai'i. |
| *S. longirostris* | Spinner dolphin | * | - | Most likely in nearshore, leeward coastal waters | Known Currently | C | Common along the coastlines. Occurs in nearshore or offshore areas in waters adjacent to O'ahu and Hawai'i. |
| *Steno bredanensis* | Rough toothed dolphin | * | - | Most likely in deeper offshore waters | Known Currently | C** | Prefers deeper offshore waters but has been sighted off coast of O'ahu. May be sighted in waters adjacent to or between O'ahu and Hawai'i. |
| *Tursiops truncatus* | Bottlenose dolphin | * | - | May occur in nearshore or offshore waters | Known Currently | C | Common along the coastlines. Occurs in nearshore or offshore areas in waters adjacent to or between O'ahu and Hawai'i. Also common offshore in project area waters. |
| *Ziphius cavirostris* | Cuvier's beaked whale | * | - | Most likely in deeper offshore waters | Known Currently | C** | Most common of the beaked whales in project area waters. Prefers deeper offshore waters but can be common in nearshore or offshore areas in waters adjacent to or between O'ahu and Hawai'i. |
| ***Sea Turtles*** | | | | | | | |
| *Caretta caretta* | Loggerhead turtle | T | - | In project area; prefers nearshore waters | Known currently | U | Considered uncommon in PTA ROI waters |
| *Chelonia mydas* | Green turtle | T | - | In project area; prefers nearshore waters | Known currently | C | Nests annually on Hawaiian beaches; common in nearshore areas of any of the main seven islands. Most abundant sea turtle in PTA ROI waters. |
| *Dermochelys coriacea* | Leatherback turtle | E | - | In project area; prefers offshore waters | Known currently | C | Primarily occurs over deep oceanic waters; sighted equally as frequently off any of the main seven islands. This species is expected in project area waters, especially along the north shores and in offshore waters. |

**Table 8-19**
**Sensitive Marine Wildlife Occurring or Potentially Occurring in Waters of PTA ROI** *(continued)*

| Scientific Name | Common Name | [1]Federal Status | [2]State Status | Habitat | Date Last Observed | Likelihood of Occurrence | Notes |
|---|---|---|---|---|---|---|---|
| *Eretmochelys imbricata* | Hawksbill turtle | E | - | In project area; prefers nearshore waters | Known currently | U | Considered uncommon; a small number nest on the Island of Hawaii |
| *Lepidochelys olivacea* | Olive ridley turtle | T | - | In project area; prefers offshore waters | Known currently | U | Infrequently seen in Hawaiian offshore waters |

Sources: NMFS 2000a-bb; ONR 2000.

**Status:**

**[1]Federal:**
E = Endangered
* = Protected under MMPA
D = Depleted under the MMPA
CH = Critical habitat designated or proposed for designation
** = presence confirmed from aerial surveys but found at a distance offshore from the coastline, as discussed in Appendix I-1.

**[2]State**
/-/ = No Status

**Likelihood of occurrence in the project site**
C = Confirmed
P = Potentially may occur
U = Unlikely to occur

### *Whales and Dolphins Potentially Occurring in Hawaiian Waters of the PTA ROI*

Non-ESA listed but MMPA-protected marine mammals considered to have the potential to be found in Hawaiian waters, or in waters of the PTA ROI, include the following:

- Bryde's whales (*Balaenoptera edeni*);
- Minke whales (*B. acutorostrata*);
- Pygmy sperm whales *(Kogia breviceps*);
- Dwarf sperm whales (*K. simus*);
- Killer whales (*Orcinus orcina*);
- False killer whales (*Pseudorca crassidens*);
- Pygmy killer whales (*Feresa attenuate*);
- Pilot whales (*Globicephala macrorhynchus*);
- Beaked whale species (*Mesoplodon* and *Ziphius* spp.);
- Baird's beaked whale (*Berardius bairdii*);
- Melon-headed whales (*Peponocephala electra*);
- Bottlenose dolphins (*Tursiops truncatus*);
- Spinner dolphins (*Stenella longirostris*);
- Rough-toothed dolphins (*Steno bredanenis*) ;
- Risso's dolphin (*Grampus griseus*);
- Striped dolphin (*Stenella coeruleoalba*);
- Common dolphin (*Delphinus delphis*); and
- Several species of spotted dolphins, the most common of which is *Stenella attenuata.*

The natural history of these species, as well as specific documented locations either in or near the PTA ROI (if known), are described in Appendix I-1.

### ***Sensitive Species***

A list of all sensitive vegetation and wildlife and any critical habitat found in the region, according to USFWS and DLNR records, is found in Tables 8-19 through 8-21. An assessment of the likelihood of a species occurring on PTA was made where possible, based on the habitat requirements and geographic distribution of the species, existing on-site habitat quality, and the results of biological surveys of PTA. The Army has undergone ESA Section 7 consultation with USFWS for previous Army training and actions that would affect listed species such as the palila and its federally designated critical habitat (USFWS 1978, USFWS 1983a) as well as other listed species on the premises (USFWS 1986b). Natural history descriptions of sensitive species with the potential to occur in the ROI, and specific locations if known, are in Appendix I-1 (Recovery Plans I-1a; Plants I-1b; Wildlife I-1c; Critical Habitat I-1d).

### *Sensitive Plant Species*

The Army has funded botanical surveys on PTA since 1988, though other surveys date as far back as 1888 (USARHAW and 25th ID[L] 2001b). Approximately 38 percent of the plants found on PTA are indigenous or endemic. Endangered species, threatened species, and species of concern (all according to federal guidelines) are found on PTA, as well as a new species *(Tetramolopium* unnamed sp.*)* that could be included on the endangered species list as it is known only from three small populations on PTA. State and locally regulated rare species are included in this report, along with species that have experienced rapid population decline or whose habitat has markedly decreased in recent years. Table 8-20 lists sensitive plant species and their potential to occur in the PTA ROI. Documented occurrences of sensitive plant species in the PTA ROI are shown in Figure 8-34.

### *Sensitive Wildlife Species*

The following discussion includes a profile of only those sensitive wildlife species considered likely to be found in the project area. This information is based primarily on information from the PTA INRMP (USARHAW and 25th ID[L] 2001b, R. M. Towill Corp. 1997c); special species wildlife information was based on surveys conducted on PTA. In 1990 Dr. Freed conducted bird and mammal surveys at PTA (Freed 1991). Later surveys include David's two endangered and threatened species surveys conducted along designated palila critical habitat (David 1995), Cooper's studies of endangered seabirds and Hawaiian hoary bat (Cooper et al. 1996), and the HINHP's arthropod inventory (USGS 2001b). Annual avian surveys, with a focus on sensitive species, have been conducted on PTA since 1997 (HINHP 1998; Schnell et al. 1998; Schnell et al. 1999). The latest USFWS and survey information on species and habitat in the SBCT ROI has been incorporated into this evaluation of biological resources.

Nineteen sensitive species have been determined to have the potential to occur within the PTA ROI (USARHAW and 25th ID[L] 2001b). Information regarding the locations of sensitive species on PTA is based on previous analyses of PTA natural resources (USARHAW and 25th ID[L] 2001b; R. M. Towill Corp. 1997c; HINHP 2002). The majority of these species observations have been on the west and northwest of PTA where the BSAs are located. Little information is known as to species occurrences within the impact area because zoological surveys have not been conducted due to safety hazards. Table 8-21 lists sensitive terrestrial wildlife and their potential for occurring on the island of Hawai'i and Figure 8-35 shows the locations of sensitive terrestrial wildlife documented on the PTA ROI.

### *Marine Wildlife*

Six species of endangered whales occur in the Pacific tropical waters of Hawai'i. Of these, only one is considered likely to occur in the PTA ROI waters. This is the humpback whale *(Megaptera novaeangliae)*. The other listed species are the fin *(Balaenoptera physalus),* blue *(Balaenoptera musculus),* sei *(Balaenoptera borealis),* and pacific right *(Eubalaena glacialis);* and the sperm whale *(Physeter macrocephalus).*

**Table 8-20**
**Sensitive Plant Species Occurring on or Potentially Occurring at PTA ROI**

| Scientific Name | Hawaiian Name/Common Name | Federal Status[1] | State[2]/Global Status[3] | Habitat | Date Last Surveyed | Likelihood of Occurrence |
|---|---|---|---|---|---|---|
| *Asplenium fragile* var. *insulare* | -/fragile fern, lola | E, CH | -/- | Dry forest, subalpine shrubland, barren lava, and lava tubes | 1999 | C |
| *Chamaesyce olowaluana* | ‘akoko, kōkōmālei/ Maui milk tree | SOC | -/G2 | Multiple tree and shrubland types on PTA | 1999 | C |
| *Cystopteris douglasii* | -/- | SOC | -/G2 | Myoporum forest and shrubland | 1999 | C |
| *Dubautia arborea* | na‘ena‘e/- | SOC | -/- | Subalpine shrub and woodlands and alpine desert | 1999 | C |
| *Eragrostis deflexa* | Kalamalo/bent lovegrass | SOC | -/G1 | Multiple treeland and shrubland habitats on PTA | 1999 | C |
| *Exocarpos gaudichaudii* | heau/whisk broom sandalwood | SOC | -/G1 | Multiple treeland communities associated with *Metrosideros* | 1999 | C |
| *Festuca hawaiiensis* | -/Hawaiian fescue | C | -/-G1 | Multiple treeland and shrubland habitats on PTA | 1999 | C |
| *Haplostachys haplostachya* | honohono/Hawaiian mint | E | -/G1 | Multiple treeland and shrubland habitats on PTA, though with very small populations | 2002 | C |
| *Hedyotis coriacea* | Kio‘ele/- | E, CH | -/G1 | *Metrosideros* treeland communities | 1999 | C |
| *Hesperocnide sandwicensis* | -/- | C | -/G1 | All native vegetation communities at PTA | 1999 | C |
| *Isodendrion hosakae* | aupauka/- | E | -/- | Several dry shrubland habitats | 2002 | C |
| *Lipochaeta venosa* | nehe/- | E | -/- | Dry shrubland | 1999 | C |
| *Melicope hawaiensis* | manena/- | SOC | -/G2 | *Metrosideros* treeland and *Dodonaea* shrubland | 1999 | P |
| *Neraudia ovata* | ma‘aloa, ma‘oloa/ spotted nettle brush | E, CH | -/G1 | *Metrosideros* treeland and *Myoporum* shrubland communities | 1999 | C |
| *Portulaca sclerocarpa* | ‘ihi, poe/hard fruit purslane | E, CH | -/G1 | Barren lava and *Metrosideros* treeland communities | 1999 | C |
| *P. villosa* | -/- | - | -/G1 | *Metrosideros* treeland communities | 1999 | P |
| *Schiedea hawaiiensis* | ma‘oli‘oli/- | SOC | -/- | Subalpine dry forests | 1999 | C |
| *Silene hawaiiensis* | -/Hawaiian catchfly | T, CH | -/G1 | Multiple tree, shrub, and grasslands and on barren lava | 2002 | C |
| *S. lanceolata* | -/lanceleaf catchfly | E, CH | -/G1 | Multiple tree, shrub, and grasslands and in dry habitats | 1999 | C |

**Table 8-20**
**Sensitive Plant Species Occurring on or Potentially Occurring at PTA ROI** *(continued)*

| Scientific Name | Hawaiian Name/Common Name | Federal Status[1] | State[2]/Global Status[3] | Habitat | Date Last Observed | Likelihood of Occurrence |
|---|---|---|---|---|---|---|
| *Solanum incompletum* | pōpolo kū mai/- | E, CH | -/GH | Sparse *Metrosideros* treelands and *Myoporum* shrublands | 1997 | C |
| *Spermolepis hawaiiensis* | -/Hawaiian parsley | E, CH | -/G1 | Multiple tree, shrub, and grasslands and in dry habitats | 1999 | C |
| *Stenogyne angustifolia* | Maʻohiʻohi/creeping mint | E | -/G1 | Multiple tree and shrublands and on barren lava | 2002 | C |
| *Tetramolopium arenarium* var. *arenarium* | -/Mauna Kea pāmakani | E, CH | -/G1 | *Dodonaea* mixed shrubland | 1999 | C |
| *T. unnamed* sp. *leptophyllum* var. *leptophyllum* | -/narrow leaf pāmakani | - | -/G1 | Multiple tree and shrubland communities | 1999 | C |
| *Vigna o-wahuensis* | mohihihi/- | E,CH | -/- | Lowland shrublands, dry to moist | 2002 | C |
| *Zanthoxylum hawaiiense* | heaʻe, aʻe/Hawaiian yellow wood | E, CH | -/G1 | *Metrosideros* dominates dry and moist forests and on barren lava | 2002 | C |

Sources: USFWS 2002b; USARHAW and 25th ID[L] 2001b; HINHP 2002; Shaw 1997

Status:

**[1]Federal:**
E = Endangered
T = Threatened
SOC = Species of concern
C = Candidate species for listing
CH = Critical habitat designated

**[3]Heritage Global Rank:**

G1 = Species critically imperiled globally (typically 1-5 current occurrences)

G2 = Species imperiled globally (typically 6-10 current occurrences)
GH = Species known only from historical occurrences
/-/ = No Status

**[2]State**
/-/ = No Status

**Likelihood of occurrence on the project site**
C = Confirmed
P = Potentially may occur
U = Unlikely to occur

**Figure 8-34**
Sensitive Plant Species in the Pōhakuloa Training Area Terrestrial Biological Region of Influence

**Table 8-21**
**Sensitive Terrestrial Wildlife Species Occurring or Potentially Occurring at PTA ROI**

| Scientific Name | Hawaiian Name/ Common Name | Federal Status[1] | State[2]/Global Status[3] | Habitat | Date Last Observed | Likelihood of Occurrence |
|---|---|---|---|---|---|---|
| **Invertebrates** | | | | | | |
| *Euconulus (Nesoconulus)* sp.cf. *gaetanoi* | -/snail | SOC | -/- | Not available | 1998 | C |
| *Helicoverpa confusa* | -/Hawaiian helicoverpa moth | SOC | -/G1 | Not available | 1998 | C |
| *Leptachatina* spp. (5 species) | -/snail | SOC | -/G1 | Not available | 1998 | C |
| *L. lepida* | -/Amastrid land snail | SOC | -/- | Not available | 1998 | C |
| *Nesopupa (Infranesopupa) subcentralis* | -/snail | SOC | -/- | Not available | 1998 | C |
| *Nesovitrea hawaiiensis* | -/snail | SOC | -/- | Not available | 1998 | C |
| *Philonesia* sp. | -/snail | SOC | -/- | Not available | 1998 | C |
| *Rhyncogonus giffardi* | -/Giffard's rhyncogonus weevil | SOC | -/G1 | Includes montane dry shrublands, dry to mesic forest and woodland | 1998 | C |
| *Striatura (Pesudohyalina)* sp. cf. *Meniscus* | -/snail | SOC | -/- | Not available | 1998 | C |
| *Striatura* sp. | -/snail | SOC | -/- | Not available | 1998 | C |
| *Succinea konaensis* | -/snail | SOC | -/- | Not available | 1998 | C |
| *Vitrina tenella* | -/snail | SOC | -/- | Not available | 1998 | C |
| **Birds** | | | | | | |
| *Branta sandvicensis* | nēnē/Hawaiian goose | E | E/G1 | Cropland, pasture, herbaceous rangeland, shrub brush rangeland, mixed rangeland, evergreen forest land, nonforested wetland, bare exposed rock and mixed barren land | 1999 | C |
| *Buteo solitarius* | ʻio/Hawaiian hawk | E | E/G1 | Cropland, hedgegrow, hardwood forest, herbaceous grassland and hardwood woodland | 1997? | P |
| *Chasiempis sandwichensis sandwichensis* | ʻelepaio/- | * | -/G4 | Native Hawaiian forest, hardwood woodland and forest, nonnative forest, riparian | 2000 | C |
| *Hemignathus munroi* | ʻakiapōlāʻau/- | E | E/G1 | Mesic to wet ʻōhiʻa, koa-ʻōhiʻa, and koa-māmane forests, dry māmane and māmane-naio forests; most common in mesic koa forests and woodlands | 1997? | C |
| *H. virens virens* | amakihi/- | + | -/G3 | Humid ʻōhiʻa forest, drier mamane-naio forest, subalpine scrub; at higher elevations and also in lowland mixed native-exotic forest | 2000 | C |
| *Himatone sanguinea* | ʻapanane/- | + | -/G4 | Hardwood forest, native and mixed native/nonnative forests in higher elevations | 2000 | C |
| *Loxoiides bailleui* | palila/- | E | E /G1 | Māmane and māmane/naio forests | 2000 | C |

**Table 8-21**
**Sensitive Terrestrial Wildlife Species Occurring or Potentially Occurring at PTA ROI** *(continued)*

| Species *(Scientific Name)* | Hawaiian Name/ Common Name | Federal Status[1] | State[2]/Global Status[3] | Habitat | Date Last Observed | Likelihood of Occurrence |
|---|---|---|---|---|---|---|
| *Myadestes obscurus* | ʻōmaʻo/- | + | -/G4 | Primarily inhabits mesic and wet native ʻōhiʻa and mixed ʻōhiʻa and koa forests above 1000 meters elevation; also found in mixed tree fern ʻōhiʻa habitat in Hawaiʻi Volcanoes National Park, ʻōhiʻa scrub on lava flows, kipukas, and treeless alpine scrub | Unknown? | P |
| *Pterodromoa phaeopygia sandwichensis* | ʻuaʻu/Hawaiian dark-rumped petrel | E | E/G1 | Open ocean; breeds along barren mountain slopes | 1996? | P |
| *Vestiaria coccinea* | ʻiʻiwi/Hawaiian honeycreeper | + | -/G4 | Native forests especially ʻōhiʻa *(Metrosideros)* forest | 1999? | P |
| **Mammals** | | | | | | |
| *Lasiurus cinereus semotus* | -/Hawaiian hoary bat | E | E/G5T2 | Bare rock, cliff, hardwood forest, grassland/herbaceous, hardwood woodland, and riparian habitats | 1996 | C |

Sources: USARHAW and 25th ID[L] 2001b; HDLNR 2002a; R. M. Towill Corp. 1997b; USGS 2001b; NatureServe 2001; Virginia Tech 1998

Notes:
*The state endangered listing refers only to the populations on Oʻahu, Lanai, and Molokaʻi.

Status:

**[1]Federal:**
E = Endangered
SOC = Species of concern
+ = Birds of Conservation Concern

**[3]Heritage Global Rank:**
G1 = Species critically imperiled globally (typically 1-5 current occurrences)
G3 = Species with restricted range, rare globally (typically 20-100 current occurrences)
G4 = Species apparently globally secure
G5 = Species demonstrably globally secure
T1 = Subspecies critically imperiled globally (typically 1-5 current occurrences)
T2 = Subspecies imperiled globally (typically 6-10 occurrences)

**[2]State**
E = Listed as endangered
/-/ = No Status

**Likelihood of occurrence on the project site**
C = Confirmed
P = Potentially may occur
U = Unlikely to occur

**Figure 8-35**
Sensitive Wildlife Species in the Pōhakuloa Training Area Terrestrial Biological Region of Influence

There is one Federally listed endangered seal, the monk seal *(Monachus schauinslandi)*. The monk seal has critical habitat in the northwestern portion of the Hawaiian Island chain, outside of the PTA ROI.

There are five listed sea turtles that could occur in the Pacific tropical waters of Hawai'I and could potentially occur in the PTA ROI. The most likely of these are the green sea turtle *(Chelonia mydas),* which is federally threatened, and the leatherback sea turtle *(Dermochelvs coriacea),* which is federally endangered. The green sea turtle is the most likely to occur in the coastal portions of the PTA ROI. The leatherback turtle is expected to occur most commonly in offshore waters. Adult leatherbacks are commonly sighted in the waters off the outer Hawaiian Islands (NOAA Fisheries 2000z). The other species, i.e. the loggerhead *(Caretta caretta gigas),* hawksbill *(Eretmochelys imbricata),* and olive ridley *(Lepidochelys olivacea),* are less common but have the potential to occur. Hawksbills and green sea turtles nest annually on Hawaiian beaches (ONR 2000) though no nests for either species have been documented in the PTA ROI. The hawksbill species is considered uncommon in Hawaiian waters, but does have nesting sites on Hawai'i and Moloka'i (NOAA Fisheries 2000y) are distant from the ROI. Loggerheads and olive ridleys are known to occur in Hawaiian waters as they occur as bycatch in the longline fishery, but they are predominantly pelagic species. Loggerheads are known to spend 40 percent of their time at the surface, and olive ridleys are only at the surface 20 percent of the time and tend to be found in shallower waters than loggerheads (Polovina et al. 2000). Olive ridleys are the most abundant sea turtles in the world (Polovina et al. 2000) though they are less common in Hawaiian waters. Most records of olive ridley are from entanglements and strandings (NOAA Fisheries 2000aa).

The green sea turtle is expected to be the most common near the coastlines, while the other species would more likely be in the offshore waters along the transit lines for the vessels traveling between Oahu and the island of Hawaii.

Of these ESA-listed marine wildlife, the most likely occurrences in the ROI would be for the humpback whale, the sperm whale, the monk seal, and both the green and leatherback sea turtle. Table 8-19 lists the likelihood of occurrence of these species within the project area and associated habitat and regulatory information. The natural history of these species, as well as specific documented locations either in or near the PTA ROI (if known), is described in Appendix I-1.

### *Humpback Whale (FE/MMPA)*

The waters off the coasts of the Hawaiian Islands are known for their seasonal population of humpback whales, which are also the most abundant marine mammal throughout the Hawaiian waters (Mobley et al. 2001). The Hawaiian Islands serve as an important breeding ground for this species (Calambokidis et al. 1998). The humpback whale is the only one of the five endangered baleen whales potentially occurring in Hawaiian waters that is known to be present in reasonably large numbers. The International Whaling Commission and NOAA Fisheries consider the Hawaiian population of humpbacks to be a separate stock (NOAA Fisheries 2000a). Humpback whales are found throughout the island chain and are most abundant in coastal waters of the main Hawaiian Islands, including Hawai'i and O'ahu, from November through April, with peak abundance occurring from late February through mid-

March (Baker and Herman 1981). Approximately two-thirds of the entire North Pacific humpback whale population (approximately 4,000 to 5,000 whales) migrate to Hawaiian waters to breed, calve, and nurse (NOAA Fisheries 2000a). These whales are generally found in shallow waters shoreward of the 600-foot (183-meter) depth contour (ONR 2000).

Humpback whale mothers and calves prefer the calmer shallower waters often found on the leeward sides of the islands (Smultea 1992), and they prefer very shallow water less than 60 feet (18 meters) (ONR 2000; Smultea 1992). Some results suggest that habitat use patterns of females and calves in nearshore areas may decrease as a result of increasing vessel traffic and human activities (ONR 2000). Humpback whales are vulnerable to human disturbance in Hawaiian waters and possibly to vessel strikes. Hawai'i regulations prohibit boats from approaching within 100 yards (91 meters) of adult whales and within 300 yards (274 meters) of mother/calf pairs. Humpback whales (of varying pod sizes and types, including mother and calf pods) are commonly sighted off the O'ahu coast and are confirmed in project area waters, though with unknown frequency, from January through April (Pickering 2003; Clark and Tyack 1998).

*Monk Seal (E/MMPA,D)*

The monk seal is the only pinniped (seal species) known to occur in the Hawaiian archipelago, and it is endemic. This species may occasionally occur in the waters or shore of the ROI. However, it is more common in the northwest island chain. Incidental transients are known at all of the main seven islands, and two individuals are known from the North Kohala area of the island of Hawaii. There is a small uncounted population on the island of Ni'ihau (NOAA Fisheries 2000w). The species was designated as depleted under the MMPA in 1976, following a large decline in animal counts from the late 1950s and mid 1970s. The monk seal was also listed as endangered under the ESA in 1976. In 1988, NOAA Fisheries designated critical habitat for the Hawaiian monk seal but this area is quite distant from the ROI. It is designated in 10 areas of the northwestern Hawaiian Islands, extending from shore to a distance offshore to 20 fathoms (180 feet, or 55 meters) of depth. The species is managed as one stock, though each island may in fact have its own subpopulations (NOAA Fisheries 2000w). Virtually nothing is known about its distribution and movement patterns when it is at sea. Current estimates indicate that the monk seal population is declining and is believed to include approximately 1,000 animals. Hawaiian monk seals breed primarily at Laysan Island, Lisianski Island, and Pearl and Hermes Reefs but also are known to use the Midway Islands, among other northwest Hawaiian Islands (NOAA Fisheries 2000w).

*Green sea turtle (FT)*

The green sea turtle is considered the most abundant turtle in Hawaiian waters (Zug et al. 2002; ONR 2000; NOAA Fisheries 2000x-z, 2000aa, 2000bb). The Hawaiian population of nesting green sea turtle comprise a distinct genetic unit (Zug et al. 2002). Except during their post-hatching pelagic phase, this species spends the majority of time in coastal waters, shallow bays, and nearshore areas where foraging is optimal (Brill et al. 1994; Zug et al. 2002). Juveniles and subadult green turtles are especially abundant in the nearshore areas. These turtles have nested on all of the seven main islands (Dollar 1999). The most accurate abundance estimates for adult female green turtles which nest annually on Hawaiian beaches are from 450 to 475 animals, with the majority of reproduction taking place at the French

Frigate Shoals (Balazs 1980; NOAA Fisheries 2000x, 2000y). Submergence intervals vary by behavior. When the animals are resting, they have regular, long submergence intervals. When feeding, submergence interlace are short and irregular (Brill et al. 1994). In Hawaii, 40 – 60 percent of immature green sea turtles suffer from fibropapillomatosis, a disease that causes tumor growth (Work et al. 2003). Studies are currently ongoing to assess the impacts of these tumors on the animal's behavior.

Green sea turtles are expected to occur especially in the coastal portions of the ROI or on beach habitats. This species is known to feed on marine plants that occur in the ROI and in the nearshore areas. The PTA ROI does have sea turtle foraging and resting areas. Green sea turtles have been shown from some Hawaiian areas to remain within a small portion of a habitat area if foraging and rest habitat is optimal there, and to have short submergence intervals (Brill et al. 1994). During the breeding season, adult green sea turtles undertake long-distance oceanic migrations from feeding areas throughout the Hawaiian archipelago to nesting beaches at French Frigate Shoals, Laysan Island, Lisianski Island, Pearl Reef and Hermes Reef, Cure Atoll, and Midway Island. It is hypothesized that green turtles in the Hawaiian archipelago could be a genetically distinct subpopulation (NOAA Fisheries 2000x). The majority (90 percent) of green turtle nesting in the Hawaiian Islands occurs far distance from the ROI at the French Frigate Shoals, the portion of the islands that are 800 miles (1,482 kilometers) northwest of the main Hawaiian Islands, consisting of a string of 11 small island regions.

#### *Leatherback sea turtle (FE)*

Leatherbacks do not nest regularly or in great numbers in the Hawaiian Islands (NOAA Fisheries 2000x, 2000aa). Adult leatherbacks are commonly sighted in the Pacific Ocean near the Hawaiian archipelago, primarily over deep oceanic waters. Leatherbacks could occur equally as frequently off any of the main seven islands, but they are often sighted off the north shores of both O'ahu and the island of Hawai'i (NOAA Fisheries 2000z; ONR 2000). They are considered to have the potential to occur in ROI waters (NOAA Fisheries 2000z).

### *Sensitive Habitats*

#### *Critical Habitat*

Critical habitat designation ensures that any USFWS authorized action on that land is not likely to result in destruction or adverse modification of that habitat. Critical habitat was designated for 41 plants on the Island on Hawaii in 2003.

Army lands were excluded from critical habitat based upon a rationale that recognizes and emphasizes the essential contribution that Army-led natural resource conservation actions play in the recovery of threatened and endangered species. These contributions include ongoing and proposed management actions specified in Integrated Natural Resource Management Plans (INRMPs) and other natural resource conservation programs. The INRMPs for Army installations on the islands of Oahu and Hawaii complement and support recovery goals through monitoring, invasive species control, and endangered species management, thereby providing conservation benefits to listed species.

There are presently four noncontiguous specially managed vegetation areas on PTA. These areas were designated as such because of their botanical composition or rare species potential habitat. Areas additional to these are fenced units protecting individuals or populations of rare plants. In addition, there are Botanically Significant Areas within the Region of Influence (ROI) of the proposed action outside of Army installation boundaries in the West PTA Acquisition Area (Palmer 2003).

Palila critical habitat was first designated in 1977 when the USFWS dedicated 60,187 acres (24,357 hectares) for their protection (USFWS 1977a and 1977b). There are 2,569 acres (1,040 hectares) of this habitat are in two noncontiguous areas on PTA (Figure 8-36). The vegetation of critical habitat area A, adjacent to the BAAF, is mostly *Dodonaea* shrubland, with *Eragrosits atropoides,* māmane *(Sophora chrysophylla),* and naio *(Myoporium sandwicense)*. There are no firing points in this area. Critical habitat area B is mainly māmane and naio open forest, *sophora myoporum* shrubland with grass understory, and contains 11 firing points (USARHAW and 25th ID[L] 2001b). There is no plant critical habitat designated within the ROI.

### Hawaiian Islands Humpback whale National Marine Sanctuary

The Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS) was designated under the National Marine Sanctuaries Act ( 16 U.S.C. 1431 et seq., P.L. 106-513). This act was enacted to designate and manage areas of the marine environment with special national significance as National Marine Sanctuaries. The primary objective of this law is to protect marine resources. The Act also directs the Secretary of Commerce to facilitate all public and private uses of those resources that are compatible with the primary objective of resource protection. Sanctuaries are managed according to site-specific Management Plans prepared by the NOAA Fisheries. HIHWNMS waters are composed of five separate areas abutting six of the major islands. Designated sanctuary waters encompass the entire western portion of the island of Hawai'i and include waters just outside and surrounding Kawaihae Harbor (see Figure 3-13).

### Biologically Significant Areas

The Hawai'i Natural Heritage Program has defined three types of BSAs for managing important natural communities (Figure 8-37). Areas outside of PTA proper but within the ROI, such as PTA Trail and Kawaihae Harbor, have not been evaluated for BSA status.

BSA1 contains a high density of federally listed endangered, proposed endangered, or candidate species; approximately 11,618 acres (4,702 hectares) within PTA proper is designated as BSA1. This includes a portion of Kipuka Kalamauna endangered plants habitat and Pu'u Kapele, which is the site of a large population of *Haplostachys haplostachya* (USARHAW and 25th ID[L] 2001b).

**Figure 8-36**
Federally Designated Palila Critical Habitat in the Pōhakuloa Training Area Terrestrial Biological Region of Influence

**Figure 8-37**

Biologically Significant Areas Found in the Pōhakuloa Training Area Terrestrial Region of Influence

BSA2 contains all or some of the following: lower densities of current occurrences of federally listed endangered or proposed endangered species, current occurrences of candidate species or other species of concern that are expected to be upgraded to federally protected status within the next few years, and areas judged likely to contain high densities of federally listed species based on habitat assessment, despite the lack of any record of such occurrence to date. Approximately 20,909 acres (8,462 hectares) of BSA2 are identified in PTA proper.

BSA3 is stands of intact native vegetation, with few known occurrences of rare elements. These areas are valuable for their remnant natural vegetation and the potential to support reintroduced special status species. BSA3 areas make up a large portion of PTA, including a large portion of central and southern PTA. There are 45,841 acres (18,551 hectares) of BSA3 occurring within PTA proper.

### 8.10.2 Environmental Consequences

In response to the agency and public comments received during the Draft EIS comment period we reevaluated our analysis of the biological resources. As a result of considering these comments and a reanalysis of the available information, we recognize that the impact to biological resources from fire could not be mitigated to the less than significant level. However, these impacts will be substantially reduced as a result of mitigation.

#### *Summary of Impacts*

Biological resources that have been considered include vegetation communities, wildlife, sensitive species, and sensitive habitats. All biological resources have been assessed for potential impacts from project activities. Significant impacts have been identified from fire and from construction and training activities, both of which would occur to sensitive species and habitat. Significant impacts mitigable to less than significant have been identified for impacts from the spread of nonnative species from construction and troop movements on sensitive species and sensitive habitat. Less than significant impacts have been identified from construction and training on general vegetation and wildlife, for migratory birds from the FTI construction, from noise and visual effects from construction and other project activities on wildlife, from vessel transport on marine wildlife and habitat, and runoff impacts on marine wildlife and coral ecosystems. For a full description of the impact methodology used to determine impact on a resource please refer to chapter 4.10. Only the resources potentially affected are included in this chapter. If a resource was determined not to be impacted, it has not been included for discussion. A summary of significant and less than significant impacts is provided in Table 8-22.

#### *Proposed Action (Preferred Alternative)*

Implementing the Proposed Action would increase the amount of land used for training ranges and maneuver lands, which would directly and indirectly impact biological resources.

##### Significant Impacts

*Impact 1: Impacts from fire on sensitive species and sensitive habitat.* Wildfire is a great threat to flora and fauna communities at PTA. An increase in construction and training at PTA would increase the likelihood of wildfires, which can spread rapidly and affect areas outside of the initial ignition area.

**Table 8-22**
**Summary of Potential Biological Impacts at PTA**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Impacts from fire on sensitive species and sensitive habitat. | ⊗ | ⊗ | ⊗ |
| Impacts from construction and training activities on sensitive species and sensitive habitat. | ⊗ | ⊗ | ⊘ |
| Impacts from the spread of nonnative species on sensitive species and sensitive habitat. | ⊘ | ⊘ | ⊘ |
| Impacts from construction and training activities on general habitat and wildlife. | ⊙ | ⊙ | ○ |
| Threat to migratory birds. | ⊙ | ⊙ | ⊙ |
| Noise and visual impacts. | ⊙ | ⊙ | ⊙ |
| Vessel impacts on marine wildlife and habitat. | ⊙ | ⊙ | ⊙ |
| Runoff impacts on marine wildlife and coral ecosystems. | ⊙ | ⊙ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:
⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact
N/A = Not applicable

The use of various types of ammunition, weapon systems, and pyrotechnics during military training increases the risk of wildfire ignition. Proposed actions that could ignite fires include the use of BAX and the AALFTR. Fire sources associated with the proposed SBCT actions are discussed in detail in Chapter 8, Section 8.12, under fire hazards.

Federally listed species are known to occur within the immediate areas of the proposed ranges and in various areas throughout PTA and the WPAA (see Tables 8-20 and 8-21). Vegetation communities of PTA generally consist of montane dry forest and shrubland and subalpine dry forest and shrubland, all dominated by native species, while the WPAA is dominated by nonnative grasses and shrubs. BSAs that occur within the ROI and that would be affected by fire are presented in Figure 8-37. Species that occur within the surface danger zones of the proposed ranges could be affected by munitions during the operation of the proposed ranges. In addition to vegetation loss, major adverse ecological effects of wildland fires include reduced watershed stability, soil erosion, increased risk of weed invasion, and loss of native habitat. Increased fire frequency would affect the structure, composition, and function of ecosystems. An additional detrimental effect from fire is damage of and disturbance to native seedbeds. Though some native plants do show a degree of tolerance to fire and an ability to establish seedlings in a post-fire environment, these species are still not as vigorous as the nonnative colonizers with which they compete. The spread of nonnative species that results from wildfires is considered a significant impact because nonnative species often out-compete native species and destroy native communities, as addressed in Impact 3. Impacts from fire on sensitive species including federally listed species are expected to be significant. The mitigation measures below will substantially reduce the impacts but not to less than significant levels.

*Regulatory and Administrative Mitigation 1.* The effects of the proposed action on listed species in the ROI have been evaluated in the ESA Section 7 Consultation with USFWS. The Army will implement all the terms and conditions defined in the Biological Opinion issued by USFWS for current force and SBCT proposed actions on the island of Hawai'i, including the PTA Implementation Plan. These measures will help avoid effects and compensate for impacts on listed species that would result directly and indirectly from implementation of the proposed action. The Biological Opinion is available upon request.

The Integrated Wildland Fire Management Plan for Pohakoloa and Oahu Training Areas was updated on October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts associated with wildland fires. The plan is available upon request.

Prescribed burns will require separate ESA Section 7 consultation with USFWS.

*Impact 2: Impacts from construction and training activities on sensitive species and sensitive habitat.* The Proposed Action would result in short- and long-term impacts on listed species and their designated critical habitat within the ROI as a result of construction and increases and changes to training. Listed species affected by the Proposed Action include the following species:

- Plants: *Asplenium fragile* var. *insulare, Festuca hawaiiensis*, *Haplostachys haplostachya*, *Hedyotis coriacea, Hesperocnide sandwicensis*, *Isodendrion hosakae*, *Lipochaeta venosa*, *Neraudia ovata*, *Portulaca sclerocarpa*, *Silene hawaiiensis*, *S. lanceolata*, *Solanum incompletum*, *Spermolepis hawaiiensis, Stenogyne angustifolia*, *Tetramolopium arenarium* var. *arenarium*, *T. consaguinium* ssp. *leptophyllum* var. *leptophyllum*, *Vigna o-wahuensis,* and *Zanthoxylum hawaiiense.*
- Wildlife: *Branta sandvicensis, Buteo solitarius, Hemignathus munroi,* and the palila *(Loxoiides bailleui).*

The latest designation for plant critical habitat on the Island of Hawaii excluded Army training lands however, federally listed plant species do occur in populations on the Army training lands. Within the ROI one wildlife species, the palila, has critical habitat. Proposed activities border on the palila designated critical habitat (Figure 8-36) in the ROI. There are 2,569 acres of palila critical habitat within the ROI. The Army is responsible for maintaining this habitat in a condition suitable for the palila and, by doing so, contribute to the recovery of the species.

Construction activity and increased training would have adverse impacts on the habitat, deterring the recovery of the species. Battle Area Complex construction, for example, will destroy the easternmost population of *Haplostachys haplostachya*, significantly reducing the distribution of this species. Populations of *Silene hawaiiensis* are known from the footprints of the BAX and AALFTR, and up to 20 percent of the total number of existing plants of this species could be adversely affected by construction. One individual representing less than one percent of the total population of *Zanthoxylum hawaiiense* occurs in the BAX project area and would likely be affected by construction. Construction activities would also increase the spread of nonnative species (Impact 3).

There would be a limited short-term impact on critical habitat from construction of the FTI, the Range Maintenance Facility, and the BAAF runway upgrade/extension. Construction-related dust, noise, the spread of nonnative species (discussed in Impact 3), and increased fire hazard would adversely impact palila federally designated critical habitat. Long-term impacts on listed species and their critical habitat include habitat degradation and reduction from increased human activity, spread of nonnative species due to habitat disturbance, and the higher risk of people bringing nonnative species to the area on their clothing, equipment, or vehicles. The habitat degradation caused by vegetation trampling, erosion, and an increase in the visual presence of Soldiers in and around the critical habitat would damage plant habitat and deter wildlife use of the area. Stryker maneuvers in these areas are likely to adversely affect populations of *Stenogyne angustifolia* and *Vigna o-wahuensis*.

Changes to dismounted training would include activities in TA 23, while avoiding the 1,500 acres (607 hectares) around the MPRC. Troops would be transported to TA 23 by either Strykers or trucks using existing roads. Soldiers would begin dismounted training in tactical formations by walking in dispersed groups overland, toward a given objective. During simulated engagement some Soldiers may use ammunition consisting of blanks and laser weapons and seek concealment or cover during nonlive-fire training. Soldiers could trample listed plant species identified in the area, including *Silene hawaiiensis, Asplenium fragile* var. *insulare, Hedyotis coriacea, Silene lanceolata, Spermolepis hawaiiensis,* and *Zanthoxylum hawaiiense*(Figure 8-34). Listed wildlife, such as the nene, have been recorded in the proximity of TA 23 (Figure 8-35) and would be disturbed by noise of approaching Strykers, nonlive fire, and the increase in human presence in the area.

A moderate to large portion of vegetation within the construction footprints (approximately 10 to 30 percent) would be affected during construction of the proposed ranges. Native mammals and birds capable of escaping the area would be expected to vacate during construction and less mobile creatures, such as small mammals (nonnative) and invertebrates, could be killed during or as a result of construction of the proposed projects. Table 8-23 indicates the area of disturbance during construction of proposed ranges. Grading during construction would involve turning up the ground, moving topsoil and vegetation, and staging the heavy machinery area, would cause intensive short-term disturbance to vegetation. This represents a significant impact on native vegetation communities. Listed plant and wildlife are known to exist in the PTA ROI and would be affected by the loss and degradation of the PTA ROI (Tables 8-20 and 8-21).

**Table 8-23**
**Construction Impacts on Vegetation of Proposed Ranges**

| Proposed Range | Area of Construction Impact (approximate acres) | Existing Vegetation Communities (not including the surface danger zone) |
|---|---|---|
| Battle Area Complex | 600 (243 hectares) | *Myoporum* dominated tree and shrublands, *Metrosideros* treelands, *Sophora* shrublands, *Pennisetum* grasslands, and barren lava |
| Anti-Armor Live Fire Range | 75 (30.3 hectares) | Barren lava, *Metrosideros* treelands, *Sophora* shrublands, and *Myoporum* dominated tree and shrublands |

Source: Developed as part of ESA Section 7 consultation.

Off-road mounted maneuver would occur on approximately 31,230 acres (12,675 hectares) at PTA, primarily in the WPAA (Figure 2-6). Use of PTA Trail and the WPAA would increase the stress on the environment. The impact of all vehicle use in the PTA ROI is estimated at 92,794 MIMs as compared to the 13,659 MIMs based on all current vehicles. Long-term loss and degradation include the loss of open space areas in and around the areas proposed for project construction and in the WPAA where extensive off-road dismounted maneuver is proposed. A direct loss of habitat would be associated with the construction of PTA Trail. Sections of PTA trail would cross biologically sensitive areas with stands of intact, relatively common native vegetation types. Part of the reason that these communities still exist is their remote location. Opening this area up to the more direct effects of humans threatens these communities and their diversity. Hawaiian plant communities evolved without the environmental pressures that are prevalent on major landmasses and thus have no defense mechanisms to cope with these stresses. Fragmenting these sensitive communities interrupts corridors for species to naturally disperse, encourages the spread of nonnative plants, and limits the potential for nonnative species-dominated areas to be reclaimed to reintroduce native species.

Training restrictions on palila critical habitat, established based on ESA Section 7 consultation that occurred after the designation of critical habitat in 1977 (USARHAW and 25th ID[L] 2001b), would continue to apply to activities under the Proposed Action. Additional potential impacts such as the effects of increased noise in this area were investigated along with the effects on palila as a part of the most recent (2003) ESA Section 7 consultation. The increased likelihood of training-related fires and the increase in extent and intensity of such a fire is also a threat to this species and is discussed in detail in Impact 1. No off-road mounted maneuvers would be allowed in the critical habitat.

The Proposed Action would significantly impact sensitive species and sensitive habitat from construction and training activities. The mitigation measures below would substantially reduce the impacts but not to less than significant levels.

*Regulatory and Administrative Mitigation 2.* The Army will implement all the terms and conditions defined in the Biological Opinion issued by USFWS for current force and SBCT proposed actions on the island of Hawai'i, including the PTA Implementation Plan. These measures will help avoid effects and compensate for impacts on listed species that would result directly and indirectly from implementation of the proposed action. The Biological Opinion is available upon request. Some of the terms and conditions of the BO include:

- If a construction site is within 75 meters (246 feet) of a listed plant occurrence, then construction grading or earth moving operations shall be sprayed with water to reduce airborne dust.
- The Army will maintain a minimum of 12 percent ground cover in off-road maneuver areas on PTA.

The Army will implement land management practices and procedures described in the ITAM annual work plan to reduce erosion impacts (US Army Hawai'i 2001a). Currently these measures include: implementation of a training requirement integration (TRI) program; implementation of an Integrated Training Area Management (ITAM) program; Sustainable Range Awareness (SRA) program; development and enforcement of range regulations; implementation of an Erosion and Sediment Control Management Plan; coordinating with other participants in the Koolau Mountains Watershed Partnership (KMWP); and continued implementation of land rehabilitation projects, as needed, within the Land Rehabilitation and Maintenance (LRAM) program. Examples of current LRAM activities at KTA include: revegetation projects involving site preparation, liming, fertilization, seeding or hydroseeding, planting trees, irrigation, and mulching; a combat trail maintenance program (CTP); coordination through the Troop Construction Coordination Committee (TCCC) on road maintenance projects; and development of mapping and GIS tools for identifying and tracking progress of mitigation measures.

Regulatory and Administrative mitigation measures identified in Section 8.8, Water Resources and Section 8.9, Geology, Soils, and Seismicity, would lessen this impact on sensitive species and habitat.

*Additional Mitigation 2:* The Army proposes to fence or flag where practicable any sensitive plant communities from activities that may take place in the ROI. The Biological Opinions outline fencing for the majority of the sensitive species. USARHAW will evaluate if additional fencing may be necessary.

### *Significant Impacts Mitigable to Less than Significant*

*Impact 3: Impact from the spread of nonnative species on sensitive species and sensitive habitat.* The Proposed Action would lead to an increase in nonnative species for the short and long term in the PTA ROI. In general, nonnative species (both plant and animal) pose a threat to Hawaiian native ecosystems (Atlas 1998).

Introduction or spread of existing or new aggressive nonnative plant species can alter native plant habitat and create competition with native and sensitive plants for space, nutrients, and light (Atlas 1998). Invasive plants have an advantage in becoming established in an environment that is stressed and can often out-compete native species that are not adapted to the novel environment created through human activity (Wagner et. al. 1999). Nonnative species often benefit from fires, due to their ability to colonize areas following a burn. In addition, nonnative plant species are frequently more flammable than native plant species, so that fires are more likely to occur and affect the populations to a larger extent. Although most plant species in and around the proposed PTA Trail and the WPAA are nonnative, there is the possibility that the area could be further disturbed, by increasing the fire hazard for surrounding sensitive areas and species. This impact would affect the sensitive plant species and sensitive wildlife species (Tables 8-20 and 8-21) that are likely to occur within the PTA ROI.

Movement of troops and equipment into Hawai'i from continental US or foreign ports, as well as from other islands or subinstallations within Hawai'i would increase the likelihood of nonnative plant introductions. Construction workers and equipment used to build the PTA Trail, the construction at BAAF, and range ground softening would introduce and spread nonnative species. The BAAF runway upgrade and expansion also risk introducing animal species because the airplanes are more likely to bring in nonnative species by transporting cargo, stored goods, and additional Soldiers.

Implementation of the Proposed Action would increase the number of vehicles traversing PTA Trail, including both Strykers and conventional vehicles. There would be 145 trucks and HMMWVs and 96 Strykers that would travel from Kawaihai Harbor to PTA twice a year. This would be an increase in 105 trucks per event from existing current force use patterns and a 100 percent increase in Stryker use. Ninety percent of the Strykers and sixty percent of the trucks would travel along the PTA Trail. Strykers have a more intense impact on the land than do conventional military vehicles already in use (discussed in Impact 3). The more intense impact on the land would increase the potential for the spread and establishment of nonnative and invasive plant species. Dismounted training in Training Area 23 would likely introduce and spread nonnative species in this high value habitat which supports many sensitive species. The Proposed Action would also increase the likelihood of a fire in the ROI, as detailed in Impact 1.

Nonnative wildlife species are an existing problem in the ROI that would not change as a result of implementing the Proposed Action. The prolonged prohibition of hunting in certain areas due to the presence of unexploded ordnance could be a factor in the proliferation of nonnative mammals at PTA.

*Regulatory and Administrative Mitigation 3.* As required in the terms and conditions of the Biological Opinions, the Army will:

- Educate soldiers and others potentially using the facilities and roads in the importance of cleaning vehicles, equipment and field gear.

- Educate contractors and their employees about the need to wear weed-free clothes and to maintain weed-free vehicles when coming onto the construction site and to avoid introducing nonnative species to the project site.

- Prepare a one-page insert to construction contract bids informing potential bidders of the requirement.

- Inspect and wash all military vehicles at wash rack facilities prior to leaving PTA to minimize the spread of weeds, such as fountain grass, and animal (invertebrate) relocations.

- Ungulates shall be removed from all future fence exclosures to include the western fence unit and all eastern fence exclosures. The existing fenced areas, Kipuka Kalawamauna, Kipuka Alala, and Puu Kapele shall remain basically ungulate free. In addition, the existing fence exclosures on the Keamuku Parcel around Puu Papapa and Puu Nohonaohae shall remain ungulate free and upgraded if necessary. All ungulates shall be removed from the new fence exclosures by 2010. An annual aerial survey of each fenced area shall be conducted after 2010 to ensure that ungulates have not returned to the fence units. Ground surveys will ensure the fencelines are intact. If ungulates are observed, appropriate hunts or snaring shall immediately commence to remove these animals. The objective is to keep all fence units ungulate free, however, complete removal of ungulates may be difficult to maintain at all times due to the size, topography and/or density of vegetation within the various exclosures. However, the goal is to have all fence units as ungulate free as practicable. The Implementation Team shall address the frequency and logistics associated with fence maintenance and hunting programs to accomplish the ultimate objective.

- If a new introduction of a nonnative animal is found, the source and time of the introduction will be identified, and the area will be searched and treated with an appropriate pesticide to eradicate any other individuals of the target species that may be present. In addition, an area deemed adequate to cover the potential dispersal distance of the new nonnative animal will be searched and treated as well.

USARHAW will follow HQDA guidance developed in consultation with the Invasive Species Council and compliance with Executive Order 13112, which determines Federal Agency duties in regards to preventing and compensating for invasive species impacts. USARHAW will agree to all feasible and prudent measures recommended by the Invasive Species Council that would be taken in conjunction with SBCT action to minimize the risk of harm. The Implementation of an Environmental Management System will further improve the identification and reduction of environmental risks inherent in mission activities.

In accordance with USDA regulations and requirements, cargo originating outside of Hawai'i will be inspected by USDA and certified to ensure it is not carrying the brown tree snake or other reptiles before transporting cargo for use on training ranges.

*Additional Mitigation 3:* The Army proposes to use native plants in any new landscaping or planting efforts where practicable. When practicable, natural habitats would remain intact or adjacent areas would be restored as habitat.

### Less than Significant Impacts

*Impact 4: Impact from construction and training activities on general habitat and wildlife.* The Proposed Action is expected to have a less than significant impact on general vegetation, wildlife, and habitat at PTA. Impacts from trampling and an associated reduction in vegetative groundcover would result in loss and degradation of habitat for general vegetation, wildlife, and habitat and would be similar to impacts described under Impact 2, for to sensitive species but since these activities would take place primarily in areas of nonnative vegetation less than significant impacts are expected. The Proposed Action would disturb general vegetation and wildlife by removing vegetation, deterring wildlife from foraging, and promulgating other general degradation effects that would result from elevated human activity in the PTA ROI but not to a significant level.

Nonnative vegetation communities and barren lava prevail in the areas of proposed construction. As mentioned in the affected environment section, these communities are all affected by fountain grass, which can rapidly invade a disturbed community. Impacts in these areas would include trampling and disturbance from vehicles and military personnel. Communities within the proposed range areas would be disturbed by trampling and general operation of the ranges. In addition, operation of the proposed ranges could affect biological resources within the impact area and associated surface danger zones. The use of certain types of ammunition increases the chances of starting fires in the impact area and within the surface danger zones. The potential introduction of fire resulting from the operation of the proposed ranges is discussed under Impact 1 and Impact 3.

Due to the weight of the Stryker vehicle, vegetation in areas where the Stryker performs off-road maneuvers likely would be crushed or flattened along tire paths. Stryker maneuvers would generally occur in unforested areas at PTA that contain nonnative vegetation communities. There are areas with high concentrations of native species that will be avoided as discussed under Impact 2. Stryker operations on roads and trails within the installation would not be expected to affect biological resources. Off-road maneuvers would not adversely affect general biological resources. However, the Army would implement SOPs to prevent adverse impacts on biological resources.

Vehicle movements on the ranges and through maneuver training areas would disturb soils and increase the amount of dust in the air. Additional impacts to the soils in the ROI are discussed in section 8.9. Additional impacts associated with dust and air quality are discussed in Section 8.5.

Use of the UAV would occur over much of the land area at PTA but would not be expected to affect biological resources during normal operation. Due to the nature of the UAV, accidents would be possible and could cause wildfires. The impact of potential wildfires within the ROI is discussed under Impact 1.

Lava tubes have been surveyed for arthropods. However, these surveys are incomplete and therefore inconclusive. A more detailed survey will be conducted prior to construction to determine presence and extent of the root dependent arthropods.

Operation of the ranges is likely to displace various wildlife species, such as birds and rodents. Mobile wildlife would vacate areas immediately adjacent to the ranges while the ranges were in use due to disturbance. Displacement would likely be caused by increased human presence in the area, as well as by elevated noise levels. Wildlife within the impact area and associated surface danger zones could be affected by ordnance or other munitions. The potential introduction of fire, which could affect wildlife, is discussed under Impact 1.

Increased noise levels associated with the Proposed Action would not be expected to adversely affect wildlife species at PTA or the WPAA.

*Additional Mitigation 4:* The Army proposes to conduct more intensive surveys of lava tubes identified as potentially supporting native root dependent arthropods. Lava tubes found to contain or support native root dependent arthropods will be avoided where practicable. All generated construction and training related drainage will be channeled away from lava tubes.

*Threat to migratory birds.* The presence of the FTI antennas could significantly affect migratory bird species known to occur in the PTA ROI, especially those that migrate at night (USFWS 2000). Although the exact number of bird fatalities from tower collisions in Hawai'i is not known, birds are killed in large numbers worldwide by antenna support structures each year (USFWS 2000). This is a violation of the MBTA (16 USC 703-712), which prohibits taking or killing migratory birds. Tower size is also considered a factor, with towers taller than 200 feet (61 meters) responsible for the greatest number of bird fatalities (Manville 2000). A full description of the FTI is located in Appendix D, but in general, the antennas are under 100 feet (33 meters) high and will be mounted on already existing structures. They will not use guy wires or location lighting though some may have a small light on top as a signal to aircraft operators.

Some migratory bird species known to occur at PTA that could be adversely affected by the Proposed Action include the white-tailed tropicbird, black-crowned night heron, barn owl, golden plover, and northern cardinal (USARHAW and 25th ID[L] 2001a).

UAVs would be allowed in restricted airspace over the entire training area, but activity is not anticipated to threaten night-migrating birds. If night collisions with birds did occur, then UAV operations would be halted at night until the USFWS and the Army could agree on a solution.

*Noise and visual impacts.* The Proposed Action would have short- and long-term noise impacts on terrestrial wildlife. These impacts would be negative but less than significant. Areas surrounding the proposed PTA Trail, BAAF runway upgrade and extension, ammunition storage, and range maintenance facility projects would be exposed to greater human noise as a result of these projects. The human noise level at BAAF and the PTA cantonment area is already high. This circumstance, along with the disturbed habitat in which these facilities are located, limits the species occurring there to those that are more tolerant of human activity. Therefore, wildlife in or around these project locations would not be significantly affected by these activities. (Potential noise impacts on the palila are discussed in Impact 2.) Increased noise as a result of construction is not expected to affect terrestrial wildlife, because field surveys have shown that it is not a significant factor in behavior and does not affect reproductive success (US Army Engineering District Honolulu 2000). Noise produced as part of proposed training activities would be mitigated by ESA Section 7 Consultation. These measures would ensure that noise impacts on sensitive species would be less than significant. No significant visual impacts are expected to terrestrial species.

Less than significant impacts on marine wildlife are expected from vessel noise. LSVs and barges do emit sounds into the marine environment, and these sounds do add a component of low frequency noise to the habitat. Any noise associated with vessels under the Proposed Action is part of existing conditions for this project. Wildlife reactions to noise depend on a variety of factors. It has been shown that marine wildlife can react adversely to the introduction of loud low frequency sounds in their habitat (Richardson et al. 1995). However, in the absence of other low frequency noise sources, some of which have historically occurred in Hawaiian waters (i.e. from other projects, like the North Pacific Acoustic Laboratory or from the Low Frequency Active Sonar project), the magnitude and intensity of noise impacts from LSV and barge vessels are not expected to be significant. Frequency of vessel use is not high, there is no meaningful change in the number of vessels from existing conditions (only six per year more than the current number 60), and animals would not be collocated with the vessels for any significant amount of time.

Less than significant impacts on marine wildlife are expected from SBCT helicopter activity between O'ahu and the island of Hawai'i. Over the ocean, the aircraft normally fly at least 1,000 feet above sea level. There is no change in helicopter activity expected from existing conditions under SBCT. The Aviation Brigade of the 25th Infantry Division has local flying rules SOPs that include a 1,000-foot (300- meter) vertical limit over whales and, more recently, over monk seals and dolphins when sighted. These procedures have already been communicated to all units flying in Hawai'i and will be formally incorporated into the local flying rules. The SOP includes a suggestion that future rules will apply to vertical as well as lateral altitude limits. They also suggest altering flight paths once wildlife is observed.

No significant noise or visual marine wildlife disturbances specific to the Proposed Action are expected from other activities at Kawaihae Harbor. This includes disturbance from harbor construction, which would be considered under separate NEPA documentation and is not being done to accommodate ships for this project. It also includes disturbance from establishing a fixed tactical tower at this site. The construction mainly involves the pouring of a small 8-foot by 8-foot concrete pad and an equipment shelter constructed on it, so related activities are minor and are not expected to result in any impacts from construction or from the minor excavation. The pad is not being constructed close to shore and there will be no related run off.

Any construction-related noise impacts are not expected to be significant because they would be short-term and would be mitigated by the reduced transmission of sound through the air-water interface. There is a possibility that a monk seal or more than one seal could haul out on this coastline but since the harbor is so highly trafficked any such individuals would be noticed, and all construction in the area would be halted until the animal left the area.

Impacts on this species from activities in the Sanctuary under the Proposed Action are not considered to be significant.

*Vessel impacts on marine wildlife.* Less than significant impacts on marine wildlife are expected from vessel transport between O'ahu and the island of Hawai'i. The increase from 60 to 66 LSV trips a year is minor and not significant. Assuming that low frequency or mid-range sonars are not used from LSVs, impacts from vessel transit is expected to be minor and not significant. (Low frequency and/or mid-range sonars have been shown to cause injury and mortality in marine wildlife [Rossiter 2003], but these emissions typically occur off of vessels engaged in defense training maneuvers, not transport). Existing MMPA regulations prohibit any boats in Hawaiian waters to approach within 100 yards (91 meters) of adult whales and within 300 yards (274 meters) of mother/calf pairs (NOAA 1997). LSVs and barges do transit through Penguin Banks, a known high-concentration area for humpback whales. However since they travel at a maximum of 10 knots, collisions are unlikely. Impacts on marine wildlife from vessel transport in the ROI waters and/or in the Sanctuary under the Proposed Action are not considered to be significant. Theater Support Vessel (TSVs) are not in use at this time, however they may be utilized in the future. When and if that occurs, separate NEPA documentation will be done to address impacts from TSV use to marine wildlife. There is a minimal chance of ship strikes (direct hits on marine mammals) with LSVs or barges, but these are considered to be minimal due to the slow speed of the vessels.

The Army informally consulted with NOAA Fisheries on the proposed action in accordance with ESA Section_7. NOAA Fisheries concurred with the Army's determination that the proposed action would was not likely to adversely affect federally listed species, marine mammals or essential fish habitat. (See Appendix E).

*Runoff impacts on marine wildlife and coral ecosystems.* There would less than significant impacts on marine wildlife and coral ecosystems in the PTA ROI. No significant impacts from potential runoff are expected for marine wildlife resources or coral ecosystems. The expected increase in erosion to the ocean would be within the natural range that exists due to rainfall and runoff variation. The expected increase in erosion at the harbor, described in Chapter 8, Section 8.08, would also be within the natural range that exists due to rainfall and runoff variation. There are no contaminants moving off of the range which is located quite a distance from the coastline. No contamination of surface or ground water is expected (see Section 8-06 Water Quality). There is no runoff carrying contaminants from UXOs to nearshore ocean waters and there are no UXOs in the marine ROI. No water contaminating activities are occurring in the upland portions of the marine ROI habitat and therefore no direct effects from runoff on marine wildlife or coral reefs and their associated organisms would occur.

It is known that continued development and construction along the coastline may add to the decline of this reef system via the following mechanisms: interruption of long-shore transport due to harbor development, consequent siltation of Pelekane Bay, and the close proximity to important cultural sites, causing increased recreational use and human presence (CRAMP 2003). Over time, these mechanisms would further the decline of the coral that is already a special management concern. This is further addressed in the cumulative impacts section. The proposed construction and use of the military vehicle trail could impact protected species if activities are collocated in the nearshore environment.

However, provided best engineering practices are utilized, it is expected that these will minimize erosion and properly contain potential petroleum spills. If best engineering practices are incorporated into the project plans, vehicle trail construction is not expected to adversely impact protected species. It is also recommended that Best Management Practices (BMPs) be incorporated into the project to protect listed or otherwise protected species which may come into the nearshore project area. BMPs include ensuring that all project personnel are apprised of the status of the listed species in the area, and the protections afforded to these species under federal laws. All project personnel should become familiar with the official NOAA Fisheries brochure explaining the laws and guidelines for listed species in Hawaii. Information may also be downloaded off the NOAA web site. Also, if during project activities any listed or otherwise protected species enter the project area, activities should cease until the animal(s) voluntarily leave the area. Impacts on marine wildlife and coral ecosystems in the ROI waters under this Alternative are not considered to be significant.

The Army informally consulted with NOAA Fisheries on the proposed action in accordance with ESA Section_7. NOAA Fisheries concurred with the Army's determination that the proposed action would was not likely to adversely affect federally listed species, marine mammals or essential fish habitat. (See Appendix E).

### *Reduced Land Acquisition Alternative*

Under Reduced Land Acquisition, biological resources impacts at PTA would generally be very similar to the Proposed Action, with the following exceptions:

- QTR2 would not be built on the SRAA but rather on the Range 8 site at PTA. Construction and operation of QTR2 would occur within approximately 120 acres (48.6 hectares) in the vicinity of Range 8. Because QTR2 would be located within an existing PTA range area, collocated with the AALFTR, similar impacts and mitigation measures would occur under Reduced Land Acquisition as under the Proposed Action.
- Additional off-road mounted maneuvers would occur within the PTA ROI.

These changes would result in increases in impacts on PTA biological resources, but would not change the overall significance level of those impacts.

#### Significant Impacts

*Impact 1: Impacts from fire on sensitive species and sensitive habitat.* Impacts from fire on sensitive species would be similar to those described in Proposed Action Impact 1, but there would be an even greater probability of training induced wildfires. Construction of QTR2 on PTA Range 8 would likely increase the amount of live-fire training at PTA, thereby resulting in the potential to increase the frequency of wildfires, presenting an additional potentially significant adverse impact on sensitive species, such as *Silene hawaiiensis,* and habitat.

*Regulatory and Administrative Mitigation 1.* The same SOPs, BMPs, and mitigation measures described in Proposed Action Impact 1 and Section 8.12.2 would be applied under this alternative. The implementation of increased fire prevention and fire fighting measures would reduce the severity of this impact but it is still considered significant. All mitigation detailed under this impact for the Proposed Action as a result of ESA Section 7 consultation will be implemented for this alternative as well.

*Impact 2: Impact from construction and training activities on sensitive species and sensitive habitat.* Under Reduced Land Acquisition, there would be additional Stryker maneuvering off-road. The 25,855 MIMs proposed for road maneuvers in the SRAA under the Proposed Action would be reallocated to PTA for primarily off-road maneuvers, for a total of 118,649 MIMs. The addition of MIMs in the PTA ROI would exacerbate an already severe impact by causing further vegetation destruction and soil erosion. Compare Figures 8-34 and 8-35 with 2-10 to see the proximity of known sensitive species and habitat to the proposed QTR2 and mounted maneuverability areas. Specifically, Range 8 contains populations of *Silene hawaiiensis*. Under Reduced Land Acquisition, additional natural vegetation communities could be adversely affected, including barren lava, *Metrosideros* treelands, *Sophora* shrublands, and *Myoporum* dominated tree and shrublands**.** The same SOPs, BMPs, and mitigation measures described under this impact for Proposed Action would be applied for this impact.

*Regulatory and Administrative Mitigation 2.* The same SOPs, BMPs, and mitigation measures described in Proposed Action Impact 2 and Section 8.12.2 would be applied under this alternative. The implementation of increased fire prevention and fire fighting measures would reduce the severity of this impact but it is still considered significant. All mitigation detailed under this impact for the Proposed Action as a result of ESA Section 7 consultation will be implemented for this alternative as well.

Significant impacts mitigable to less than significant and less than significant biological resources impacts associated with Reduced Land Acquisition would be largely identical to biological resources impacts associated with the Proposed Action.

### *No Action Alternative*

No Action would result in no new impacts on biological resources, but would involve a continuation of existing impacts. An in-depth analysis of current force training impacts on PTA biological resources can be found in the *O'ahu Training Areas INRMP* (USARHAW and 25th ID[L] 2001a) and the *Endangered Species Management Plan Report (ESMPR) for Pōhakuloa Training Area* (R. M. Towill Corp. 1997c). All conservation measures detailed in the 2003 BO for Routine Military Training and Transformation of the 2nd Brigade 25th ID(L) at U.S. Army Installations on the island of Hawai'i (USFWS 2003e) will be enacted under this alternative as well. A synopsis of No Action Alternative impacts is given below.

#### *Significant Impacts*

*Impact 1: Impacts from fire on sensitive species and sensitive habitat.* Current force training threatens native habitat and sensitive species in the PTA ROI. Military activities have burned areas of native vegetation and threatened habitat for federally listed flora and fauna. The Army produced a comprehensive wildland fire management plan for PTA, to be finalized in 2004.

Additionally, the mitigation for wildland fire management listed under the Proposed Action should be implemented for current force training, including reducing the densities of fire-adapted introduced species. Mitigation for wildland fires would be the same as those under the Proposed Action. All mitigation detailed under this impact for the Proposed Action as a result of ESA Section 7 consultation will be implemented for this alternative as well.

### *Significant Impacts Mitigable to Less than Significant*

*Impact 2: Impacts from construction and training on sensitive species and sensitive habitat.* Current force activities occur near designated palila critical habitat. The BAAF and PTA cantonment area are located on or near the critical habitat (Figure 8-36). The primary threat posed to palila and palila designated critical habitat is disruption to vegetation and ecological communities caused by training activities and use of BAAF that occurs in the vicinity of valuable palila habitat. This leads to the introduction and spread of nonnative and potentially invasive species. Palila's food source, mamane seeds and flowers, would be threatened by the introduction of nonnative vegetation (USGS 2001b). The introduction of nonnative animals could continue to lead to increased predation of native species, such as the impacts from mongoose on ground nesting bird species. Nonnative animals could also act as disease vectors and are thought to be one of the reasons for the palila's sharp decline (USGS 2001b and 2001c). Secondarily, activities are likely to disrupt and deter use of nearby palila habitat and lower its potential value. All mitigation detailed under this impact for the Proposed Action as a result of ESA Section 7 consultation will be implemented for this alternative as well.

*Impact 3: Impact from the spread of nonnative species on sensitive species and sensitive habitat.* Existing impacts on biological resources would continue under No Action. Nonnative plants and animals, some of which may be invasive, have likely been introduced and would continue to be introduced into natural areas at PTA. Transport of troops around the installation and between islands spreads weedy species via clothing and vehicles. In compliance with EO 13112 on invasive species, the Army would continue to undertake all feasible and prudent measures to minimize risk of harm caused by invasive species. Army environmental management (Chapter 2, Section 2.2.4), including research, monitoring, and stabilization projects, would reduce these impacts to the less than significant level. All mitigation detailed under this impact for the Proposed Action as a result of ESA Section 7 consultation will be implemented for this alternative as well.

### *Less than Significant Impacts*

*Threat to migratory birds*. No threats to migratory birds as a result of routine training have been identified though additional Army programs are outlined in the BO to preserve habitat and monitor species.

*Noise and visual impacts.* Noise would continue to be produced as a result of current activities. Noise would have an adverse impact on animals in the area due to disturbance but would not significantly affect their behavior and would not lead to a population level decline. Studies such as the *Final Report: A Study to Determine the Effects of Noise from Military Training on the Endangered O'ahu 'Elepaio* (HINHP 1998) show that Army-related noise on O'ahu has not significantly affected species, including sensitive species, such as the ʻelepaio. There are no visual impacts under this alternative.

*Vessel impacts on marine wildlife.* Less than significant impacts on marine wildlife are expected from vessel transport between Oʻahu and the island of Hawaiʻi. There are 60 LSV and 4 barge trips per year. Assuming that low frequency or mid-range sonars are not used from LSVs, impacts from vessel transit is expected to be minor and not significant. Existing MMPA regulations prohibit any boats in Hawaiian waters to approach within 100 yards (91 meters) of adult whales and within 300 yards (274 meters) of mother/calf pairs (NOAA 1997). LSVs and barges do transit Penguin Banks, a known high-concentration area for humpback whales. However since they travel at a maximum of 10 knots, collisions are unlikely. Impacts on marine wildlife from vessel transport in the ROI waters and/or in the Sanctuary under No Action are not considered to be significant.

### No Impact

*Impacts from construction and training activities on general habitat and wildlife.* Training and construction would have no additional impact on general habitat and wildlife. Mounted, dismounted, and live fire activities would continue to be executed in the areas for which they are currently approved. Construction projects would be approved on a case by case basis consistent with current force needs. The ongoing Army environmental programs such as ITAM would ensure no impact to general habitat and wildlife under this alternative.

*Runoff impacts on marine wildlife and coral ecosystems.* No significant impacts from potential runoff are expected for marine wildlife resources or coral under this Alternative. Best management and best engineering practices described under the Proposed Action Alternative are expected to ensure no impacts. In addition, there are no changes from existing conditions.

## 8.11 CULTURAL RESOURCES

### 8.11.1 Affected Environment

#### *Region of Influence*

The ROI for this project area is all of PTA (which also includes BAAF), the proposed PTA Trail between Kawaihae Harbor and PTA, and the WPAA identified for acquisition.

#### *Hawaiian Homelands*

In 1920 the US Congress established the Hawaiian Home Lands Program, which provides a means by which eligible Native Hawaiians can obtain 99-year leases on Hawaiian Home Lands. Hawaiian Home Lands are intended for three purposes: residences, agriculture, and ranching (Department of Hawaiian Home Lands 2003). The Humuʻula and Piʻihonua Hawaiian Home Land parcels, consisting of 52,315 acres (21,171 hectares), are adjacent to PTA's western boundary, and the Kawaihae parcel, consisting of 10,153 acres (4,109 hectares), is on the coast north of KMR.

#### *Native Hawaiian History and Tradition*

*Cultural History*

PTA is part of a larger cultural landscape that includes the sacred mountains Mauna Kea and Mauna Loa and the Saddle area between them. Research by Pualani and Edward Kanahele (1999), Kepā Maly (1997, 1999), Holly McEldowney (1982), Charles Langlas (Langlas et al. 1997), and Usha Prasad and Keone Nunes (SRP 2002), among others, has helped to identify some of the factors that make the area spiritually and historically one of the most important places in Hawaiian tradition and history.

The importance of Mauna Kea, Mauna Loa, and the surrounding landscape can be seen in the abundance of physical or archaeological remains and through the many oral histories that describe historical events and uses of the area (Maly 1999). The region around PTA contained a rich resource zone that supported traditional activities that included bird hunting for feathers and meat, quarrying volcanic glass, and lithic workshop locations for manufacturing the adzes made from Mauna Kea basalt. The Saddle region has numerous trails and served as a much-used passage for travelers moving both cross-island and to the Mauna Kea and Mauna Loa summits.

Cave shelters are abundant due to the extensive natural lava tube systems in the area. These shelters provided refuge from the elements and, because there is relatively low rainfall within the region, they also served as a source of limited water. Archaeologists speculate that ancient Hawaiians practiced different economic activities in this uplands area. Radiocarbon dating of PTA sites (primarily caves) indicates occupation between the 12th and 18th centuries. Some reports indicate the presence of burials at PTA (Haun 1986; Athens and Kaschko 1989; Reinman et al. 1998). Past archaeological work has also suggested that Native Hawaiians planted sweet potato crops in stony areas (Reinman and Schilz 1999), but more recent work supports the hypothesis that excavated pits were used for enhancing bird (petrel) habitat (Hu et al. 1996; Moniz-Nakamura 1999; Williams 2002a, 2002b).

The Ahu a ʻUmi heiau on the slopes of Hualālai south of PTA is said to have been built by the legendary chief ʻUmi a Līloa around 1600. Both ʻUmi and his father, Līloa, are credited, in different accounts, with unifying the island of Hawaiʻi and with creating the system of land division that persisted through the end of the traditional era. In a broad sense, the entirety of Mauna Kea, whose southwestern slopes form part of PTA's base, is considered holy. From cultural practitioners to academic specialists to oral history informants, that sacredness has been expressed in a number of different ways that are briefly summarized here.

Attempts to translate the Hawaiian sense of Mauna Kea's spiritual meaning for a general audience often focus on two concepts, hiapo (first-born, recipient of special privileges and responsibilities) and lōkahi (unity or harmony). The mountain is seen as the first-born child of Wākea and Papa, the original father and mother, and thus as a personal ancestor of living Hawaiians. It is also seen as the piko or navel through which the island of Hawaiʻi came into being. In addition, its height helps to make it sacred.

This sense of Mauna Kea as a living elder and holder and transmitter of tradition complements a sense of lōkahi, in which the mountain participates in the larger cycle of life, where each element has a crucial part to play. For example, its height attracts clouds, which bring precious rain. Through hiapo the mountain reaches up to the sacred realm, while through lōkahi it reaches out to the natural world—Hawaiian tradition did not see those two realms as separate.

Several deities are associated with the mountain, perhaps most famously Poliʻahu, the snow goddess of the summit, and Lilinoe, embodying the mist and rain of the Pōhakuloa area. In legend, the region was also the scene of conflict between Poliʻahu and the fire goddess Pele. In geologic terms, this conflict can be seen in the ancient meeting of volcanic fire and mountain ice that produced exceptionally high-quality basalt prized by traditional adze makers.

Water is an important part of the mountain's sacred aspect. These sacred water sources include springs and their importance as part of cultural landscapes, rain clouds attracted by the peak, mist and snow representing its deities, and the icy water of Lake Waiau near the summit, prized for use in religious and medical practice. Water that had not touched the ground was considered especially precious, whether it collected in the cupped part of a taro leaf, in high Lake Waiau, or in the top of a bamboo shoot. Interestingly, the ahupuaʻa that stretches from the Hāmākua shore to include both Mauna Kea and Mauna Loa peaks and much of the land base for PTA is named Kaʻohe, or bamboo—a plant that was often used as a water carrier.

### *Traditional Activities*

It is considered unlikely that the chilly heights of the Saddle area and above were ever the site of permanent homes, but many people passed through the region in pursuit of the numerous and unique natural resources available. These individuals included bird hunters, and gatherers of various plants and other forest resources, and craftsmen in search of high quality wood and fine quality basalt for adze manufacturing. Lava that cooled quickly on the frigid mountaintop yielded an especially fine-grained form of basalt that could be turned into high-quality adzes and other tools in the days before metal was available. Quarry sites were probably workshops, with associated shrines and temporary dwellings located in caves at lower warmer elevations, some of them within PTA.

Craftsmen turned to the high forest when they needed particularly large trees from valuable upland hardwoods such as māmane. According to Kanahele and Kanahele, the upper slopes were considered more sacred than the lower forests and were left alone as much as possible as conservation areas; when one of the larger and more valuable trees was taken, a major offering, often a human sacrifice, was given in return.

Perhaps the most valuable of the traditional forest resources were the birds. Songbirds were hunted for their plumes, and seabirds that nest were hunted as food. Participants in early 20th century interviews remembered a variety of bird-catching techniques, from tethering a live ʻio (hawk) next to a trap, to setting tiny nooses alongside lehua blossoms, to snaking a gummed snare made of ʻieʻie vines into a shallow cave to catch ʻuaʻu chicks, a delicacy reserved for the aliʻi. Most techniques required a great deal of finesse and patience and, in the case of the larger birds, strength and speed as well. Natural holes in the lava beds were improved to make them more attractive nesting places. Birds hunted for their feathers were, hunters recalled, released again in viable condition (Reinman et al. 1998a; Moniz-Nakamura 1999).

Cows, sheep, and other ungulates are a post-contact introduction, but as they were released into the uplands and multiplied, hunting them became a pastime and sometimes a living, pursued by Hawaiian and haole alike. For decades, hunting of the wild/feral creatures continued as more structured and privately owned ranching began to grow. Hawaiian participation, both in the wild hunts and in ranching, has become an island tradition in its own right.

People using the upland resources, as well as people traveling cross-island, developed a network of trails in the prehistoric and early historic eras. Some of those trails are now underneath lava flows, others lie under modern roads, and others may be of questionable location and antiquity, but it is clear that a number of trails crossed the Saddle region connecting the various coastal districts around the island with one another. The Ahu a ʻUmi heiau derives some of its importance from its location at the juncture of several of these trails.

The sacredness of the area and Native Hawaiian connection to the Mauna Kea landscape manifests itself in many ways. Oral testimony (Maly 1997) has revealed a number of activities and traditional practices that have been less documented than the ones described above, possibly because they are not as readily reflected in the archaeological or archival record. Some of these practices involve secret family worship, a place of refuge from enemies, and a general sense of the magical deity-inspired restorative and healing power of the higher elevations of Mauna Kea. Prayer and worship are reported to continue to this day (Maly 1997).

Water from Lake Waiau (the small lake on the summit platform of Mauna Kea, described above) is considered sacred and is associated with the god Kåne. Healing power and a spiritual connection is associated with the water, and it is still used by Native Hawaiians. Many generations are reported to have deposited their children's umbilical cords (piko) into the lake, as well as on the summit peak of Pu'u o Kukahau'ula, and this tradition is still practiced by some families (Maly 1997). In addition to reported historic burials, some use Mauna Kea as a place to spread the cremated remains of their deceased loved ones (Maly 1997).

It is likely that in historic times, the landscape and forms of Mauna Kea and Mauna Loa were used as navigation aids both at sea and on land. Mountains to this day are used as physical and emotional benchmarks that help people regain their sense of place. Astronomy, although an important Native Hawaiian traditional component, has not been directly tied to Mauna Kea in the archival record. Because of the "significant association of gods and deity whose forms are seen in the heavens and whose names are also commemorated at locations on Mauna Kea…it is very likely that practices of the native *kilo hoku* occurred on Mauna Kea" (Maly 1999, 20).

The area of the cloud line is considered wao akua (inhabited by gods and spirits, the creators of life), and as such, the kama 'aina (children of the land, or natives) have an even greater respect for these higher elevations. Most of the population were commoners, or maka'āinana, whose daily activities did not involve lands in the wao akua region and were not likely to have visited. However, an elite few, the akua (gods), ali'i (royalty), or kahuna (priests) of high rank, and the class of specialized practitioners who gathered resources or worshipped in the wao akua and mountain region areas in which they practiced cultural activities (Maly 2004 personal communication) made use of natural resources and cared for both natural and cultural resources in the area.

It is difficult to describe the emotional and spiritual link that exists between Native Hawaiians and the natural setting. Hawaiians generally believe that all things in nature have mana, or a certain spiritual power and life force. A custodial responsibility to preserve the natural setting is passed from generation to generation, and personal strength and spiritual well being are derived from this relationship. Because of this belief, Mauna Kea may be the most powerful and sacred natural formation in all Hawai'i.

### *Historic Overview*

#### *Pōhakuloa Training Area*

In the late 1800s owners of two large ranches competed for the rights to raise cattle and sheep and to hunt feral animals in the Saddle Region. John Parker II held a lease to the Ka'ohe lands of PTA from sometime before 1876 through 1891. The Waimea Grazing and Agricultural Company leased Humu'ula to the east of PTA from Kamehameha III around 1860 and raised sheep and also killed wild cattle for their hides. The company built a wagon road from its remote sheep station along the current Saddle Road in Humu'ula to Waimea, through PTA, to transport wool to the harbor at Kawaihae. A portion of this road still remains within and to the east of PTA. The company also raised sheep in the portion of Waikōloa that forms the WPAA, establishing the Ke‘āmuku Sheep Station.

By 1891 the Humu‘ula lease was held by the Hackfields' Humuula Sheep Station Company, which in that year obtained the lease for the east side of Ka‘ohe, while Parker continued to lease the west side. The company built a number of stone walls in the 1890s, some of which may be the stone walls still standing in the northeastern part of PTA. After 1900 Parker Ranch was expanded to include the Humuula Sheep Station Company and most of the lands in the Saddle (Langlas et al. 1997).

PTA's use as a military installation began in 1942 with the building of the Kaūmana Road for military access between Hilo and Waimea. The road is now known as Saddle Road (SH200), which served as the forerunner to the development of the Saddle Training Area, which primarily consisted of BAAF and the PTA cantonment area. Many members of the local community have, or have had, relatives who worked or trained at PTA. Most of the cantonment area is composed of Quonset huts dating from 1955 to 1958 (Eidsness et al. 1998, 31).

Kawaihae Military Reservation is located on fill land built onto the reef of Kawaihae Bay in the ahupua‘a of Kawaihae 1 in the district of South Kohala. From Kawaihae Harbor, the proposed military vehicle trail will extend southward and inland through the other ahupua‘a that make up South Kohala, Kawaihae 2, and Waimea.

### *Previous Consultations and Reports*

#### *Areas of Traditional Importance Surveys*

Social Research Pacific (SRP) (2002) has completed a draft report of an oral history survey of PTA, focusing on place names, trail systems, and known Native Hawaiian built structures. The report includes information gleaned from previous works, including McEldowney (1982), which contains oral accounts and written evidence about the Mauna Kea summit area; other various early accounts from western visitors passing through the area (e.g., Maly 1997, 21); and myth and legend material found in Elbert (1959) and Kamakau (1992).

Additionally, SRP (2002) conducted interviews with 29 individuals, both Native Hawaiians and other long-time residents of the island of Hawai‘i familiar with the area. A field visit with eight of the informants was made to Ahu a ‘Umi heiau, located west of PTA on the slopes of Hualālai, in the Saddle area. Extensive information was gathered about the heiau, which served during the historic period as a resting place along the trails that traversed the central part of the island. The report includes a description of the heiau recorded by Jacques Remy in 1853, based on an interview with Kanuha, an extremely elderly chief at the time of the interview (SRP 2002).

Informants reported the presence of burials both from observation and from oral traditions, but no exact burial locations could be recalled. Informants did know of the continued use of old trails that crossed PTA and of the persistence of bird hunting, one of the major traditional uses of the area from prehistoric times into the early part of the 20th century.

Informants described the use of modified lava blisters (bubbles in the lava flows) to encourage nesting and trap birds. A list of 20 potentially significant place names within and around the vicinity of PTA was prepared; however, little or no oral historical information could be collected concerning these places (SRP 2002).

Maly (1997) conducted a series of interviews that considered not only Mauna Kea itself, but the landscape and view planes of the area. Many of the respondents had knowledge of several of the traditional practices described above. In the 1997 study, and in follow-up interviews, the researchers surmised that the Hawaiian people feel a "deep cultural attachment to the broad spectrum of natural and cultural resources" found in and around Mauna Kea (Maly 1999, 3). Maly recommended that the traditions, sites, practices and continuing significance of Mauna Kea, both historically and today, make it "eligible for nomination as a traditional cultural property under federal law and policies" (Maly 1999, 3).

### *Historic Building Surveys*

The DPW Building List includes 138 structures at PTA that are approaching 50 years of age. Kenneth Hays of the USAG-HI DPW Environmental staff has conducted a survey and condition assessment of these structures. An MOA for the treatment of these properties is being developed as part of the PTA master plan.

### *Archaeological Surveys*

Inventory surveys of PTA began in the 1960s and 1970s, supported by the Bishop Museum (Rosendahl 1977). Since the 1980s, many archaeological studies have been conducted at PTA, mostly for regulatory compliance (e.g., Cox 1983; Haun 1986; Hommon and Ahlo 1983). Other studies at PTA include Athens and Kaschko (1989), Reinman and Schilz (1993, 1994, 1999), and Streck (1985, 1986, 1990). Surveys in the northern section of PTA include those of Barrera (1987), Kalima and Rosendahl (1991), and Welch (1993), among others. A biological inventory of cave and lava tube systems within PTA recorded cultural resources at the cave entrances and within the underground system (Pearthree, Stone, and Howard 1994). GANDA has completed additional survey work, including surveying potential SBCT project areas, training areas 1, 3, 4, 5, and 21, and potential Stryker maneuver areas north of the cantonment area (GANDA 2002a, 2003d).

There have been many archaeological investigations of the lands traversed by the PTA Trail corridor, including Barrera and Kelly (1974), Clark (1981), Hammatt and Shideler (1989), Hammatt et al. (1988), Langlas et al. (1997), Clark and Kirch (1983), Clark (1987), and Soehren (1980). Cox (1983) conducted a reconnaissance of the military vehicle trail between Kawaihae Harbor and PTA.

Most of the early archaeological surveys at PTA took place in the west and southwest portions of the training area along or off Bobcat Trail. In 1985, PHRI conducted a survey of the Bobcat Trail Habitation Cave Site and the surrounding kīpuka (Haun 1986), and, in 1987, Athens and Kaschko (1989) surveyed the heavily forested and (at the time) undeveloped region of the Multi-Purpose Range Complex (MPRC). In 1992, Ogden revisited the MPRC and conducted data recovery excavations of sites to be affected, as well as a survey of an additional 20,000 acres (8,094 hectares) (Reinman and Schilz 1999). This resulted in the discovery of 48 new sites.

On the east side of PTA, surveys were not initiated until 1993, when BioSystems Analysis conducted an aerial and pedestrian inventory survey of 6,700 acres along both sides of Redleg Trail (Reinman and Pantaleo 1998b). Following this work, Ogden surveyed four areas east of Redleg Trail totaling about 970 acres (393 hectares) (Williams et al. 2002). Later, an additional area of 2,640 acres (1,068 hectares) to the east of the trail was surveyed and Phase II surface collection and testing conducted of sites in areas previously surveyed (Williams 2002 a and b). In an area with an expected low density of sites, 67 sites and over 1,800 excavated pits were recorded.

Areas that will be directly affected by the Proposed Action were surveyed in 2002 and 2003. Many of the sites are now being formally evaluated.

### *Known Prehistoric and Historic Resources*

#### *Pōhakuloa Training Area*

In general, archaeological resources at PTA consist of modified natural features, such as lava tubes, lava shelters, and lava blisters. A 1998 review of previous archaeological studies concluded that lava tubes made up 70 percent of all recorded sites at PTA (Eidsness et al. 1998, 31), and they remain one of the most common site types found in more recent surveys. Other site types include cairn sites, trails, volcanic glass quarries, excavated pits, and lithic workshops. Within these sites, material remains include grinding tools, charred wooden torches, gourds, cordage and matting, woven ti leaf sandals, kukui nuts, ‘opihi shells, and other faunal remains. Surface features include stone-lined hearths, cupboards, rock-paved areas, low walls and platforms, rock-filled crevices, ramps, cairns, shrines, open-air shelters, and trails. The region has much value for archaeological research and has produced important information concerning bird hunting, trail systems, and short-term living conditions at higher elevations.

Reinman et al. (1998a) claim the cultural resources at PTA are important for addressing issues about Hawaiian prehistory and history in the uplands region, as well as the development of Native Hawaiian society.

The existence of approximately seven stone shrines attest to the likely ritual activity that went on at PTA. With prayers and ritual permeating traditional Hawaiian life, some of the structures at PTA may be occupational shrines (Buck 1957, 259, cited in McEldowney 1982, 1.10). Cairns (ahu) have been recorded at various terrains, either associated with trail systems or boundary markers, or as just isolated features. There appears to be no pattern to the distribution of cairns across the PTA landscape, and they have been quantified as representing between 10 and 15 percent of known sites. Cairns have also been constructed for military purposes, although the trained eye can usually differentiate military cairns from prehistoric ones. It is also possible that some cairns were constructed for rituals.

### *Archaeological Resources*

PTA is rich with archaeological resources, with 291 reported archaeological sites, including both prehistoric and historic Native Hawaiian sites and historic military structures (Tables 8-24 and 8-25). The only site listed on the NRHP is the Bobcat Trail Habitation Cave (Site 50-10-30-5004). Figure 8-38 shows archaeological sensitivity areas at PTA.

Most relevant to the Proposed Action are the archaeological sites found during surveys along Redleg Trail and areas to the east. The BAX and AALFTR projects are located on the west side of Redleg Trail, and the survey conducted by BioSystems Analysis included portions of the two project areas. One site was identified within the boundaries for the BAX, Site 19490, and one within the boundaries for the AALFTR, Site 18673 (Reinman and Pantaleo 1998b). The survey also identified one site, Site 18671, a small lava tube containing cultural features and material, east of Redleg Trail just outside the AALFTR. The northernmost part of the Redleg Trail survey area lay to the east of the BAX. Site 21495, a complex of excavated pits, and Site 21671, a complex of scattered chill glass quarry locations, were located on the east side of Redleg Trail near the BAX boundary (Williams 2002 a and b). One of the four areas surveyed to the south, Survey Area III, is located across Redleg Trail immediately east of the AALFTR boundary. However, all sites recorded in this area lie in the eastern portion of the survey area well outside the AALFTR (Williams et al. 2002).

**Table 8-24**
**Summary of Known Cultural Resources at PTA and WPAA**

| | Total Archaeological Sites | Sites Listed, Eligible, or needing DE | Area Surveyed for Archaeological Sites | Potential Historic Structures | Buildings Listed, Eligible, or Needing DE |
|---|---|---|---|---|---|
| **PTA** | 291 | 291 (290 DE) | 33,500 acres (13,557 hectares) | 138 | 0 |
| **WPAA** | 96 | 95 (DE) | All 23,000 acres | 2 | 2 (DE) |
| **PTA Trail** | 6 | 6 (DE) | Unknown | 0 | 0 |

Source: IARII 2003; Roberts et al. 2003

Notes: “DE” means a site or building that has not yet been found ineligible for the NRHP and therefore must be treated as eligible pending such a finding.

GANDA conducted a recent survey of the entire proposed area for the AALFTR that revealed the presence of 21 lava tube caves, five of which were found to contain cultural materials (Table 8-26) (Roberts et al. 2003; IARII 2003; GANDA 2002a). One of these had been identified during earlier surveys. All five lava tubes contained evidence of their use as shelters or temporary habitation areas, but in one site three upright stones were found on basalt ledges, suggesting that these may have been shrines. Two complexes of excavated pits and a lithic scatter representing a workshop area were also found during the survey. A total of eight archaeological sites are located in the AALFTR.

**Table 8-25**
**Archaeological Sites Recommended as Eligible to the NRHP at PTA**

| State Site Number 50-10-31- | Site Type | Site Function |
|---|---|---|
| 05000 | Lava Tube | Shelter |
| 05001 | Lava tube | Shelter |
| 05002 | Wall | Ranching |
| 05003 | Lava tube | Shelter/habitation |
| 05004 | Lava tube | Shelter/habitation/religious |
| 05005 | Lava tube | Shelter/habitation/religious |
| 05006 | Trail | Transportation |
| 05007 | Trail | Transportation |
| 05008 | Trail | Transportation |
| 05009 | Trail | Transportation |
| 07119 | Wall | Ranching |
| 10220 | Lava tube | Shelter/habitation |
| 10221 | Lava tube | Shelter/habitation |
| 10222 | Lava tube | Shelter/habitation |
| 10265 | Lava tube | Shelter/habitation |
| 10266 | Lava tube | Resource procurement |
| 10267 | Lava tube | Shelter/habitation |
| 10268 | Lava tube | Resource procurement |
| 10269 | Lava tube | Shelter/habitation |
| 10270 | Lava tube | Water procurement |
| 10271 | Lava tube | Resource procurement |
| 10271 | Ahu | marker |
| 10272 | Overhang shelter | Shelter |
| 10644 | Lava tube | Shelter |
| 10645 | Lava tube | Shelter |
| 10646 | Lava tube | Shelter |
| 10647 | Lava tube | Shelter |
| 10648 | Lava tube | Shelter |
| 10649 | Lava tube | Shelter |
| 10650 | Lava tube | Shelter |
| 10651 | Lava tube | Shelter |
| 10652 | Lava tube | Shelter |
| 10653 | Lava tube | Shelter |
| 10654 | Lava tube | Shelter |

**Table 8-25**
**Archaeological Sites Recommended as Eligible to the NRHP at PTA** *(continued)*

| State Site Number 50-10-31- | Site Type | Site Function |
|---|---|---|
| 10655 | Lava tube | Shelter |
| 10656 | Lava tube | Shelter |
| 10657 | Lava tube blister | Shelter |
| 10658 | Lava tube | Resource procurement |
| 14638 | Site-complex (enclosures, lava tube blisters, wall, C-shape, lithic scatter, overhang shelter | Lithic workshop, resource (lithic) Procurement/shelter/workshop/trail? |
| 17116 | Lava tube | Shelter/habitation |
| 17117 | Ahu | Marker |
| 17118 | Ahu | Marker |
| 17119 | Ahu complex | Unknown |
| 17120 | Ahu | Marker |
| 17121 | Ahu | Marker |
| 17122 | Ahu | Marker |
| 17123 | Ahu | Marker |
| 17124 | Ahu | Marker |
| 17125 | Lava tube | Resource procurement |
| 17126 | Overhang shelter | Shelter |
| 17127 | Overhang shelter | Shelter |
| 17128 | Overhang shelter | Shelter |
| 17129 | Overhang shelter | Shelter |
| 17130 | Ahu | marker |
| 17131 | Overhang shelter | Shelter |
| 17132 | Overhang shelter | Shelter |
| 17133 | Overhang shelter | Shelter |
| 17134 | Overhang Shelter | Shelter |
| 17135 | Overhang shelter | Shelter |
| 17136 | Lava Tube blister | Shelter |
| 17137 | Quarry | Resource procurement |
| 17138 | Ahu complex | Unknown |
| 17139 | Lava tube | Shelter/historic butchering site |
| 17140 | Ahu | Marker |
| 17142 | Ahu | Marker |
| 17143 | Quarry | Resource procurement |
| 17144 | Overhang shelters | Shelter |
| 17145 | overhang shelter | Shelter |

**Table 8-25**
**Archaeological Sites Recommended as Eligible to the NRHP at PTA** *(continued)*

| State Site Number 50-10-31- | Site Type | Site Function |
|---|---|---|
| 17147 | Ahu | Marker |
| 17148 | Overhang shelter | Shelter |
| 17149 | Overhang shelter | Shelter |
| 17150 | Lava tube | Shelter/habitation |
| 17151 | Lava tube | Shelter/habitation |
| 17153 | Ahu | Marker |
| 17154 | Overhang shelter | Shelter |
| 17155 | Lava tube | Shelter (historic) |
| 17156 | Lava tube | Resource procurement/religious |
| 17157 | Overhang shelter | Shelter |
| 17158 | Lava tube | Shelter |
| 17159 | Ahu | Marker |
| 17160 | Quarry | Resource procurement |
| 17161 | Overhang shelter | Shelter |
| 17162 | Quarry | Resource procurement |
| 17163 | Lava tube | Historic shelter |
| 17164 | Quarry | Resource procurement |
| 17165 | Quarry | Resource procurement |
| 17166 | Quarry | Resource procurement |
| 18671 | Lava tube | Shelter/habitation |
| 18672 | Lava tube | Shelter/habitation |
| 18673 | Lava tube | Shelter/habitation/religious |
| 18674 | Shrine | Religious |
| 18675 | Quarry | Resource procurement |
| 18676 | Shrine | Religious |
| 18677 | Site complex | Religious |
| 18678 | Platform | Religious |
| 18679 | Trail | Transportation |
| 18680 | C-shape | Shelter |
| 19490 | Lava tube, C-shape, trail | Shelter/habitation/transportation |
| 19491 | Lava tube | Sandalwood resource procurement |
| 19492 | Lava tube | Shelter/resource procurement |
| 19493 | Overhang shelter | Shelter |
| 19494 | Overhang shelter | Shelter |
| 19495 | Lava tube | Shelter/habitation |
| 19496 | Lava tube | Water procurement |
| 19497 | Lava tube | Shelter/habitation |

**Table 8-25**
**Archaeological Sites Recommended as Eligible to the NRHP at PTA** *(continued)*

| State Site Number 50-10-31- | Site Type | Site Function |
|---|---|---|
| 19498 | Lava tube blister | Shelter |
| 19499 | Lava tube | Shelter/habitation/resource procurement |
| 19500 | Lava tube | Shelter |
| 19501 | Lava tube | Shelter/habitation/water and resource procurement |
| 19502 | Lava tube | Water procurement |
| 19503 | Lava tube | Shelter |
| 19504 | Lava tube | Water procurement |
| 19505 | Lava tube | Shelter/resource procurement |
| 19506 | Lava tube | Shelter/water procurement |
| 19507 | Overhang shelter | Shelter |
| 19508 | Lava tube | Water procurement |
| 19509 | Lava tube | Water procurement |
| 19510 | Quarry | Resource procurement |
| 19511 | Lava tube | Water procurement |
| 19512 | Lava tube | Shelter |
| 19513 | Lava tube | Shelter/water procurement |
| 19514 | Lava tube | Shelter/habitation/resource procurement |
| 19515 | Lava tube | Shelter/habitation/resource procurement |
| 19516 | Lava tube | Water procurement |
| 19517 | Lava tube | Water procurement |
| 19518 | Lava tube | Shelter/habitation |
| 19519 | Lava tube | Resource procurement |
| 19520 | Lava tube | Shelter |
| 19521 | Lava tube | Shelter |
| 19522 | Lava tube | Shelter |
| 19523 | Lava tube | Shelter/habitation/resource procurement |
| 19524 | Lava tube | Shelter |
| 19525 | Lava tube | Shelter |
| 19526 | Lava tube | Shelter |
| 19527 | Lava Tube | Resource procurement |
| 19528 | Na Ohule Elua Trail | Transportation |
| 19529 | Lava tube | Shelter/habitation |
| 21164 | Lava tube | Shelter/habitation |
| 21165 | Lava tube | Shelter/habitation |
| 21166 | Lava tube | Shelter/habitation |
| 21167 | Quarry | Resource procurement |

**Table 8-25**
**Archaeological Sites Recommended as Eligible to the NRHP at PTA** *(continued)*

| State Site Number 50-10-31- | Site Type | Site Function |
|---|---|---|
| 21168 | Ahu | Marker |
| 21169 | C-shape | Shelter |
| 21170 | Ahu | Marker |
| 21171 | Trail | Transportation |
| 21172 | Trail | Transportation |
| 21281 | Lava tube | Shelter/habitation |
| 21282 | Lava tube | Shelter/habitation |
| 21283 | Site complex, lava tube | Shelter/habitation/resource procurement |
| 21284 | Ahu complex | Unknown |
| 21285 | Lava tube | Shelter/habitation |
| 21286 | Lava tube | Shelter/habitation |
| 21287 | Lava tube | Shelter/habitation |
| 21288 | Ahu complex | Marker, unknown |
| 21289 | Shrine | Religious |
| 21290 | Shrine | Religious |
| 21291 | Lava tube | Shelter/habitation |
| 21292 | Lava tube | Shelter/habitation |
| 21293 | C-shape | Shelter |
| 21294 | Lava tube | Shelter/habitation |
| 21295 | Lava tube | Shelter/habitation |
| 21296 | Lava tube | Shelter/habitation |
| 21297 | Lava tube | Shelter/habitation |
| 21298 | Ahu complex | Marker, unknown |
| 21300 | Excavated pit | Unknown |
| 21301 | Pavement | Unknown |
| 21302 | Ahu, petroglyph | Marker, unknown |
| 21303 | Lava tube | Shelter/habitation |
| 21304 | Quarry | Resource procurement |
| 21305 | Lava tube | Shelter/habitation |
| 21306 | C-shape | Shelter |
| 21307 | Ahu | Marker |
| 21308 | C-shape | Shelter |
| 21309 | Lava tube | Shelter/habitation |
| 21310 | Ahu | Marker |
| 21311 | Ahu, platform | Marker, religious |
| 21312 | Lava tube | Shelter/habitation |
| 21313 | Pits, area I | Unknown |

**Table 8-25**
**Archaeological Sites Recommended as Eligible to the NRHP at PTA** *(continued)*

| State Site Number 50-10-31- | Site Type | Site Function |
|---|---|---|
| 21314 | Pits, area II | Unknown |
| 21315 | Pits, area III | Unknown |
| 21316 | Pits, area IV | Unknown |
| 21351 | Site complex | Workshop |
| 21483 | Lava tube | Shelter/habitation |
| 21484 | Lava tube | Shelter/habitation |
| 21485 | Lava tube | Shelter/habitation |
| 21486 | Lava tube | Shelter/habitation |
| 21487 | Lava tube | Shelter/habitation |
| 21488 | Lava tube | Shelter/habitation |
| 21489 | Lava tube | Shelter/habitation |
| 21490 | Lava tube | Shelter/habitation |
| 21491 | Lava tube | Shelter/habitation |
| 21492 | Lava tube | Shelter/habitation |
| 21493 | Quarry, excavated pit | Resource procurement, unknown |
| 21494 | Lava tube | Shelter/habitation |
| 21495 | Site complex | Unknown |
| 21496 | Lava tube | Shelter/habitation |
| 21497 | Lava tube | Shelter/habitation |
| 21498 | Lava tube | Shelter/habitation |
| 21499 | Ahu complex | Unknown |
| 21500 | Ahu complex | Unknown |
| 21501 | Lava tube | Shelter/habitation |
| 21502 | Lava tube | Shelter/habitation |
| 21503 | Site complex | Religious |
| 21665 | Lava tube | Shelter/habitation |
| 21666 | Quarry | Resource procurement |
| 21667 | Quarry | Resource procurement |
| 21668 | Quarry | Resource procurement |
| 21669 | Quarry | Resource procurement |
| 21670 | Quarry | Resource procurement |
| 21671 | Quarry | Resource procurement |
| 21672 | Quarry | Resource procurement |
| 21673 | Quarry | Resource procurement |
| 21674 | Quarry | Resource procurement |
| 21744 | Lithic, pavement | Resource procurement, lithic workshop |
| 21745 | Lava tube | Shelter/habitation |

**Table 8-25**
**Archaeological Sites Recommended as Eligible to the NRHP at PTA** *(continued)*

| State Site Number 50-10-31- | Site Type | Site Function |
|---|---|---|
| 21746 | Site complex | Unknown |
| 21747 | Lava tube | Shelter/habitation |
| 21748 | Excavated pit | Unknown |
| 21749 | Lava tube | Shelter/habitation |
| 21750 | Shrine | Religious |
| 21807 | Lava tube | Shelter/habitation |
| 21809 | Lava tube | Shelter/habitation |
| 22941 | Lava tube, lithic | Resource procurement |
| 23450 | Ahu | Marker |
| 23451 | Lava tube | Shelter |
| 23452 | Enclosure | Unknown |
| 23453 | Enclosure | Unknown |
| 23454 | Modified outcrop | Unknown |
| 23455 | Excavated pit complex | Resource procurement |
| 23456 | Enclosure | unknown |
| 23457 | Trail | Transportation |
| 23458 | Quarry | Resource procurement |
| 23459 | Enclosure | Shelter |
| 23460 | Lava tube/modified outcrop | Shelter |
| 23461 | Enclosure | Shelter |
| 23462 | Ahu | marker |
| 23463 | Excavated pit complex | Resource procurement |
| 23464 | Site-complex | Shelter/habitation |
| 23465 | Lithic scatter | Lithic workshop |
| 23466 | Lava tube | Shelter/habitation |
| 23621 | Excavated pit complex | unknown |
| 23622 | Excavated pit complex | unknown |
| 23625 | Lava tube | Shelter/habitation |
| 23626 | Lava tube | Shelter/habitation |

Source: IARII 2003

**Figure 8-38**
Archaeological Sensitivity Areas at Pōhakuloa Training Area

**Table 8-26**
**Archaeological Sites at PTA within the AALFTR and BAX**

| Site No. 50-10-31-* | Site Name/Type | Probable Function | Probable Age |
|---|---|---|---|
| 18673 | Lava tube system | Habitation ceremonial | Late prehistoric |
| 21285 | Lava tube cave | Shelter/ habitation | Prehistoric |
| 21299 | Lava tube cave | Shelter/ habitation | Prehistoric |
| 21306 | Lava tube cave | Shelter/ habitation | Prehistoric |
| 23463 | Excavated pit complex | Possible bird nesting | Prehistoric |
| 23465 | Lithic scatter | Lithic workshop | Prehistoric |
| 23622 | Excavated pit complex | Possible bird nesting | Prehistoric |
| 23625 | Lava tube cave | Shelter/ habitation | Prehistoric |
| 19490 | Site complex: 4 lava tubes, 2 trails, 1 C-shape, 4 ahu | Habitation transportation markers | Prehistoric /historic |
| 23450 | Rock mound | Marker | Prehistoric |
| 23451 | Lava tube | Shelter | Prehistoric |
| 23452 | Enclosure | Unknown | Unknown |
| 23453 | Rock mound | Unknown | Prehistoric |
| 23454 | Modified outcrop | Unknown | Prehistoric |
| 23455 | excavated pit complex | Resource procurement | Prehistoric |
| 23456 | Enclosure | Unknown | Prehistoric |
| 23457 | Trail | Transportation | Prehistoric |
| 23458 | Chill glass quarry | Resource procurement | Prehistoric |
| 23459 | Rock shelter | Shelter | Prehistoric |
| 23460 | Lava tube/ modified outcrop | Shelter | Prehistoric |
| 23461 | Rock shelter | Shelter | Prehistoric |
| 23462 | Ahu | Marker | Unknown |
| 23464 | Site complex: overhang shelter, enclosure, modified outcrop | Shelter/ habitation | Prehistoric |
| 23621 | Excavated pit complex | Unknown | Prehistoric |
| 23626 | Lava tube cave | Shelter/ habitation | Prehistoric |

Sources: Roberts et al. 2003; IARII 2003

Seventeen sites have been found in the proposed area for the BAX, including excavated pit complexes, rock shelters, modified outcrops, rock mounds, a cairn, a lava tube, a lithic scatter, and an enclosure. One site, a complex of lava tubes, trails, enclosures, and a shrine had been identified prior to archaeological survey for the Proposed Action (Reinman and Pantaleo 1998b). The GANDA survey of the entire BAX area revealed the presence of an additional 16 sites (Roberts et al. 2003). Except for the ahu or cairns, whose age is uncertain, all features seem to be prehistoric in age. Table 8-26 lists the archaeological sites within these two project areas.

### *Historic Structures and Military Landscapes*

The cantonment area includes 138 structures, including Quonset huts that date from 1955 to 1958. The condition of all structures has been assessed, and they appear to be NRHP eligible. The Army has agreed to preserve some of them. Other associated structures within the cantonment area and BAAF and throughout the PTA have been evaluated for NRHP eligibility for either the World War II or Cold War eras. Although no structures have been determined as eligible, the Army has agreed to preserve some of the buildings. An MOA is in development covering treatment.

### *PTA Trail*

While Kawaihae Harbor has no archaeological sites, records indicate that the nearshore area contains an underwater shark heiau. The trail itself runs inland from the harbor and then turns south, paralleling the current highway. It passes John Young's house on the coastal side of the property and then turns inland again as it crosses the lands of Pu'u Koholaā National Historic Park, between Young's homestead and the two heiau in the park. The Pu'u Koholaā Heiau is associated with the founding of the Hawaiian kingdom. Built between 1790 and 1791 by Kamehameha I, it was constructed to incur the favor of the war god Kuka'ilimoku (National Park Service 2004).

Near the harbor to the north and east, there are other areas rich in archaeological site. additional sites have been located along the proposed alignment for PTA Trail as the trail approaches the installation (Table 8-27). Figure 8-39 shows archaeological sensitivity areas for PTA Trail and WPAA.

**Table 8-27**
**PTA Trail Archaeological Sites**

| Site Number | Site Type | Probable Function | Probable Age |
|---|---|---|---|
| 50-10-05-9012 | Wall | Cattle boundary | Historic |
| 50-10-05-23601 | Retaining wall | Cart road | Historic |
| 50-10-05-23602 | Mound | Marker | Historic |
| 50-10-05-23623 | Wall network | Cattle boundary | Historic |
| 50-10-05-23624 | Terrace | Possible habitation | Possibly prehistoric |
| None | Lava blister | Possible burial | Possibly prehistoric |
| None | Mound | Undetermined | Undetermined |

Source: IARII 2003

GANDA surveyed a 98-foot- (30-meter-) wide corridor along the proposed trail, between Kawaihae Harbor and Māmalahoa Highway, and identified seven archaeological sites (Roberts et al 2003). Four sites are likely post-Contact or Historic in age. Two of these are segments of rock walls used as cattle enclosures or boundaries for Parker Ranch. One site is a stone mound possibly used as a trail marker. The fourth historic site, immediately inland from Kawaihae, consists of the remains of a .62-mile- (1–km-) long stretch of a cart road probably representing the main road built in the mid-1800s between Kawaihae and Waimea. Preserved features of the road include bridge foundations built of cobbles and boulders, milled lumber from the bridges with nails in place, stone retaining walls, and possible pahoehoe barrow pits from which construction material was obtained.

**Figure 8-39**
Archaeological Sensitivity Areas at West PTA and PTA Trail

Two possibly prehistoric sites include a lava blister, which might contain a burial, and a terrace that may have been used during the prehistoric period. No cultural materials were found in association with the prehistoric features during the survey. The seventh site recorded consists of a stone mound of undetermined age .

### *Potential Stryker Maneuver Areas*

GANDA conducted a Phase I reconnaissance survey of approximately 9,000 acres for the SBCT Go-Areas at PTA (GANDA 2003d). The PTA Go-Areas include a portion or all of training areas 1, 2, 4, 6, 9, 12 to 16, 18, and 19. The survey was conducted between May 19 and July 11, 2003.

Twenty-two sites or site complexes were identified, including traditional Hawaiian sites: habitation complexes, rockshelters, pahoehoe pits, ʻaʻā pit complexes, and a lithic scatter. One of the habitation complexes has a pictograph panel with six anthropomorphic figures, one Lono figure, one dog figure, and six linear figures. These are the first pictographs identified at PTA.

Also unusual were the ʻaʻā pit complexes identified in the Go-Areas. The pits were excavated into the surrounding ʻaʻā flow with the excavated material often piled around the perimeter of the pit forming a partial or complete enclosure. In some cases the ʻaʻā pits were horizontally excavated into naturally occurring outcrops within the ʻaʻā flow. Little to no soil occurs within the pits. The function of the pits is undetermined.

With the exception of the ʻaʻā pits and the pictograph panel, all features and site types identified within the Go-Area are common to PTA and represent short-term occupation, resource exploitation, and lithic workshop.

### *West PTA Acquisition Area*

The WPAA is west and north of PTA proper. Under the Proposed Action the Army would acquire approximately 23,000 acres (9,308 hectares) of fee-simple land from the Richard Smart Trust (Parker Ranch). The area is roughly triangular-shaped and lies between the west boundary of PTA, Māmalahoa Highway, and Saddle Road. The proposed land acquisition area surrounds the Waikiʻi Ranch development on its north, west, and south sides. It is would be used as a force-on-force training area.

Prior to 2002, two archaeological surveys had been conducted of small portions of the WPAA. During survey of the Waikoloa Maneuver Area, Ogden conducted a limited survey within the WPAA and identified two sites, a rock shelter (Site 22929) near one crater and a dryland agricultural complex (Site 22933) within another crater (Robins et al. 2001). PHRI conducted survey of several proposed corridors for the Saddle Road through the area and identified five sites, although two historic sites adjacent to Saddle Road were considered not eligible to the NRHP and not described or given state site numbers. The other sites included a portion of the historic Old Waimea-Kona Belt road (Site 20855), the Keʻāmuku Sheep Station (Site 23529), and two enclosures (Site 20852) that were reported by an informant to be associated with a burial (Langlas et al. 1997). The exact location of the last site has not been disclosed, and it is not known if it is included among the sites later recorded in the area.

In 2002, GANDA surveyed the entire WPAA for archaeological resources. GANDA found 90 new sites and relocated four of the seven previously known sites; thus, a total of 97 sites have been identified in the area (Table 8-28). The sites include ahu, C-shaped stone mounds (one with bone fragments), an enclosed excavated pit, mounds, a mound complex (with over 20 mounds), rock piles, enclosures, an enclosed platform, wall sections, a wall-mound-terrace complex, and a petroglyph (IARII 2003). Military features were not recorded as sites. An ancient trail, the Hualālai-Waikiʻi Trail, would have crossed the parcel, but no evidence of the trail was found during the surveys.

**Table 8-28**
**PTA Go-Area Archaeological Sites**

| State Site # - | Site Type | Feature Types |
|---|---|---|
| 50-10-31-23933 | Multi-use complex | Enclosure, excavated ʻaʻā pits, wall, cairn |
| 50-10-31-23934 | ʻAʻā pit complex | ʻAʻā pits |
| 50-10-31-23935 | Repeated-use hab complex | Rockshelter, pictographs, wall, hearth, terrace, mod outcrops, lava tube, alignment and a cairn |
| 50-10-31-23936 | Limited-use hab complex | Enclosure, wall |
| 50-10-31-23937 | ʻAʻā pit complex | ʻAʻā pits |
| 50-10-31-23938 | Wall | - |
| 50-10-31-23939 | ʻAʻā pit complex | ʻAʻā pits |
| 50-10-31-23940 | Wall | - |
| 50-10-31-23941 | Ranching complex | C-shape, terrace, walls |
| 50-10-31-23942 | Cairn | - |
| 50-10-31-23943 | ʻAʻā pit complex | ʻAʻā pits |
| 50-10-31-23944 | Rockshelter | Rockshelter, work area, enclosure |
| 50-10-31-23945 | Modified sink | Lava tubes, mounded wall |
| 50-10-31-23946 | Enclosure | - |
| 50-10-31-23947 | Rockshelter | - |
| 50-10-31-23948 | Multi-use complex | ʻAʻā pits, alignments, mound, lithic scatter |
| 50-10-31-23949 | Limited-use hab complex | Enclosure, modified outcrop |
| 50-10-31-23950 | Mound | - |
| 50-10-31-23951 | Lava tube | - |
| 50-10-31-23952 | ʻAʻā pit complex | ʻAʻā pits |
| 50-10-31-23953 | Limited-use hab complex | Lava tube, wall |
| 50-10-31-23954 | Lithic scatter | - |

### *Known Areas of Traditional Importance*

As discussed above, Social Research Pacific (SRP) is conducting an oral history survey of PTA to define and locate TCPs, as defined in Section 3.11.2, and other ATIs at PTA. None of the potential ATIs identified in the draft report (SRP 2002) fall within the areas of the Proposed Action. The Ahu a ʻUmi heiau is constructed on the plain on the interior slope of Mount Hualālai, well outside of the SBCT project area, although trails that cross PTA lead to this area. A major battle was said to have occurred in the plain, with the result determining

**Table 8-29**
**WPAA Archaeological Sites**

| Site No. | Site Name/Type | Probable Function | Probable Age |
|---|---|---|---|
| 50-10-21-20852 | Unknown | Ranching | Historic |
| 50-10-21-20854 | 2 enclosures and trash scatter | Habitation animal pen | Historic |
| 50-10-33-20855 | Road, "waimea-kona belt road" | Transportation | Historic |
| 50-10-21-21132 | Unknown | Possible burial | Unknown |
| 1522-102 | Unknown | Quarry | Unknown |
| 1522-105 | Unknown | Ranching | Historic |
| 20854 | C-shape complex | Habitation | Historic |
| 22929 | Terrace-enclosure complex | Temporary habitation/agriculture | Historic? |
| 22933 | Rock shelter | Temporary habitation | Pre-Contact/historic |
| 23467 | Enclosure | Agriculture | Undetermined |
| 23468 | Mound | Possible burial | Undetermined |
| 23469 | Mound-cairn-wall complex | Undetermined/marker | Undetermined |
| 23470 | Cairn | Marker | Undetermined |
| 23471 | Cairn | Marker | Undetermined |
| 23472 | Cairn | Marker | Undetermined |
| 23473 | Mound complex | Undetermined | Undetermined |
| 23486 | Wall | Agriculture | Undetermined |
| 23487 | Enclosure/excavated pit | Agriculture | Undetermined |
| 23488 | Mound | Agriculture/land clearing | Undetermined |
| 23489 | Mound | Ranching/land clearing | Post-Contact |
| 23490 | Enclosure | Ranching | Post-Contact |
| 23491 | Mound | Ranching/land clearing | Post-Contact |
| 23492 | Wall section | Boundary remnant | Post-Contact |
| 23493 | Mound | Ranching/land clearing | Post-Contact |
| 23494 | Cairn | Marker-painted white | Modern |
| 23495 | Wall-mound-terrace complex | Temporary habitation/agriculture | Post-Contact? |
| 23496 | Platform | Habitation? | Undetermined |
| 23497 | Enclosure-C-shape-wall complex | Possible habitation | Pre-Contact |
| 23498 | Cairn | Survey marker | Post-Contact |
| 23499 | Enclosure-concrete basin | Cistern | Post-Contact |
| 23500 | Parallel walls | Possible cattle chute | Post-Contact |
| 23501 | Petroglyph | Rock art | Pre-Contact |
| 23502 | Cairn | Marker | Undetermined |
| 23503 | Cairn | Marker | Undetermined |
| 23504 | Cairn | Marker | Undetermined |
| 23505 | Enclosure-platform | Possible burial | Pre/post-Contact |
| 23506 | Wall | Possible cattle chute | Post-Contact |
| 23507 | Rock shelter | Temporary habitation | Pre-Contact |
| 23508 | Terrace | Agriculture? | Undetermined |
| 23509 | Mound complex (20+) | Quarry material? | Post-Contact |
| 23510 | Mound (on Pu'u Iwa'iwa) | Survey marker | Post-Contact |
| 23511 | C-shape | Temporary habitation | Pre-Contact |
| 23512 | Enclosure | Permanent habitation (near old Mama road) | Post-Contact |

**Table 8-29**
**Archaeological Sites** *(continued)*

| Site No. | Site Name/Type | Probable Function | Probable Age |
|---|---|---|---|
| 23513 | Cairn | Survey marker? | Modern? |
| 23514 | Cairn | Survey marker? | Modern? |
| 23515 | C-shape | Temporary habitation | Post-Contact |
| 23516 | Retaining wall | Road bed-Keʻāmuku Station | Historic |
| 23517 | Enclosure, mound, burial | Military training/cremation burial | Multiple |
| 23518 | Retaining wall | Ranch road | Historic |
| 23519 | Wall-enclosure | Boundary/habitation | Historic |
| 23520 | Mounds complex | Land clearing | Post-Contact |
| 23521 | Mounds | Land clearing/quarrying | Post-Contact |
| 23522 | Mound complex | Land clearing | Post-Contact |
| 23523 | Terrace | Land clearing | Post-Contact |
| 23524 | Cairn | Marker | Post-Contact |
| 23525 | Mound | Marker | Historic/modern |
| 23526 | Enclosure remnant | Ranching/quarrying? | Historic |
| 23527 | Pictograph | Rock art | Pre/post-Contact |
| 23528 | Cairn | Marker | Historic/modern |
| 23529 | Cairn | Ahupuaʻa boundary marker | Historic |
| 23530 | Cairn | Ahupuaʻa boundary marker | Historic |
| 23531 | Cairn | Ahupuaʻa boundary marker | Historic |
| 23532 | Cairn | Ahupuaʻa boundary marker | Historic |
| 23533 | Cairn | Marker | Historic/modern |
| 23534 | Mound | Marker | Historic/modern |
| 23536 | Mound | Ahupuaʻa boundary marker | Historic |
| 23537 | Mound | Ahupuaʻa boundary marker | Historic |
| 23538 | Mound | Marker/land clearing | Historic/modern |
| 23539 | Keʻāmuku Village complex | Sheep-cattle station: permanent habitation; animal pens; possible burial. | Historic |
| 23540 | Retaining wall | Possible historic road section. | Historic |
| 23541 | Enclosure complex | Sheep farming | Historic |
| 23542 | C-shape | Temporary habitation/hunting? | Historic |
| 23543 | Mound complex | Land clearing/road material? | Historic |
| 23574 | Mound | Land clearing/marker? | Historic |
| 23575 | Mound complex | Land clearing/road material? | Historic |
| 23576 | Concrete structure | Foundation | Historic |
| 23577 | Mound complex | Land clearing/road material? | Historic |
| 23578 | Retaining wall | Possible road | Historic |
| 23579 | Mound-terrace-enclosure complex | Temporary habitation; agriculture? | Historic |
| 23580 | Mound | Land clearing/road material? | Historic |
| 23581 | Mound-mod. Outcrop complex | Land clearing/road material? | Historic |
| 23582 | Mound | Land clearing/road material? | Historic |
| 23583 | Mound complex | Land clearing/road material? | Historic |
| 23584 | Mounds | Land clearing/road material? | Historic |
| 23585 | Mound complex | Land clearing/road material? | Historic |
| 23586 | Mound complex | Land clearing/road material? | Historic |
| 23587 | Mound | Land clearing/road material? | Historic |
| 23588 | Faced mound | Marker? | Historic |
| 23589 | Mound | Land clearing/road material? | Historic |

**Table 8-29**
**Archaeological Sites** *(continued)*

| Site No. | Site Name/Type | Probable Function | Probable Age |
|---|---|---|---|
| 23590 | Mound complex | Land clearing/road material? | Historic |
| 23591 | Lava tube | Temporary habitation; burial | Pre-Contact |
| 23592 | Mound | Marker | Historic/modern |
| 23593 | Mound complex | Markers | Historic/modern |
| 23594 | Mound | Marker/possible temporary habitation | Historic? |
| 23595 | Mound complex | Land clearing/road material? | Historic/modern |
| 23596 | Mound | Land clearing | Historic/modern |
| 23597 | Mound | Land clearing | Historic/modern |
| 23598 | Mound complex | Land clearing? | Historic/modern |
| 23599 | Mound complex | Quarry piles/ranching? | Historic/modern |
| 23600 | Mound | Land clearing | Historic/modern |
| 23620 | Mound complex | Land clearing | Historic/modern |

Source: IARII 2003, Roberts et al. 2003

how the island would be divided after ʻUmialīloa's death. Preliminary work on the ATIs of PTA by SRP reveals that the grandparents of some kūpuna or elders were known to cross the island via ʻUmi's Road.

ATIs may include previously identified archaeological sites. Almost all sites at PTA are Native Hawaiian sites and reflect the traditional types of activities that Hawaiians conducted in this region. Activities included procurement of lithic (stone) resources, primary preparation of tools in workshops, hunting of birds, and collection of nestling birds. A few sites incorporate ritual aspects. Streck (1986b) interprets a basalt platform on a terraced mound within a lava tube as a shrine (Site 10269). Shapiro et al. (1995) identify a grouping of rock platforms and open-air sites with stone uprights near Puʻu Koli in the southeastern portion of PTA as a place where prehistoric Hawaiian religious activities took place (Reinman et al. 1998, 17). Ritual permeated traditional Hawaiian life, including everyday work activities, and some of the religious structures at PTA may be occupational shrines, where fowlers, quarry workers, and woodcutters recited formulas and made offerings connected with their work.

Most of the sites in the WPAA are associated with historic era agriculture and ranching activities. Only 10 sites are clearly or possibly of traditional Native Hawaiian origin. These mainly consist of a few agricultural terraces and enclosures and habitation shelters. A few sites may be of special importance to Native Hawaiians: a basalt ledge with a petroglyph, and a boulder face with an anthropomorphic red pigment pictograph.

## 8.11.2 Environmental Consequences

### *Summary of Impacts*

Cultural resources impacts related to the Proposed Action at PTA vary depending on the location and nature of the project. There are five significant impacts and two significant and mitigable to less than significant impacts to cultural resources within PTA and the proposed WPAA. Impacts primarily relate to the construction phase and range uses in PTA and the

WPAA. As explained in the mitigation sections below, severity of these impacts would be reduced by compliance with the PA the Army has developed, in consultation with the Hawai'i SHPO, the ACHP, and various Native Hawaiians. The PA is provided in Appendix J.

Mitigation measures for archaeological resources or ATIs will include evaluation for NRHP eligibility and avoidance or data recovery of eligible sites. Impacts on ATIs or TCPs, as defined in Section 3.11.2, will be mitigated through avoidance and monitoring of construction by Native Hawaiian monitors as defined in the PA. Mitigation will be developed in consultation with the SHPO and Native Hawaiians, also in accordance with the provisions of the PA. Documentation of such ongoing consultation is provided in Appendix J.

Four less than significant impacts include the risk to archaeological sites from constructing the FTI, the risk to undiscovered archaeological sites in areas of low potential for subsurface archaeological resource, the risk to historic architecture and landscapes from installation of cables and conduits, and the risk to archaeological sites from troop travel from Kawaihae to PTA. These impacts will be mitigated by complying with the IDP contained in the PA, complying with the Secretary of the Interior's Standards for Rehabilitation of Historic Buildings, and monitoring by installation personnel. Table 8-30 summarizes the potential impacts on cultural resources at PTA.

### Proposed Action (Preferred Alternative)

#### *Significant Impacts*

*Impact 1: Impacts on historic buildings.* Ke'āmuku Sheep Station, Site 23539, has eight features, including three habitation foundations and remnants of three outbuildings. There is historic debris, wood from former structures, and chicken coops on or near the features (Roberts et al. 2003, 70-72). These buildings may be put at risk from military use, particularly as a result of training exercises that may result in damage to the buildings. Military training in the new range may result in damage to these historic buildings, and other historic ranching features. Impacts may include damage from vehicles, vandalism or fire, among other possible impacts. A Range Maintenance Facility would be built on the west side of the PTA cantonment area, approximately 300 feet (91.4 meters) north of the main entrance from Saddle Road. The cantonment area contains Quonset huts dating from 1955 to 1958 that have not been evaluated for NRHP eligibility as Cold War era properties. Constructing the Range Maintenance Facility would require demolishing eight of these Cold War era buildings (Building numbers T187, T188, T17, T19, T20, T31, T3, and T2).

The Proposed Action would upgrade the 4,750-foot (1,448-meter) runway at BAAF to accommodate C-130 and C-17 aircraft. BAAF was built in 1956 (Langlas et al. 1997, 50) and is a potential Cold War site.

The mitigation measures below will reduce the severity of the impact but not to less than significant levels.

**Table 8-30**
**Summary of Potential Cultural Resources Impacts at PTA**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Impacts on historic buildings | ⊗ | ⊗ | ○ |
| Impacts on archaeological resources from range and facility construction | ⊗ | ⊗ | ○ |
| Impacts on archaeological resources from training activities | ⊗ | ⊗ | ○ |
| Impacts on ATIs | ⊗ | ⊗ | ○ |
| Impact on archaeological resources from construction of FTI | ⊙ | ⊙ | ○ |
| Impacts from installation information infrastructure architecture construction | ⊙ | ⊙ | ○ |
| Impacts on archaeological sites from road construction | ⊗ | ⊗ | ○ |
| Impacts on archaeological sites from road use | ⃠ | ⃠ | ○ |
| Impacts on archaeological sites from construction of the ammunition storage facility. | ⃠ | ⃠ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

* Impacts may be mitigable to less than significant.

LEGEND:

| | | | | |
|---|---|---|---|---|
| ⊗ | = Significant | + | = | Beneficial impact |
| ⃠ | = Significant but mitigable to less than significant | N/A | = | Not applicable |
| ⊙ | = Less than significant | | | |
| ○ | = No impact | | | |

*Regulatory and Administrative Mitigation 1.* The Army will require WPAA buildings to be avoided by using range management protocols, which will require the area around the buildings to be off-limits to military training activities. Ke'āmuku Village will be marked as off-limits for training to protect it from damage.

The Army will continue consulting with the SHPO, ACHP, and interested parties in accordance with Section 106 of the NHPA on the proposed PTA master plan to include the preservation and protection of historic buildings in the PTA cantonment area.

*Impact 2: Impacts on archaeological resources from range and facility construction.* The AALFTR is to be built on Range 3 and Range 8, extending into the ordnance impact area and along the west side of Redleg Trail. The ordnance impact area has UXO and restricted access. The northern BAX parcel extends into the ordnance impact area and north of the trail. There would be no increased impacts on archaeological resources in the ordnance impact area as a result of the Proposed Action.

Eight sites are within the proposed AALFTR area. Site 18673 (an extensive lava tube system containing cultural features and materials) had been previously located within the project area during the survey along the Redleg Trail (Reinman and Pantaleo 1998b). The recent SBCT survey in the AALFTR area (Roberts et al. 2003) identified an additional four lava tube cave sites. All five lava tubes contained evidence of their use as shelters or temporary habitation areas, but in the Site 18673 lava tube, three upright stones were found on basalt ledges, suggesting that these may have been shrines. The other sites consist of two complexes of excavated pits and one lithic scatter. All sites are Native Hawaiian sites that have not been formally evaluated for the NRHP. A total of 17 sites may be affected by construction of the proposed BAX; none of these have been evaluated for eligibility for the NRHP. Site types include excavated pit complexes, a complex of lava tubes with associated trails and cairns, rock shelters, modified outcrops, rock piles, a stand-alone cairn, a lava tube, a lithic scatter, and an enclosure. Potential impacts include site destruction or damage from construction of BAX/AALFTR facilities.

Facility and range construction involves grubbing vegetation, softening the ground, grading site surfaces, excavating, and moving heavy construction equipment. All of these activities, particularly ground softening, would directly damage or destroy unidentified archaeological resources or would indirectly damage them by contributing to soil erosion. Cultural resources within lava tubes would be particularly subject to damage as a result of ground softening prior to construction of the BAX. The mitigation measures below will reduce the severity of the impact but not to less than significant levels. *Regulatory and Administrative Mitigation 2.* Before construction, the Army will evaluate any archaeological sites within areas subject to range and facility construction. Sites determined to be eligible for the NRHP will be flagged for avoidance. The projects will be designed to avoid all eligible and unevaluated archaeological sites, to the full extent practicable. GIS and GPS information will be given to project designers and range control to ensure sites are considered in project design. If it is not possible to avoid archaeological sites, the Army will consult in accordance with the PA to determine the appropriate mitigation for the damage to the sites, such as data recovery or other mitigation measures**.** To address the accidental discovery of archaeological sites, human remains, or cultural items, the Army has developed an IDP as part of the PA.

*Impact 3: Impacts on archaeological resources from training activities.* In addition to the 25 sites within the BAX and AALFTR project areas, 96 archaeological sites (both prehistoric and pre-military historic) have been located within the WPAA. Site types on the parcel include ahu, mounds and mound complexes, an enclosed excavated pit, rock piles, enclosures, partial enclosures (C-shapes), an enclosed platform, wall sections, wall-mound-terrace complexes, a petroglyph, a pictograph, a sheep-cattle station complex, and a historic road.

Training activities on PTA and the WPAA under the Proposed Action would result in increased access by ground troops into the training areas, resulting in possible impacts on archaeological sites, off-road vehicular movement by current force and Strykers, cleanup of unexploded ordnance, and subsurface excavations related to troop maneuvers (e.g., field fortifications and obstacle placement). Live-fire activities on PTA ranges could damage surface or subsurface resources from direct impacts of munitions or explosions, although such activities are directed toward established live-fire ordnance impact areas. Activities such as ordnance removal, construction of field fortifications or defensive positions, and off-road vehicular movement could cause site destruction or damage directly or indirectly through soil erosion. As discussed in Section 8.9, soil erosion is expected to increase at PTA under the Proposed Action. Unrestricted Stryker maneuvering is identified as a potential source of damage to archaeological sites. This type of damage would be more likely in the WPAA than at the AALFTR or BAX, based on the Army's preliminary maneuverability maps for the installation and the dozens of archaeological sites located within the unrestricted maneuvering area. These sites would be at significant risk of damage from training exercises through direct and indirect effects of mounted maneuvers. The mitigation measures below will reduce the severity of the impact but not to less than significant levels.

*Regulatory and Administrative Mitigation 3.* The Army will evaluate archaeological sites within training areas related to SBCT. Sites determined to be eligible for the NRHP and sites pending evaluation will be identified and avoided through protective measures, to the full extent practicable. If avoidance of identified archaeological sites or newly discovered sites is not feasible, the Army will consult in accordance with the PA to determine the appropriate mitigation for the damage to the sites, such as data recovery or other mitigation measures. To address the accidental discovery of archaeological sites, human remains, or cultural items, the Army has developed an IDP as part of the PA

*Impact 4: Impacts on Areas of Traditional Importance.* SRP (2002) is conducting a TCP survey at PTA to identify ATIs. As noted previously, evidence indicates the possible presence of ATIs, including burials in the ROI of PTA, although the survey did not identify any ATIs within the project areas.

There would be no noise impacts on ATIs at Mauna Kea because the noise analysis shown in Section 8.6 indicates that noise contours relating to ordnance use and construction under SBCT would not extend much beyond the PTA boundaries.

Conducting military training at the WPAA would limit access to the property. There are cultural resources of Native Hawaiian origin on the property, and it is possible that some of these resources constitute ATIs. Converting the use of the parcel to military training may also damage or destroy any unrecorded sites. Native Hawaiians consider range and training activities inappropriate and disrespectful uses of the land that disturb and change the character and feeling of spiritual places.

One FTI antenna will be placed on Mauna Loa, nine others will be located around PTA and the WPAA, and one more will be erected at Kawaihae. While the precise locations of the FTI sites will avoid archaeological resources, Mauna Loa has been identified as a particularly sacred element of the Native Hawaiian cultural landscape. While the antennas would be erected on top of existing support structures, the construction may be considered to have an adverse effect on the nature of the cultural landscape. ATIs and burials, if located within the area of construction activities or new training areas, would be at risk of damage or destruction as a result of the Proposed Action. Impacts could be caused by human presence in the area, physical disturbance from human or vehicle passage, or actual damage from excavation or erosion. The mitigation measures described below will reduce the severity of these impacts on ATIs.

*Regulatory and Administrative Mitigation 4.* Facility construction or training area uses will be designed to avoid identified traditional places and limit visual impacts on TCPs by site location, design, and orientation, where feasible.

If avoiding identified TCPs or ATIs is not feasible because of interference with the military mission or risk to public safety, the Army will consult with the SHPO and Native Hawaiians in accordance with the PA to identify impacts and to develop appropriate mitigation measures. Mitigation for impacts on the cultural landscape could include consulting with Native Hawaiians and monitoring of construction by a cultural monitor.

The Army will continue to provide Native Hawaiians with access to traditional religious and cultural properties, in accordance with AIRFA and Executive Order 13007, on a case-by-case basis. This access program will be expanded to include new land acquisitions.

The Army previously identified Native Hawaiian burial sites in the SBCT ROI. The Army completed notification and consultation for these burial sites, in accordance with NAGPRA, and left these human remains in place. To address any impacts on any burial sites, or an inadvertent discovery of Native Hawaiian human remains or funerary objects, the Army will abide by all notification and consultation requirements outlined in Section 3 of NAGPRA.

*Impact 5. Road construction impacts on archaeological sites.* Acquisition and construction of PTA Trail would occur along a different alignment than the trail now used by military units traveling from Kawaihae Harbor to PTA. The seven cultural resources identified in the trail corridor, sites near the corridor, and in or near construction staging areas may be adversely affected during construction. Many archaeological sites have been identified near the northern end of the trail alignment. The large number of sites within the WPAA may also be affected, and until the location of the roads are selected, the potential impacts to sites that may be in close proximity to the roads can not be assessed.

PTA Trail as established, avoids all archaeological and historic sites in the Kawaihae area, but any alteration in the alignment could result in impacts on historic properties.

Constructing PTA Trail would involve grubbing vegetation, grading soil, and the regular use of heavy equipment. This activity could expose or disturb surface or subsurface cultural resources. Off-road movement of construction vehicles also could cause erosion, which could lead to damage of undiscovered sites in the vicinity of project operations. All of these activities could result in direct destruction or damage of archaeological resources or indirect damage by contributing to soil erosion. The mitigation measures below will substantially reduce the impact but not to less than significant levels.

*Regulatory and Administrative Mitigation 5.* In accordance with the PA, the Army will identify cultural properties, evaluate cultural properties for NRHP eligibility, and implement avoidance strategies to the full extent practicable. GIS and GPS information will be provided to project designers to ensure sites are considered in the design and construction of all the proposed military vehicle trails and training roads in WPAA. If it is not possible to avoid archaeological sites, the Army will consult in accordance with the PA to determine the appropriate mitigation for the damage to the sites, such as data recovery or other mitigation measures. To address the accidental discovery of archaeological sites, human remains, or cultural items, the Army has developed an IDP as part of the PA.

### *Significant Impacts Mitigable to Less than Significant*

*Impact 6: Impacts on archaeological resources from road use.* Impacts on sites along PTA Trail from military use of the trail could include erosion and possible vandalism or human access. These impacts are likely to be less than significant and will be mitigated by regular monitoring by installation cultural resources personnel. Road use within WPAA, however, poses a greater risk to resources recorded within the proposed new training area. The large number of gravel roads proposed would create additional impacts to sites within the WPAA including erosion and possible vandalism or human access. The mitigation measures below will reduce the severity of the impact to less than significant levels.

*Regulatory and Administrative Mitigation 6.* Eligible and unevaluated sites will be flagged and mapped on a range control GPS map. Installation cultural resources staff will monitor the sites regularly. Participants in training activities on the ranges will be ordered to avoid identified sites. To address the accidental discovery of archaeological sites, human remains, or cultural items, the Army has developed an IDP as part of the PA.

*Impact 7: Impacts on archaeological sites from construction of the ammunition storage facility.* The ammunition storage facility project involves the construction of three earth-covered ammunition storage buildings adjacent to existing ammunition storage buildings. There is one site complex (site 23455) of pahoehoe pits so there is a potential for a significant impact.

*Regulatory and Administrative Mitigation 7.* Before construction, the Army will complete the evaluation of any archaeological sites within areas subject to range and facility construction. Sites determined to be eligible for the NRHP will be flagged for avoidance. The projects will be designed to avoid all eligible and unevaluated archaeological sites, to the full extent practicable. GIS and GPS information will be given to project designers and range control to ensure sites are considered in project design. If it is not possible to avoid archaeological sites, the Army will consult in accordance with the PA to determine the appropriate mitigation for the damage to the sites, such as data recovery or other mitigation measures. To address the accidental discovery of archaeological sites, human remains, or cultural items, the Army has developed an IDP as part of the PA.

### *Less than Significant Impacts*

*Impacts from installation information infrastructure architecture construction.* I3A would involve laying cables and conduits throughout the PTA cantonment area and out to the ranges, motor pool, and other facilities. These would be both underground and aboveground conduits. Excavation to lay cabling and conduits for the I3A project has the potential to disturb archaeological resources. Additionally, the I3A project could require bringing cables and conduits into historic buildings, which would necessitate drilling holes in the buildings and possibly other more extensive modifications. Depending on the precise location of cable and conduit placements and the level of renovation needed to the buildings, this project could have an adverse effect on the historic integrity of Cold War era buildings or archaeological sites at PTA. The Army is conducting an evaluation of historic structures in the PTA cantonment area and at BAAF. If avoidance is not feasible, adverse effects on historic buildings will be mitigated by compliance with the Secretary of the Interior's Standards for Treatment of Historic Properties. Impacts on buildings and archaeological sites will be mitigated by compliance with the provisions of the PA.

*Impacts from construction of a tactical vehicle wash.* A tactical vehicle wash would be built during fiscal year 2005. USAG-HI DPW Environmental staff have conducted an assessment of this location and found no cultural resources within the project area (IARII 2003). An archaeological inventory survey will be conducted to confirm this finding prior to initiation of construction.

The Range Maintenance Facility in the PTA cantonment area has no identified archaeological sites within the construction area.

*Impacts on archaeological resources from fixed tactical internet construction.* Eleven FTI antennas would be erected at PTA, WPAA, and several sites off the installation. While antennas would be mounted on existing support structures where feasible, many of the sites would require construction of a new equipment shed to support the facility. This construction itself would be ground disturbing and could result in adverse impacts on archaeological resources. The Army has surveyed the sites and determined there are no impacts on cultural resources. The sites will be monitored during construction, in accordance with the PA. There would be no impacts on cultural resources from the FTI construction at Kawaihae Harbor, as the project site is completely disturbed, and there are not expected to be any undiscovered cultural resources. Five Cold War era structures at Kawaihae Military Reservation require determinations of eligibility; however, the 7-foot (2.1-meter) antenna support structure to be erected on top of an existing equipment shed would not have any impact on these buildings.

### Reduced Land Acquisition Alternative

The RLA Alternative would produce roughly the same impacts as the Proposed Action, because QTR2 would be on the same disturbed areas as the BAX and AALFTR, and thus would not result in any greater impacts on cultural resources.

### No Action Alternative

#### No Impacts

The existing baseline for cultural resources would continue under No Action. Under the status quo of No Action, military use of PTA would continue at current levels. As a result, there would be no new risk of damage to known or undiscovered archaeological resources. Ongoing activities at PTA under No Action include regular uses of the installation for military exercises, in compliance with Army regulations concerning cultural resources preservation and management. Although the WPAA land would not be acquired, any continued use would also fall under the same preservation measures in place at PTA. Under

No Action, the TCP survey of PTA would be completed, and any ATIs would be evaluated and managed.

## 8.12 HUMAN HEALTH AND SAFETY HAZARDS

### 8.12.1 Affected Environment

The following section describes the affected environment pertaining to human health and safety hazards as a result of military actions on PTA.

#### *Hazardous Materials and Waste Management*

The US Army maintains a spill prevention control and countermeasure plan for hazardous materials management at PTA. The major facility of concern for the plan is the bulk fuel storage area. Minor facilities include a grease rack used to inspect military vehicles and heating oil tanks (both aboveground and below ground) used for heating water for the kitchens, showers, and officers' quarters.

The US Army also maintains an installation-wide hazardous waste management plan that regulates the storage and disposal of hazardous waste. PTA operates its own TAP site, where it stores hazardous waste for a maximum of 90 days before a contractor picks it up and transports it to the DRMO, where it is shipped off-island for permanent disposal at a certified hazardous waste disposal site (Akasaki 2002b).

#### *Specific Health and Safety Hazards*

The following sections address specific human health and safety hazards, such as hazardous materials and wastes that may be used, stored, or transported within PTA. Hazardous materials and waste have the potential to affect the environment and often have specific regulations that govern their use, storage, and disposal.

##### *Ammunition*

As further discussed in Chapter 2, PTA provides the space for infantry and associated support units to maneuver. Under this maneuver, live bullets are not fired, and blanks are used in rifles and small caliber automatic weapons, along with MILES equipment. Chapter 2 also discusses the available range areas, types of ordnance used, and scheduling of the ranges at PTA.

In addition to the dry- and blank-fire maneuver space, PTA provides two types of live-fire ranges. The first is a series of static live-fire ranges used for familiarization, zero, or qualification of weapon systems (The process of setting the sights of a weapon to place the projectile at the point of aim is called zeroing the weapon [FRII 2002]). The other type of live-fire range provides fire teams, through company or larger units, the chance to engage a series of objectives.

During eight or nine months of the year, ammunition is brought from WAAF or Lualualei to PTA via boat or helicopter (Saldivar 2002). If boats are used, the ammunition is driven from Kawaihae Harbor to PTA. There have been no accidents involving the transport of ammunition in the last two years.

During training, ordnance is temporarily stored in ammunition holding areas on PTA. At completion of training, unused ammunition is returned to the ammunition supply point on WAAF. Permanent ammunition storage is not authorized on PTA (Borja 2002a).

Surface danger zones are designated for the ranges at PTA (Sato 1996, 5-8). Their construction is based on information in AR 385-63 and the draft update of this regulation. Increased emphasis is placed on the effects of ricochets at closer ranges in the draft version. During the last 24 months, there were no accidents pertaining to the transporting, storage, or firing of ammunitions at PTA that risked public safety (Kila 2002).

SDZs are configured toward a cumulative ordnance impact area (approximately 51,000 acres) in the central portion of PTA. In addition, although ICMs are no longer used on any Army training land due to the extreme safety risk (HQDA 2001), there is a 16,800-acre (6,799-hectare) ICM impact area within the larger impact area. ICMs, also referred to as cluster bombs, are artillery munitions that contain multiple submunitions. The ordnance impact area and ICM area are not accessible.

The Army conducts nonlive-fire maneuver training on training areas around PTA. UXO is suspected in various training areas and presents a potential threat to Army personnel. UXO is not cleared before maneuvers commence because there is a low level of suspected UXO. As further explained in Section 3.12, Soldiers are taught how to identify UXO and how to properly handle it.

As discussed in Section 3.12, Ammunition, live-fire activities include artillery and mortar training, which requires the use of bags filled with explosive propellant for artillery and similar explosive propellant charges for mortars. Charges that are not used during training are burned, creating a residue. Residues from burned propellant are the only hazardous wastes temporarily stored at the range burn site in a designated HWSSP. Hazardous waste is transferred to the PTA TAP for proper storage until disposal contractors and DRMO coordinate to ensure proper disposal.

The burn site for PTA was selected and constructed in accordance with Section 17-5, the Department of Army Pamphlet 385-64, Ammunition and Explosive Safety Standards. Table 8-31 summarizes the burn pan operating specifications. The burn site is operated under the following restrictions (there are no OB/OD operations on PTA):

- All burn sites have a means of collecting remnants produced by the burning operation.
- Propellants to be burned are unconfined and spread evenly over the burn pan. The depth of the propellant would not exceed 3 inches (7.62 centimeters).
- The burn pan would be used only once per 24-hour period.

**Table 8-31**
**Burn Site Specifications**

| Burn Site | Estimated Amount in Lbs./Burn | Estimated Frequency of Burns/Week | Type of Propellants | Burn-Pan Dimensions | Pan Quantity |
|---|---|---|---|---|---|
| PTA | 10-50 | 2 | M1, M8, M9, M10 | 5'9" by 8'10" by 33" | 1 unit |

Source: US Army 1999

Results from recent range soil sampling revealed metals, explosives, and SVOC levels above EPA Region IX residential and industrial PRGs on PTA ranges. Although metals such as aluminum and iron occur naturally in Hawaiian soils, byproducts of munitions, such as lead and RDX, contribute contaminants that could create health and safety in the natural environment. Section 8.8, Water Resources, and Section 8.9, Geology, Soils, and Seismology, provide a more detailed discussion of investigation results and effects on surface water and soils. The investigation study is provided in Appendix M1.

### *Installation Restoration Program*

PTA was entered into the CERCLA System in July 1992, under the USEPA Identification number HI3214522234, and was inspected in 1997 as a potential hazardous waste site. The IRP investigation is described in detail in Appendix K-2.

### *Lead*

The properties of and regulations for lead are described in detail in Section 3.12 of this document. To this date, DPW has not surveyed for lead at any of the structures on PTA. Any future lead survey information for PTA will be maintained on the DPW lead and asbestos database.

### *Asbestos*

The properties of and regulations for asbestos are described in detail in Section 3.12 of this document. Asbestos survey information for PTA is maintained on the DPW lead and asbestos database.

To this date, DPW has surveyed for ACM at 35 locations on PTA. Fifteen of the surveys did not find asbestos as part of any structures. Asbestos was detected in 20 surveys; the ACM was friable in one of the surveys and nonfriable in the other surveys. Three of the survey structures were set for demolition (USARHAW 2002d). A total of 122 ACM surveys were contracted to begin the week of September 2, 2002. Results are being obtained by the DPW and will be incorporated upon receipt.

### *Polychlorinated Biphenyls*

PRC Environmental Management, Inc., conducted a preliminary assessment/site inspection of four potential contaminant sources (a former pesticide storage area, a fire training area, and two landfills) within the boundaries of PTA during March and April 1993. The analytical results for soil sampling in these areas indicated that PCB concentrations were all below the listed PRG.

Efforts are ongoing to assess and remediate possible PCB contamination sources throughout PTA. The Army is committed to removing or refilling all electrical equipment containing regulated amounts of PCBs. On-line devices containing regulated levels of PCB are to be replaced with non-PCB devices or refilled and reclassified to non-PCB status, in accordance with reclassification requirements outlined in 40 CFR 761.30(a)(2)(v). Off-line devices containing regulated levels of PCB are to be removed from the installation and disposed of (PRC 1995, 4).

#### *Electromagnetic Fields*

Equipment producing EMF that could pose a serious health risk is operated under strict constraints, in site-approved areas, and by qualified personnel per technical publications (Moreno 2002). Mobile radar equipment is owned by Division Artillery and consists of a radar-set designed to detect incoming artillery and projectiles. It is operated and managed by the Forward Area Defense section.

Four remote weather stations on PTA are used for fire indexing, which forecasts the threat of wildfires. The RAWS, typically located in remote wildland areas on installations, requires personnel to be on-site only for maintenance and not for operations. The general public typically is not allowed in areas that could contain EMF hazards from Army equipment, minimizing exposure to potential sources of EMF.

#### *Petroleum, Oils, and Lubricants*

PRC Environmental Management conducted a preliminary assessment and site inspection of PTA in March and April 1993 (PRC 1997, ES-1). Soil samples were obtained across the installation and were analyzed for various constituents, including petroleum products. The results indicated that subsurface soils and bedrock at the fire training area and two landfill areas were contaminated with low concentrations of petroleum-based substances (likely used motor oil and fuel oil, such as kerosene). The former burn pit was in the vicinity of the fire training area and was constructed of rubber plates covered with dirt and surrounded by an earthen berm. Flammable liquids were poured into the burn pit during fire training exercises and may have seeped into the underlying soil and bedrock along the unsealed plate seams. The former burn pit was decommissioned after 1983, and a new fire training facility with a more suitable design was constructed in 1994.

Gross petroleum contamination was not apparent based on field observations and screening. Analytical results indicated that VOCs and SVOCs were below USEPA Region IX PRGs. Site inspection data for soils in these areas indicate the presence of some contaminants of concern, but at concentrations that if left in place, would pose minimal, if any, threat to human health and the environment (PRC 1997, ES-3).

There are four basic maintenance areas on PTA (Ross 2002):

- A 1-acre (0.4-hectare) two-bay motor pool in the building complex T-2 and T-3.
- A 10-acre (4.05-hectare) motor pool by Building T-41. Although this site is inactive, units may bring temporary, full-service maintenance tents during their maneuvers.

- A vehicle maintenance area in the hangar area that units use only during maneuvers.
- A former motor pool at Building T-25, where such materials as lubrication oil, used oil, antifreeze, and waste antifreeze were used. The facility is currently used as a Directorate of Logistics vehicle storage area.

DPW stores heavy equipment at Facility 401. As vehicles and equipment are stored for extended periods of time, petroleum and oils have been observed on the ground (Ross 2002).

*Underground Storage Tanks*

The bulk storage facility, which was constructed in early 1982 at Building 343, has eight USTs. POL containers belonging to the bulk fuel facility are stored on a concrete pad with secondary containment.

One UST is included on the LUST list maintained by DPW. This tank was located at the dining facility in Building T-186 and was removed in May 1994. This site has been remediated, and the USEPA issued a clean closure status in December 2001. One UST is in use at this dining facility, though details of the tank are not available.

Appendix K-4 lists all USTs and LUSTs currently in use and permanently out of use on PTA (Bourke 2002a). Additionally, this table provides location, responsible party, construction, and content information for all USTs and inspection and remediation status information for all LUSTs.

*Aboveground Storage Tanks*

Several ASTs are used to store diesel fuel and liquid petroleum gas, also known as propane, used for fueling building hot water heaters. Appendix K-4 provides a listing and location, capacity, and content information for all ASTs on PTA (Bourke 2002c). Additionally, this table provides containment and leak protection information.

*Oil/Water Separators, Wash Racks, and Grease Traps*

There are no OWSs on PTA, but an oil skimmer, similar to an oil-water separator, is attached to a wash rack used to wash vehicles and equipment. The oil generated from the wash rack is skimmed into this closed-loop device, where it is manually removed to be disposed of by a private contractor or DRMO, coordinated through USAG on O‘ahu (Ross 2002).

Grease racks have not been used since November 1996 at any of the motor pool or maintenance areas. All grease racks have been condemned, and such facilities are used as inspection racks (Ross 2002).

### Pesticides/Herbicides

Pest control operations on PTA cantonment area require only a part-time effort by one person (USARHAW 2000b). Big Island Pest Control, Inc., controls pests under contract. The workload consists of cockroach, ant, filth fly, rodent, and weed control.

An individual pest management plan is not required under AR 200-5, Environmental Quality, Pest Management. In addition to PTA being covered under the USAG-HI pest management plan, a section of the document is dedicated to addressing the specific pest management program for this area.

There is one primary pesticide storage location on PTA, the DPW Natural Resources Department (Building T-93). This entity controls alien species and protects native threatened and endangered species with the use of herbicides and rodenticides on all training areas. Small volumes of pesticides are stored in plastic lockers, with closed plastic containers as secondary containment. Larger volumes are stored in plastic containers on secondary containment pallets. Pest management of the cantonment area is completed under contract. Contractors are not allowed to store hazardous materials, including pesticides, on site (Yamamoto 2002).

According to site visits and interviews by outside consultants with PTA facility personnel during a 1997 hazardous waste inspection, a pesticide storage shed used to be located near the north side of Building T-31. In the 1980s, the pesticide storage shed was moved to the engineer's storage yard along the northwestern side of the cantonment area. The ground surface around the former pesticide storage area may be contaminated from inadvertent spills of pesticides during the formulation and mixing process; however, installation personnel identified no specific instances of spillage. Pesticide formulation and mixing was conducted at a potable water source equipped with a backflow-prevention device. Pesticide-contaminated rinsates from the spray equipment and container rinsing were also reportedly disposed of by applying the rinsate to needed areas. Pesticides may also have spilled within the storage shed and seeped through a pervious wooden floor, contaminating the underlying soils. A gravel driveway now exists north of Building T-31, over the area that is believed to have been occupied by the pesticide storage shed. Later soil analysis in the area positively detected pesticide constituents in the soil, but average pesticide concentrations across the former pesticide storage area were well below the USEPA Region IX PRG for pesticides of interest (PRC 1997, ES-3). As previously mentioned, pesticides are now stored in Building T-93 and are properly contained with an up-to-date spill plan.

Appendix K-5 provides a list of all pesticides used and stored on PTA (Yamamoto 2002).

### *Wildfires*

PTA is particularly susceptible to fire for numerous reasons (USARHAW and 25th ID[L] 2001b, 78). First, there is a history of ordnance-induced fires because several ranges are used year-round for live firing of a wide variety of ordnance. Also, there is a high risk of wildfire ignition from the use of aerial flares and similar pyrotechnics. Fire suppression is difficult in the impact area's rugged habitat, and UXO makes it difficult for helicopters to drop water in the impact area. Vehicles with catalytic converters, which pose a potential fire threat, are used on PTA. Highly flammable fuels and unique weather conditions also lead to high ignition rates. However, fires may also originate from other sources, such as arson, cigarettes, or campfires, within or adjacent to training areas.

Military live fire activities start many of the fires in the ordnance impact area (USARHAW and 25th ID[L] 2001b, 149). Most of these fires and other fires that start on PTA are prevented from leaving the boundaries of the installation; however, some fires have burned onto adjacent lands. Also, fires can come onto the installation from off-post. For example, a wildfire in 1994 affected about 4,670 acres (1,890 hectares) on the installation and originated in the Puʻu Anahulu Game Management Area, and a wildfire in 1999 that affected 3,560 acres (1,441 hectares) originated along Māmalahoa Highway (Highway 190).

The PTA Fire Chief is responsible for ensuring that wildland fire responses are in accordance with the IWFMP (USARHAW and 25th ID[L] 2001b, 149-151). Figure 8-40 shows the location of fire management facilities. Four remote weather stations on PTA are used for fire indexing. An auxiliary wildland firefighting force provides an initial attack on a fire before the fire department arrives. The Hawaiʻi County Fire Department, DLNR, and Hawaiʻi Volcanoes National Park assist with wildland fire suppression.

Historically, fire in the area of PTA was most likely rare and of little significance, limited to volcanically started fires and occasionally lightning (USARHAW and 25th ID[L] 2003, 7-51). Military use for live-fire exercises and target practice has increased ignition frequency dramatically and resulted in numerous small fires, though it appears that much of the threat to endangered species populations is a result of off-post ignitions. Fire history at PTA was inferred as best as possible from existing fire records and documentation provided by various agency sources. Fire records were numerous for PTA but most were incomplete. Many records included a date, time, and location for each fire but very little information was available about the size of fires or the weather conditions during the fires.

The number of fires per month peaks from March to July (Beavers et al. 2002b, 12, 13). However, because PTA is dry throughout the entire year and the amount of precipitation received during the winter is probably not enough to change the probability of fire by any significant amount, an annual cycle in fire frequency was not expected. Therefore, the main cause of monthly variation in the data is probably the frequency and intensity of use by the military.

Fire frequency by time of day illustrates that fires occur most frequently during the early afternoon and least frequently at night (Beavers et al. 2002b, 13). Eighty percent of all recorded fires between 1987 and 1999 started between 9:00 AM and 5:00 PM.

PTA Ranges 1, 10, and 12 were the most common locations for fires between 1987 and 1999 (Beavers et al. 2002b, 14 and 15). Ranges 1 and 10 are both assault courses designed for squad- and platoon-size units, respectively. There are several possible reasons why these ranges are the most common locations for fires. First, they are the most frequently used areas at PTA. Second, it is common for a large number of rounds from a wide variety of weapons systems to be expended during training.

**Figure 8-40**
Fire Management Facilities at Pōhakuloa Training Area

Fires caused by tracer ammunition is by far the largest cause of fires at PTA (USARHAW and 25th ID[L] 2003, 7-51). This comes as no surprise because tracers easily start fires and are one of the most commonly used munitions. Unknown ignition sources also account for a large number of fires (Beavers et al. 2002b, 16).

It is important to note that fires originating from nonmilitary sources have caused the overwhelming majority of the acres burned at PTA (USARHAW and 25th ID[L] 2003, 7-51). Since July 1990, over 8,000 acres (3,238 hectares) have burned. Of these, over 7,700 acres (3,116 hectares), or 91 percent of all acres burned, were burned by fires caused by lightning, arson, or carelessly discarded cigarettes, and the largest of these started on Army lands and later burned into PTA.

Based on fire history for PTA, the data show that the western and the northern sections of PTA potentially face the greatest threat of wildfire (USARHAW and 25th ID[L] 2003, 7-51). Military training activities have been the leading cause of past fires. The high risks inherent in military training activities, the existence of heavy loads of readily ignitable fuel, and the prevalent dry conditions of the area present significant fire management problems for the training area and adjoining lands.

Five wildfire areas have been designated, based on existing and planned fuel management corridors (USARHAW and 25th ID[L] 2003, 7-56). The ordnance impact area is not considered because prevention activities there are not possible and resources at risk are largely unknown. Each area was assigned an ignition potential, fuels hazard, and habitat value, based on the best currently available information. Representatives of the USFWS and USARHAW agreed on the ratings. The Kipuka Kalawamauna, Mauna Kea, and Kipuka Alala areas have a high wildfire prevention priority. The West PTA land acquisition area and southwestern PTA area have a moderately high wildfire prevention priority.

According to the IWFMP, fire protection in the fire management area includes firebreaks and fuels modification (USARHAW and 25th ID[L] 2003, 7-57 to 7-62). Given the weather, topography, and fuel conditions, which make fire suppression at PTA difficult, implementing adequate prevention measures is all the more important for minimizing fire loss. Serviceable access roads and firebreaks should be of highest priority, as they can be reasonably implemented and provide an effective fire management tool when properly planned and maintained.

Existing roads will serve as firebreaks (USARHAW and 25th ID[L] 2003, 7-57 to 7-62). Pre-constructed firebreaks need to be negotiable by four-wheel drive vehicles to facilitate fire and management access. All firebreak/fuelbreak measurements are additive (e.g., a 30-foot [9-meter] firebreak, combined with an 82-foot [25-meter] fuelbreak results in firebreak/fuelbreak combination of 112 feet [34 meters] in width). Most firebreaks at PTA will be combined with a fuelbreak to increase their effectiveness.

Firebreaks are or will be constructed at PTA (USARHAW and 25th ID[L] 2003, 7-57 to 7-62). These include the western firebreak, northern firebreak, Twin Pu'us firebreak, Keamuku firebreak, Keamuku Pu'us firebreak, Mamalahoa Highway firebreak, and Old Saddle Road firebreak. The Mamalahoa Highway firebreak and Old Saddle Road firebreak will be established in Keamuku.

Grasses are the primary fuel-related concern because their spread and accumulation increase ignition potential and provide contiguous fine fuel beds (USARHAW and 25th ID[L] 2003, 7-57 to 7-62). Implementing road/firebreak improvement and developing recommendations will reduce flashy fuels along high ignition risk roads and will break up contiguous fuel beds.

Six fuel management corridors will be established and maintained, providing areas through which fire will not carry (USARHAW and 25th ID[L] 2003, 7-57 to 7-62). These corridors will be aligned so as to provide several distinct areas of PTA within which fire may be contained. Each corridor will be approximately 328 to 984 feet (100 to 300 meters) wide, though terrain, safety concerns, or protected resources may constrain the width in some areas. Fuel specifications within the corridor require that canopy cover not exceed 20 percent, which will be estimated on-site.

All of these corridors are in locales with little or no fuel (USARHAW and 25th ID[L] 2003, 7-57 to 7-62). They will be monitored once every five years, beginning in 2005, to determine whether fuels management needs to be initiated. If so, these corridors will be monitored biannually and treated whenever necessary to remain within specifications.

Prescribed burning will also be considered as a future fuels management option (USARHAW and 25th ID[L] 2003, 7-57 to 7-62). It will be focused on areas dense in exotic grasses, such as far western Kipuka Kalawamauna and the Twin Pu‘us.

Grazing will be considered as an option to control fuels within fuelbreaks (USARHAW and 25th ID[L] 2003, 7-57 to 7-62). It will also be considered to control fuels throughout the Keamuku Parcel, should that land be acquired by USARHAW.

A fire danger rating system designed specifically for PTA has been developed by the US Forest Service and Colorado State University, based on analysis of PTA’s fire history, fuels, fire behavior models, and weather (USARHAW and 25th ID[L] 2003, PTA-11 and PTA-29). National fire danger rating indices, as recommended by the US Forest Service and Colorado State University, are applied to the predominant fire carrying vegetation in each of six fire danger rating areas. The fire danger rating system uses the following five colors to characterize fire conditions at PTA:

- Blue (indicating low fire danger). No training restrictions.
- Green (indicating moderate fire danger). No training restrictions.
- Yellow (indicating high fire danger). No tracers or white phosphorus are allowed.
- Red (indicating very high fire danger). No pyrotechnics, smoking, or cooking/warming fires are allowed.

- Orange (indicating extreme fire danger). No live-fire, except ball and blank ammunitions, which are allowed only at fixed ranges. Maneuver training is limited to fixed ranges, TAs 7-9, 12-16, 21.

A supplemental system using wind speed criteria is in place for the restriction and use of pyrotechnics at PTA.

### 8.12.2 Environmental Consequences

#### *Summary of Impacts*

This section is a discussion of the potential impacts on human health and safety hazards under the Proposed Action and alternatives at PTA.

Significant and mitigable impacts are as follows:

- Due to a 25 percent increase in munitions under these alternatives and the results of recent soil analyses on PTA, ammunition presents a significant risk of soil contamination in the range areas. Remedial cleanup would take place when the training areas are permanently closed.
- Potential UXO exposure during maneuvers and construction, creating a significant threat to workers and Army personnel.
- Construction and demolition at PTA could expose workers to lead-based paint or lead-containing construction materials, creating a significant health and safety risk. In addition, construction of the AALFTR and BAX, as well as QTR2 under the RLA, would involve moving soils that could release lead to the environment, creating a significant impact.
- Construction and demolition at PTA could expose workers to asbestos-containing materials, which could be a significant health and safety risk.
- Adding two live-fire ranges under the Proposed Action and three ranges under the RLA Alternative and constructing a highway between PTA and Kawaihae Harbor would result in increased travel, occasionally involving hazardous and combustible materials; this presents a significant wildfire risk.

These impacts could be reduced to less than significant through mitigation. All other human health and safety hazard issues were considered either to have less than significant impact or to have no impact at all. Impacts, methodology, and factors determining significance are discussed in Section 4.12.1. Table 8-32 summarizes the potential impacts for PTA that have been identified in this analysis. No ordnance impact areas are being introduced to this installation. Each impact is a continuation and a possible insignificant augmentation of existing conditions.

**Table 8-32**
**Summary of Potential Human Health and Safety Hazard Impacts at PTA**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Hazardous materials management | ⊙ | ⊙ | ○ |
| Hazardous waste management | ⊙ | ⊙ | ○ |
| Ammunition | ⊘ | ⊘ | ⊙ |
| Unexploded ordnance | ⊘ | ⊘ | ⊙ |
| General training | ⊙ | ⊙ | ⊙ |
| Installation restoration program sites | ○ | ○ | ○ |
| Lead | ⊘ | ⊘ | ⊙ |
| Asbestos | ⊘ | ⊘ | ○ |
| Polychlorinated biphenyls | ○ | ○ | ○ |
| Electromagnetic fields | ⊙ | ⊙ | ⊙ |
| Petroleum, oils, and lubricants | ⊙ | ⊙ | ○ |
| Pesticides/herbicides | ⊙ | ⊙ | ○ |
| Biomedical waste | ⊙ | ⊙ | ○ |
| Radon | ○ | ○ | ○ |
| Wildfires | ⊘ | ⊘ | ⊙ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact
N/A = Not applicable

### *Proposed Action (Preferred Alternative)*

#### *Significant Impacts Mitigable to Less than Significant*

*Impact 1: Ammunition*. Recent range studies at PTA have revealed elevated levels of munition byproducts, such as lead and RDX, above USEPA Region IX residential and industrial PRGs at each installation (the investigation report is included in Appendix M1), which indicate that additional risk based investigations may need to be conducted. Section 8.8, Water Resources, and Section 8.9, Geology, Soils, and Seismology, provide more detailed analyses of specific effects on surface water and soils and is therefore considered significant. As defined in the Military Munitions Rule, ammunition used for its intended purpose on military ranges is not considered a regulated hazardous material. This material, however, may be an environmental hazard. In addition, under the Proposed Action, the quantity of ammunition rounds fired during Army training on all Army training ranges in Hawai'i would increase from 16 million to 20 million rounds per year, a 25 percent increase, primarily consisting of small arms munitions (97 percent of the total increase). The proposed increased level of training could elevate contamination levels in range soils by 25 percent over the contamination generated by current force training. However, the analysis showed that the areas where the contamination occurs is in areas where the contamination is not running off-site. In addition, the Soldiers will not be conducting foot maneuvers in this area and will not be exposed to the contaminants. Only government personnel or government contractors specifically trained and certified to travel safely in the impact area access the contaminated areas on a regular basis.

Management of the increased quantity of ammunition and other ammunition-related issues associated with PTA are discussed under less than significant impacts.

The regulatory and administrative measures defined below will reduce the significant impacts from contaminants associated with ammunitions to less than significant.

*Regulatory and Administrative Mitigation 1.* All government personnel or government contractors accessing ordnance impact areas will continue to follow OSHA and Army standards and guidelines to minimize health and safety impacts from exposure to any contaminants or ordnance. The general public will be allowed in or near impact areas only at times and in group sizes approved by USARHAW Command. Army trained and certified personnel would escort the general public at all times. Access is limited to only those areas deemed safe by USARHAW Range Control.

The Army will undertake additional risk-based investigations as appropriate in the event any active range is closed and transferred out of DoD control. Based on the results of this health risk-based analysis, all remediation necessary to mitigate an imminent threat to human health and the environment would be undertaken at such time.

*Additional Mitigation 1.* No additional mitigation has been identified.

*Impact 2: Unexploded ordnance.* Of the 25 percent increase in ammunition under the Proposed Action, 1.3 percent of the total increase would be from UXO-producing munitions (mortars, artillery, and grenades). The WPAA is part of the Former Waikoloa Maneuver Area, which is a Formerly Used Defense Site (FUDS) and has supported live-fire in the past. Based on an engineering evaluation/cost analysis conducted for the entire Waikoloa area, which includes a risk-based analysis for human health and the environmental, WPAA was assessed as low probability of UXO exposure. No live-fire training would be conducted on WPAA under the Proposed Action. The PTA trail would also be constructed through the former Waikoloa Maneuver Area. The same risk-based analysis assessed the area of the trail alignment as a medium to high risk of UXO exposure. Because this property would continue to be used for DoD operations, the trail alignment would not be eligible for FUDS UXO clearance prior to trail construction. However, construction would be preceded by Army-sponsored surface and subsurface clearance and if necessary followed by ordnance health and safety monitoring during construction in order to reduce potential exposure and impacts from this project.

Presence of UXO has the potential to affect the construction of the proposed AALFTR and BAX. The AALFTR and BAX would involve movement of soils that may be potentially contaminated with UXO from prior activities in the ordnance impact area that could present a significant safety risk. The SDZs for these proposed ranges would overlay the existing range impact and ICM areas. These areas are, however, inaccessible to Army personnel, thus preventing exposure to existing or future UXO. In addition, maneuver training would continue to be conducted on existing training areas, excluding the 1,500-acre (607-hectare) MPRC area, under the Proposed Action. When PTA is in full use in support of brigade-level training exercises, which currently occurs twice per year, company-sized units would typically train in these areas. Although this would not include live-fire training, which could introduce new UXO, UXO is suspected due to past training, which presents a potential threat to Army personnel. UXO would not be cleared prior to maneuvers because of the suspected low occurrence of UXO. In addition to the below mitigation measures, the Army would continue to educate Soldiers on how to identify UXO and in proper safety procedures for handling UXO, as explained in Section 3.12. The mitigation measures below would reduce the significant impact to less than significant.

*Regulatory and Administrative Mitigation 2.* Before construction begins, the Army will employ qualified personnel to conduct a UXO survey of the proposed construction area. If the risk of encountering UXO is low, then UXO construction support will be used. If the risk of encountering UXO is high, then UXO clearance will be performed to ensure the safety of the site. The Army will document UXO surveys and removal actions in full accordance with applicable laws, regulations, and guidance. The Army will perform UXO clearance activities if rounds are fired outside of designated ordnance impact areas or present an immediate threat to human health or safety.

*Additional Mitigation 2.* No additional mitigation has been identified.

*Impact 3: Lead*. Construction activities associated with the Proposed Action could involve the exposure of workers to airborne lead particulates at project sites on PTA. The workers could be exposed to lead-based paint and pipes during demolition or soil excavation or grading at specific sites within PTA. There are three buildings proposed for demolition in conjunction with the construction of the Range Maintenance Facility: T17, T19, and T20. There have been no lead surveys conducted on these buildings. Implementation of the below mitigation would reduce the impacts to less than significant.

Construction of the AALFTR and BAX would redistribute the material from the berms at the current locations and redistribute the material onto retained firing range berms. In this manner, the material would be readily available for re-establishment of the berms at a future point to be determined. The berms used to stop projectiles fired at the ranges are expected to contain significant quantities of lead, and potentially UXO. Recent soil studies of the PTA ranges confirmed this, revealing elevated levels of lead in the soils, above USEPA Region IX residential and industrial PRGs (see Appendix M1 for the investigation report). The presence of lead may cause additional soils to become contaminated due to vehicle and equipment movement and soil deposition. Additional contamination would increase the volume of soil that needs to be remediated in the future.

*Regulatory and Administrative Mitigation 3.* The Army will expand existing programs for LBP to any SBCT-related activities that would affect older structures where LBP might have been used. Lead is managed in place for existing structures. In the event of demolition or renovation projects affecting such structures, a survey is required prior to demolition/renovation and appropriate actions must be taken to prevent the release of LBP into the environment. Construction workers must be properly trained/certified to handle LBP, and any debris must be tested by TCLP and disposed of according to the results.

The Army will retain lead-contaminated soils from existing berms on-site and will use the soils in the construction of new berms associated with the AALFTR and BAX. If lead-contaminated soils were not reused at the site for new berm construction, the soils would be remediated for lead, in accordance with applicable federal and state standards.

*Additional Mitigation 3.* No additional mitigation has been identified.

*Impact 4: Asbestos.* Construction activities associated with the Proposed Action could involve the exposure of workers to asbestos at PTA. The workers could be exposed to asbestos during demolition or grading at project sites within PTA. Asbestos surveys have been conducted on each of the above-mentioned buildings proposed for demolition for the construction of the Range Maintenance Facility, and ACM was found in the roof sealant of Building T20. No ACM would be used under the Proposed Action, so there would be no significant impacts from asbestos and no mitigation would be required when using materials during construction. Implementation of the following mitigation would reduce the impacts to less than significant.

*Regulatory and Administrative Mitigation 4.* The Army will expand existing programs for asbestos to any SBCT-related activities that would affect older structures where ACM might have been used. Asbestos is managed in place for existing structures. In the event of demolition or renovation projects affecting such structures, a survey is required prior to demolition/renovation, and appropriate actions must be taken to prevent the release of these substances into the environment. Construction workers must be properly trained/certified to handle ACM, and any debris must be tested by TCLP and disposed of according to the results.

*Additional Mitigation 4.* No additional mitigation has been identified.

*Impact 5: Wildfires.* PTA is particularly susceptible to fire for numerous reasons. Two ranges are proposed to be built on PTA, the BAX and AALFTR. These ranges would be located in previously disturbed sites and oriented towards pre-existing ordnance impact areas. The proposed WPAA would be used for maneuver training and would remain a nonlive-fire area. As a result, both live- and nonlive-fire training would increase, resulting in the potential to increase the frequency of wildfires. I

The military vehicle trail would be improved and extended to provide off-highway transport of vehicles, personnel, and equipment between Kawaihae Harbor and PTA. Improving the military vehicle trail between Kawaihae Harbor and PTA would increase the trail's use, resulting in the potential to increase the frequency of wildfires along the trail. Transporting personnel and using flammable or combustible materials could increase the potential for starting a wildfire, especially in areas not previously used frequently. However, the IWFMP does not address fire management actions for the trail. The use of the trail by the Army would increase potential sources of wildfire ignition from Army training in areas that don't have established fire management actions, such as fire prevention and fire suppression. Unlike training activities conducted at PTA, the trail would not always be near an installation where access to Army fire suppression resources would be readily available. A wildfire along the trail or at the ranges could damage animal and plant communities, damage cultural resources, and contribute to soil erosion by removing vegetation.

*Regulatory and Administrative Mitigation 5.* The IWFMP, which includes the fire management areas and standing operating procedures, would be updated to address proposed activities along the trail. These updates will be completed before activities associated with the Proposed Action commence. Additionally, ITAM geographic information systems will be used to monitor the effectiveness of wildfire management activities. Army personnel will practice BMPs in operations, and trained personnel and equipment will be on hand during training activities to respond to wildfires.

IWFMP wildfire management infrastructure, such as the two dip tanks proposed for PTA, would be constructed before SBCT training commenced. During training, appropriate personnel and equipment will be assigned to water resources for responding to a wildfire.

Under this mitigation, there would be less than significant impacts involving wildfires.

*Additional Mitigation 5.* The IWFMP Pōhakuloa and O'ahu Training Areas was updated in October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts associated with wildland fires. Public and firefighter safety is the first priority in every fire management activity. The plan considers the potential need for firebreaks and/or fuel breaks at each installation, along with other safety concerns. The plan is available upon request. .

### *Less than Significant Impacts*

*Hazardous materials management.* The Proposed Action would not significantly increase hazardous materials usage at PTA. Impacts on hazardous materials management at PTA would be similar to those at SBMR, as discussed in Section 5.12.2. No new procedures would need to be implemented to store or use construction-related hazardous materials. The additional quantities of hazardous materials would be removed at the completion of construction.

In addition to general construction materials used for infrastructure, petroleum asphalt would be used in extending and upgrading the runway at BAAF. This project is depicted on Figure D-24. Although PTA Trail would primarily be composed of gravel, road grades steeper than 10 percent would be paved with asphalt or concrete to ensure all-weather safety conditions. These materials would also be used to install supporting provisions such as guardrails and signage.

The MSDSs for both asphalt and concrete are summarized in Section 4.12. Although OSHA does not categorize either of these materials as specifically carcinogenic to humans, serious health problems can result from extended exposure. Skin contact and breathing of mists, fumes, or vapors would be avoided by the construction team. Construction and disposal activities would be conducted in accordance with federal, state, and local regulations.

Hazardous materials would be handled in accordance with existing regulations and installation-wide hazardous materials management and SOPs. Hazardous materials for use during training are brought to PTA with the individual units and stored within temporary motor pools set up for each deployment operation. PTA personnel, the DPW, and Range Division manage and store the majority of hazardous materials within designated locations established to store these resources. Unused materials are brought back to O'ahu with the units. The Hazardous Substance Material System (HSMS) at PTA controls and tracks all base maintenance (Akasaki 2002b).

A new chemical would be used in conjunction with the proposed Stryker training as part of the JBPDS. A sodium azide ($NaN_3$) solution will be used to preserve suspected biological agent samples during combat maneuvers. Only simulated biological agents will be used during training in Hawai'i. The use of the chemical solution is considered a less than significant impact as stated in Sections 4.12 and 5.12.

Hazardous materials would not pose a significant impact at PTA. Mitigation would not be necessary.

*Hazardous waste management*. Activities related to the Proposed Action would not significantly affect hazardous waste management. Impacts on hazardous waste management on PTA would be similar to that on SBMR, as discussed in Section 5.12.2. The US Army follows strict regulations and SOPs for the temporary storage and disposal of hazardous waste. Temporary hazardous waste storage would be designated and operated through satellite accumulation point (SAP) facilities located at various facilities throughout PTA according to RCRA and state regulations. The Army would be required to manage and dispose of hazardous waste generated by operations through DRMO in accordance with existing regulations and installation-wide protocol regarding storage, use, and disposal. Hazardous waste associated with construction activities would cease being generated at the completion of construction.

The Range Maintenance Facility proposed to be constructed at PTA includes a carpentry shop, welding shop and target and raw material storage. These activities could potentially yield hazardous waste, in which case containment and disposal would be handled in accordance with the USAG-HI hazardous waste management plan.

The additional hazardous waste generated by the Proposed Action would not result in a significant increase to the total amount of hazardous waste managed at and disposed from the installation. Therefore, there would be no significant construction-related or operational impacts, and no mitigation would be required.

_Ammunition_. Several projects included in the Proposed Action could pose less than significant impacts on PTA due to the increased presence or use of ammunition. Complete descriptions of each proposed project are included in Appendix D; however, a brief explanation of relevant proposed projects are as follows:

- A 6,750-square-foot (627.1-square-meter) ammunition storage facility would be collocated with existing ammunition igloos;
- A BAX designed for live-fire, maneuver gunnery training and qualification requirements of weapons systems would be constructed; and
- A modified standard AALFTR would be constructed overlying Ranges 1, 3, and 8 on the east side of the installation.

The SDZs for the BAX and AALFTR would overlap the existing ordnance impact and ICM areas, but these areas are inaccessible to Army personnel; the firing points are beyond the ordnance impact area borders. Targetry and security devices would be funded by OPA. Environmental mitigation and UXO clearance is required at these ranges and would be separately funded by OMA prior to construction commencement. A consolidated Range Maintenance Facility would be constructed under the Proposed Action within the PTA cantonment area, as seen in Figure D-23. This facility would provide a centralized command to monitor and control all range activities and operations, including ordnance use, throughout PTA and the island of Hawai'i. There are no live-fire activities or artillery firing points on the proposed WPAA.

The 105mm cannon on the Stryker mobile gun systems and the 120mm mortar are the only new weapons to be introduced at PTA as a part of the Proposed Action. Both weapons, however, would be used at PTA under the Proposed Action. The amounts of other weapon systems would also be increased with the elevated level of training proposed in the transformation. Although the Proposed Action would generate a significant increase of ammunition use (an additional four million rounds) due to the elevated level of training and expansion in military force, the impact of this increase would not be significant, as management of artillery and ammunition would not change. Handling and storage methods, disposal protocols, and safety procedures would continue to be conducted in accordance with existing regulations. No new conventions would need to be instated, thus there would be a less than significant impact from the increase in ammunition and ordnance.

The Army follows strict SOPs when handling ammunition. The disposal of ordnance is regulated by RCRA as explained in Section 3.12. Excess ammunition not used during training is either brought back with the unit or by commercial carrier to be stored at the permanent ASP on WAAF. Residues from the manual burn activity, discussed in Section 8.12.1, Ammunition, are stored in hazardous waste receptacles and brought to a temporary SAP facility set up during maneuvers for disposal by DRMO. Additionally, the Army conducts routine inspections of all facilities containing hazardous materials to ensure compliance. The WPAA has never supported live-fire training, and no live-fire training would be conducted on the WPAA under the Proposed Action, so there would be no significant impacts from ammunition, and no mitigation would be required.

Range sampling and contamination impacts are discussed under the significant impact section, above.

*General training.* Activities under the Proposed Action relevant to this class or type of activity include military training on training lands outside of developed (e.g., cantonment) areas. Such training would include nonlive-fire mounted maneuver training and other nonlive-fire dismounted military training. A slight increase in transformed live-fire training would occur on current force-era ranges. The increase would be maintained and managed in accordance with federal and USAG-HI protocol, therefore creating no additional significant impact. General training issues associated with the AALFTR and BAX would not likely result in any significant impacts. The SDZs for these proposed ranges overlie the existing range impact and ICM areas, but these areas are inaccessible to personnel and are not believed to present a safety risk. In addition, these training activities may expose additional areas to potential military training equipment leaks, spills, or drips to the environment. During any on-site operational activities within a specific project area, USARHAW will implement SOPs to minimize the potential for spills or other harm to the environment.

As further explained in Section 4.12, in order to protect the public during range training, SDZs have been and would continue to be included in the range design, in accordance with Army Pamphlet 385-64, *Ammunition and Explosive Safety Standards*. Additionally, in order to protect Army personnel during range training, Soldiers and officers are given safety manuals, operation-specific field manuals, and range-specific briefings before training exercises, with a complete discussion of safety procedures while training. Therefore, there would be no significant impacts from training operations, and no mitigation would be required.

*Electromagnetic fields.* The proposed FTI sites could potentially introduce EMF to PTA. Two of the FTI sites would be outside the proposed boundaries of the installation. The general public is typically not allowed in areas that could contain EMF hazards from Army equipment and, therefore, would not be inadvertently exposed to EMF on the installation. All FTI sites would be appropriately fenced to prevent trespassing and exposure to any harmful EMF. Signs would be posted around the perimeter of all potentially harmful EMF sources on- and off-post to warn people about the EMF source. DOD Instruction 6055.11 and Army Pamphlet 385-64, as well as other Army regulations pertaining to EMF, would be followed in the operation of the new facilities to protect personnel, as is the current practice. Only trained personnel would work with equipment emitting EMF. There would be no significant impact on the public from exposure to EMF, and no mitigation would be necessary.

*Petroleum, oils and lubricants.* O'ahu-based military vehicles accumulate soils and nonnative species that may be tracked onto roads when they return to SBMR. A tactical vehicle wash facility is proposed to be designed to accommodate an 18.3-meter-long by 3.7-meter-wide vehicle and would have four wash stations. Treatment would include oil and grease removal, grit removal, and organic control. An oil-water separator would be provided to treat any residual water that did not go through the main system before wastewater is directed into the sewer main along Kawaihae Road. This project is discussed in detail in Appendix D.

In addition to the proposed infrastructure, the Proposed Action includes the construction of a runway extension and a turnaround area at BAAF. The runway, taxiway, and apron area would also be strengthened to accommodate C-130 and C-17 aircraft. Asphalt would be used in completing these construction/upgrade projects.

Although the proposed PTA Trail would be primarily composed of gravel, road grades steeper than 10 percent would be paved with asphalt or concrete to ensure all-weather safety conditions. These materials would also be used to install supporting provisions such as guardrails and signage.

Construction issues would not likely result in any specific hazardous materials and waste impacts. These construction activities may expose additional areas to potential construction equipment leaks, spills, or drips. USARHAW would, during any on-site construction activities within a specific project area, implement the SOP measures summarized in Section 5.12 to minimize the potential for spills or other harm to the environment.

Specific project construction details are included in Chapter 2 and Appendix D. There would be no significant impacts from construction of the Proposed Action projects, and no mitigation would be necessary.

Stryker vehicles would be used at PTA under the Proposed Action. Maintenance and handling of the vehicles would continue under existing SOPs. Operations would practice BMPs and follow USEPA and USAG-HI protocol for use and handling of hazardous materials such as POLs. DPW maintains a spill contingency plan and an SOP plan. These plans outline proper operating and emergency response procedures and responsibilities. Additionally, the Army conducts routine inspections of all facilities containing hazardous materials to ensure compliance. Therefore, there would be no significant impacts from POLs, and no mitigation would be required.

*Pesticides/Herbicides.* The proposed land acquisition would generate a slight increase in the amount of pesticides/herbicides used on PTA in order to maintain the maneuver training area. Pest control would continue to be maintained by DPW in accordance with the existing USAG-HI IPMP. Pesticides would continue to be stored at the centralized Environmental Shop located on PTA in Building T-93. Therefore, there would be no significant impacts from pesticides/herbicides, and no mitigation would be required.

### *No Impacts*

*Installation Restoration Program.* Construction and operational activities associated with this alternative would not affect IRP sites, as there are no proposed projects within IRP boundaries. A detailed description of the IRP program for PTA, including specific projects and locations, is provided in Appendix K-2. Activities at PTA under the Proposed Action would not conflict with the restoration progress of IRP sites. Therefore, there would be no impact, and no mitigation would be required.

*Polychlorinated biphenyls.* Construction and operational activities associated with the Proposed Action would not generate impacts from PCBs. The Army has committed to removing or retrofilling all electrical equipment containing regulated amounts of PCBs. No PCB-containing equipment is believed to exist within the project boundaries, however if PCBs are encountered, the devices would be properly handled in accordance with USEPA regulations. As per subsection 6(e) of the TSCA of 1976, no new PCB-containing equipment would be installed as part of this alternative. For that reason, there would be no impacts, and no mitigation would be required.

### *Reduced Land Acquisition Alternative*

Under the RLA Alternative, impacts at PTA would generally be very similar to the Proposed Action, except QTR2 would not be built on the SBMR SRAA, but rather on the Range 8 site at PTA.

#### *Significant Impacts Mitigable to Less than Significant*

Significant impacts associated with the RLA Alternative projects would be identical to significant impacts associated with the Proposed Action except in three areas.

*Unexploded Ordnance (UXO).* Construction of QTR2 at PTA Range 8 would likely involve movement of soils that may be potentially contaminated with UXO from prior activities in the range area. This would potentially present a significant adverse safety hazard. The SDZ for the proposed QTR2 range would overlie the existing ordnance impact and ICM areas, but these areas are inaccessible to Army personnel, thus preventing exposure to existing or future UXO. Mitigation for this impact would be the same as the mitigation identified for UXO impacts under the Proposed Action.

*Lead*. The potential for lead contamination due to the re-distribution of lead-contaminated soils at PTA Range 8 may cause additional soils to become contaminated due to vehicle and equipment movement and soil deposition. Additional contamination would increase the volume of soil that needs to be remediated. Mitigation for this impact would be the same as the mitigation identified for lead impacts under the Proposed Action.

*Wildfires.* Construction of QTR2 would likely increase the amount of live-fire training at PTA, thereby potentially increasing the frequency of wildfires at PTA, and presenting a significant adverse safety hazard. Mitigation for this impact would be the same as the mitigation identified for wildfire impacts under the Proposed Action.

#### *Less than Significant Impacts*

Less than significant impacts associated with the RLA Alternative projects would be largely identical to impacts associated with the Proposed Action. The only difference would be that due to the relocation of proposed range, QTR2, from the SRAA to PTA, this installation would undergo an increase in ammunition used and training conducted at the installation as well as an increase in hazardous materials and waste used and generated to construct and maintain the range. In addition, the SDZ for the proposed QTR2 range would overlie the existing ordnance impact and ICM areas, but these areas are inaccessible to Army personnel, thus preventing exposure to existing or future UXO.

### *No Action Alternative*

The current baseline of impact conditions would continue under No Action. No increase in hazardous material use or waste generation would occur. Less than significant impacts under No Action would primarily be due to continued practices at existing levels and would involve ammunition, UXO, general training, lead, EMF, and wildfires.

*Training Related Impacts.* As training would continue by current forces at PTA, impacts from the training and munitions use would continue to affect the land. Existing types and quantities of ammunition and ordnance would continue to be used. The 105mm cannon and the 120mm mortar would not be used. As UXO would remain a potential presence, EOD specialists would continue to implement abatement procedures to minimize potential exposure of current forces to UXO during training. Potential UXO in the former Waikoloa Maneuver Area would remain and not be cleared as the proposed PTA Trail would not be constructed. USARHAW would continue following existing SOPs to minimize the potential for spills or other harm to the environment resulting from training efforts. Current forces would continue to train at PTA, which would distribute lead and other contaminants resulting from training from small ammunition firearms into retained firing range berms. The presence of these contaminants may further contaminate soils due to vehicle and equipment movement and soil deposition. Finally, continued use of Army land for training under No Action would prolong the threat of wildfires. The WFMP and its FMAs and wildland fire SOPs, all of which are designed to prevent and manage wildfires, would continue to be followed. These impacts from continued training at existing levels would remain a less than significant impact, and no new mitigation would be required.

*Electromagnetic Fields.* EMF sources would not be introduced to the installation or areas outside the installation under No Action, but existing sources of electromagnetic radiation as well as future projects containing EMF would remain a risk. SOPs would continue to be followed in order to prevent exposure to the public or the environment.

## 8.13 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

### 8.13.1 Affected Environment

PTA occupies mainly Pāʻauhau-Paʻauilo CCD and small portions of North Kona, South Kohala, and North Hilo CCDs. As shown in Table 3.13, within Hawaiʻi County the South Kohala CCD experienced one of the greatest population growth percentages (43.7 percent), and in 2000 the population of the North Kona CCD (which includes the city of Kailua-Kona) was one of the largest population centers on the island of Hawaiʻi, with 19.2 percent of the population (US Census Bureau 1990a, 2000a). Of the CCDs occupied by PTA, North Hilo CCD had the highest level of home ownership (78.7 percent) and North Kona CCD had the lowest (58.5 percent). In Pāʻauhau-Paʻauilo CCD and South Kohala CCD, 77.1 percent and 58.9 percent of occupied units were owned. North Kona CCD had the highest level of vacancy (24.6 percent), most of which were seasonal/recreational units; and Pāʻauhau-Paʻauilo CCD had the lowest vacancy rate (7.7 percent) (US Census Bureau 1990a, 2000b).

Table 8-33 shows population percentages by race/ethnicity of the CCDs in which PTA is located. Of the PTA CCDs, Pāʻauhau-Paʻauilo CCD had the highest percentage of Hispanic population (11.3 percent) and North Kona had the lowest (7.9 percent). North Hilo had the highest percentage of minority populations (71.9 percent) and North Kona CCD had the lowest (52.9 percent) (US Census Bureau 1990a, 2000a). The percentage of the populations of North Hilo, North Kona, Pāʻauhau-Paʻauilo, and South Kohala CCDs under the age of 18 was 25.8, 25.5, 28.7, and 30.1 percent, respectively. South Kohala CCD experienced the highest percentage growth in this age group between 1990 and 2000 (45.3 percent), and North Hilo CCD experienced the lowest percentage growth (0.2 percent) over this period (US Census Bureau 1990a, 2000c).

In 2000, the ROI (i.e., Hawaiʻi County) civilian labor force totaled about 70,000 (HDLIR, 2002). The ROI unemployment rate averaged 6.7 percent in 2000, higher than the state of Hawaiiʻs average unemployment rate of 4.3 percent, and higher than the national unemployment rate of 4.0 percent.

The primary sources of employment in the ROI were the services, retail trade, and government sectors, which together accounted for 67 percent of total employment (BEA 2002b). Thirty-four percent of all jobs were in the services sector. The services industry includes establishments primarily engaged in providing a variety of services, such as hotels and other lodging places; establishments providing personal, business, repair, and amusement services; health, legal, engineering, and other professional services; educational institutions; membership organizations; and other miscellaneous services (OSHA, 2001). The leading industry in the ROI is tourism and recreation.

Retail trade accounted for approximately 18 percent of total ROI employment. The government sector was the third largest employment sector, accounting for about 16 percent of total employment. Of that 16 percent, approximately 2 percent were federal military jobs, 1 percent were federal civilian jobs, 10 percent were employed by the state, and the remaining 3 percent were employed by local government.

**Table 8-33**
**PTA Area CCD Population Percentage by Race/Ethnicity**

| | Percent of Total Population 1990 | Percent of Total Population 2000 | Percent Change in Actual Population 1990-2000 |
|---|---|---|---|
| **North Hilo CCD** | | | |
| White | 28.4 | 28.1 | 10.8 |
| Black or African American | 0.5 | 0.3 | -37.5 |
| Native American, Eskimo, Aleut | 0.8 | 0.5 | -33.3 |
| Asian and Pacific Islander | 67.8 | 40.0 | -34.2 |
| Other and Two or More Races | 2.5 | 31.1 | 1,271.8 |
| Hispanic[1] | 10.1 | 9.6 | 5.8 |
| Minority[2] | 71.6 | 71.9 | 12.0 |
| **North Kona CCD** | | | |
| White | 58.9 | 47.1 | 2.5 |
| Black or African American | 0.4 | 0.4 | 37.0 |
| Native American, Eskimo, Aleut | 0.7 | 0.5 | -13.6 |
| Asian and Pacific Islander | 38.2 | 27.0 | -9.5 |
| Other and Two or More Races | 1.8 | 24.9 | 1,710.9 |
| Hispanic[1] | 7.9 | 7.9 | 28.6 |
| Minority[2] | 41.1 | 52.9 | 64.7 |
| **Pāʻauhau-Paʻauilo CCD** | | | |
| White | 43.9 | 32.5 | -12.0 |
| Black or African American | 0.2 | 0.0 | -75.0 |
| Native American, Eskimo, Aleut | 0.9 | 0.3 | -62.5 |
| Asian and Pacific Islander | 53.7 | 34.0 | -24.9 |
| Other and Two or More Races | 1.3 | 33.2 | 2,836.0 |
| Hispanic[1] | 8.4 | 11.3 | 59.6 |
| Minority[2] | 56.1 | 67.5 | 42.7 |
| **South Kohala CCD** | | | |
| White | 52.3 | 38.8 | 6.5 |
| Black or African American | 0.5 | 0.4 | 2.1 |
| Native American, Eskimo, Aleut | 0.7 | 0.2 | -62.7 |
| Asian and Pacific Islander | 45.2 | 30.9 | -1.8 |
| Other and Two or More Races | 1.3 | 29.8 | 3,161.7 |
| Hispanic[1] | 10.0 | 8.0 | 14.3 |
| Minority[2] | 47.7 | 61.2 | 84.4 |

Source: US Census Bureau 1990a, 2000a
[1]Persons of Hispanic origin may be of any race.
[2]Minority includes Black or African American; Native American, Eskimo, and Aleut; Asian and Pacific Islander; and Other and Two or More Races.

As of September 2001, PTA employed 75 personnel (HDBEDT 2003). Seven were military personnel, 22 were civilian personnel, and the remaining 46 were other personnel (non-appropriated employees, government contractors, or foreign nationalists). There are no personnel permanently stationed at PTA.

The PCPI of the ROI was $20,399 (State of Hawaiʻi DLIR 2002). This was lower than the state of Hawaii's PCPI of $27,851, and lower than the national PCPI of $29,469.

### 8.13.2 Environmental Consequences

#### *Summary of Impacts*

The Proposed Action is expected to have temporary beneficial effects on employment, income, and business volume in Hawaiʻi County and Pāʻauhau-Paʻauilo CCD, North Kona CCD, South Kohala CCD, and North Hilo CCD, resulting from construction and the resultant increased expenditures that would stimulate the economy within the ROI. Less than significant adverse effects on population, employment, and income would occur from the Proposed Action because the changes to these factors would be within the capacity of society and the economy to absorb.

Chapter 4, Section 4.13 provides a discussion of the EIFS model results. Only the results pertaining to Hawaiʻi County are applicable to PTA. As identified in the EIFS results in Table 4-14, construction at PTA would have a significant and mitigable impact on sales volume in Hawaiʻi County. The percent change in sales volume for Hawaiʻi County is slightly above the RTV historical high for sales (7.38 compared to the RTV of 7.18 percent). This could indicate that the Proposed Action might create a high demand for certain goods and services that could result in short-term shortages and price increases.

Because construction would occur over four years, any supply and demand issues could be mitigated by long-range procurement planning to avoid excessive demand on local and outside suppliers.

The Proposed Action also would have less than significant impacts on the protection of children because, while the Army would continue to implement safety procedures, some risks to nearby populations (particularly children) are inherent to increased construction and training activities. There would be no impacts on population, schools, or housing because no new staff would be added at PTA. No disproportionate impacts on low-income or minority populations would be expected as a result of the Proposed Action. Additionally, no residences or businesses would be displaced by any of the land acquisitions associated with the Proposed Action or the RLA Alternative.

No Action would have no impacts on socioeconomic or environmental justice factors or on the protection of children. Table 8-34 summarizes the potential socioeconomic and environmental justice impacts at PTA.

**Table 8-34**
**Summary of Potential Socioeconomic and Environmental Justice Impacts at PTA**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Population | ○ | ○ | ○ |
| Employment | ⊙+ | ⊙+ | ○ |
| Income | ⊙+ | ⊙+ | ○ |
| Economy (Business Volume) | ⊘+ | ⊘+ | ○ |
| Housing | ○ | ○ | ○ |
| Schools | N/A | N/A | N/A |
| Environmental Justice | ○ | ○ | ○ |
| Protection of Children | ○ | ○ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | | |
|---|---|---|---|---|
| ⊗ | = Significant | + | = | Beneficial impact |
| ⊘ | = Significant but mitigable to less than significant | N/A | = | Not applicable |
| ⊙ | = Less than significant | | | |
| ○ | = No impact | | | |

### *Proposed Action (Preferred Alternative)*

#### Significant Impacts Mitigable to Less Than Significant

*Impact 1: Economy (Business Volume).* As identified in the EIFS results in Table 4-14, construction at PTA under the Proposed Action would have a significant and mitigable impact on sales volume in Hawai'i County. The percent change in sales volume (7.38 percent) is slightly above the RTV historical high for sales (7.18 percent). This could indicate that the Proposed Action might create a high demand for certain goods and services that could result in short-term shortages and price increases.

*Regulatory and Administrative Mitigation 1.* No mitigation has been identified.

*Additional Mitigation 1.* Because a substantial amount of construction would occur over the next several years, the Army plans to conduct long-range procurement planning to lessen excessive supply and demand issues on local and outside suppliers.

#### Less than Significant Impacts

Short- and long-term direct and indirect minor beneficial effects on population, employment, income, and business volume in Hawai'i County and Pā'auhau-Pa'auilo CCD, North Kona CCD, South Kohala CCD, and North Hilo CCD are expected as a result of construction at PTA and training associated with the Proposed Action. The expenditures and employment associated with construction would increase ROI sales volume, income, and employment. The economic benefits would last only for the duration of construction. These changes in the specific economic parameters (sales, income, employment, and population) would fall within historical fluctuations and are considered minor.

*Employment.* Implementing the Proposed Action would have a less than significant impact on employment. Construction activities would result in a temporary increase in employment. Subsequent indirect increases in employment are produced by the multiplier effect resulting from increased spending by construction employees. Increased construction employment would be within the historic RTV range for Hawai'i County and would be considered less than significant. No mitigation would be required.

*Income.* Implementing the Proposed Action would have a less than significant impact on income. Changes in income represent the wage and salary payments made to construction workers. The Proposed Action would temporarily increase total annual income of Hawai'i County by $17,753,200, a change of 0.73 percent. This change would be within the historic RTV range for Hawai'i County and is not considered significant. No mitigation would be required.

### No Impacts

*Population.* Implementing the Proposed Action would result in no impacts on population. The Proposed Action would not increase the population at PTA.

*Housing.* Implementing the Proposed Action would have no impact on housing. There would be no increased military population at PTA and, therefore, no increase in the demand for housing.

*Economic impacts to environmental justice.* No disproportionate effects on environmental justice populations would occur. PTA is relatively isolated, and there are no military or civilian personnel permanently stationed at DMR. There are no residential neighborhoods or schools nearby that would be affected by noise or traffic from training or construction activities.

Potential effects to native Hawaiian cultural or spiritual resources, or to Hawaiian Homelands, are addressed in Section 8.11, Cultural Resources.

*Protection of children.* Implementing the Proposed Action would have no impact on the health and safety of children. The Proposed Action would not involve children or present public health or safety risks that could affect children. A Girl Scout camp is located about 8 miles (13 kilometers) from the PTA cantonment area, a distance that would prevent the camp from being impacted by noise from proposed construction projects. Nor would the camp be impacted from noise or dust from training maneuvers because no training occurs near the camp.

Proposed PTA construction projects would take place in areas that are off-limits to the general public. Restricted areas would continue to be posted with signs, enclosed by a fence, or stationed with guards. Risks to children and to the general public would be minimized by strictly adhering to applicable safety regulations and procedures.

### *Reduced Land Acquisition Alternative*

#### Significant Impacts Mitigable to Less Than Significant

*Impact 1: Economy (Business volume).* As described under the Proposed Action, there would be one significant and mitigable impact on sales volume in Hawai'i County from construction activities at PTA under the RLA Alternative. The increase in business volume and, thus, the level of impact would be slightly greater under the RLA Alternative than the Proposed Action due to the shift in construction expenditures for QTR2 from SBMR to PTA.

*Regulatory and Administrative Mitigation 1.* No mitigation has been identified.

*Additional Mitigation 1.* Because construction would occur over four years, the Army proposes to conduct long-range procurement planning to lessen excessive supply and demand issues on local and outside suppliers.

#### Less than Significant Impacts

The socioeconomic impacts for the RLA Alternative would be similar to those described in detail under the Proposed Action. The RLA Alternative would be expected to have beneficial effects on employment, income, and business volume, resulting from new construction and the resultant increased expenditures that would stimulate the economy within the ROI. The RLA Alternative would have less than significant adverse effects on these resources and on the protection of children.

#### No Impacts

As described under the Proposed Action, the RLA Alternative would have no impacts on population or housing and no disproportionate effects on environmental justice populations.

### *No Action Alternative*

#### No Impacts

Existing socioeconomic and environmental justice resources would continue under No Action. Under the status quo of No Action, there would be no change in population, employment, income, or economy (business volume). No effects on housing are expected because the number of people requiring housing on- or off-post would not change as a result of No Action. No effects on environmental justice are expected. No Action would not alter the existing health and safety, housing, or economic conditions of minority or low-income populations in Pā'auhau-Pa'auilo CCD, North Kona CCD, South Kohala CCD, and North Hilo CCD, or in Hawai'i County. No effects on children are expected because No Action would not present any change in the public health or safety risk that could affect children. The Army would continue to provide measures to protect the safety of children, including using fencing, limiting access to certain areas, and providing adult supervision.

# 8.14 PUBLIC SERVICES AND UTILITIES

## 8.14.1 Affected Environment

### *Police, Fire, and Emergency Medical Services*

Army staff provide all police services on PTA. Units that come to PTA for training may bring military police of their own, depending on the size of the unit and other circumstances. The PTA police facility is located in the cantonment area and is open 24 hours per day, seven days per week. Saddle Road, a public highway, is patrolled by Hawai‘i County police, but PTA military police are available for support when necessary. Lands leased by the Army are not patrolled on a regular basis, but military police will respond to calls in coordination with county police. PTA military police coordinate extensively with county police on a regular basis (Langford 2002).

Fire and emergency medical services are provided by Army staff based at PTA as well. There is one fire station, located at BAAF, with a staff of six (including two emergency medical technicians [EMTs]) sharing duty round the clock. Available equipment includes two brush trucks (wildland rigs), a tanker, a crash rig, and an ambulance. Serious medical emergencies involve medical helicopter transport to Hilo, which is about 10 minutes away by air. PTA emergency staff respond to accidents on the roughly 25 miles (40.2 kilometers) of Saddle Road that pass through PTA, and at the border of the installation the injured are transferred to the care of the City and County of Hawai‘i (Hoke 2002).

### *Water Distribution*

The primary source of potable water had been springs fed by snow melt on Mauna Kea, but the water supply is now hauled by tanker trucks from the town of Waimea, where it is purchased (C. H. Guernsey & Company 2001). Excess demand can be supplied by the City of Hilo (C. H. Guernsey & Company 2002a). Each truck has a capacity of 5,000 gallons (18,927 liters), and up to 14 truckloads per day were required when the camp was at full capacity. Two pump stations transport the hauled water to two 670,000-gallon (2,553,226-liter) storage reservoirs, where it is treated with powdered chlorine and sent to three 10,000-gallon (37,854-liter) distribution reservoirs. Water from these reservoirs supplies PTA, BAAF, and fire reserves (C. H. Guernsey & Company 2001). Water consumption on PTA ranges from 10,000 gallons (37,854 liters) per day to 250,000 gallons (946,353 liters) per day, depending on camp occupancy; average consumption is 100,000 gallons (378,541 liters) per day (C. H. Guernsey & Company 2002a).

Hōkūpani Spring, Waihū Spring, and Liloe Spring previously supplied water to PTA. Spring water is captured by two 2-inch (5-centimeter) pipes running from the springs, through water catchments, and down to the base camp. The annual production of water supplied by the springs ranges from 20,000 gallons (75,708 liters) to 40,000 gallons (151,417 liters) per day. However, historically, the spring produces a range of 0 to 80,000 gallons (302,833 liters) per day. This water was stored in a 670,000-gallon (2,553,226-liter) tank and treated in a slow sand filter treatment plant installed in 1996. The treated water was then conveyed to the two storage reservoirs for chlorination. The slow sand filter ceased to function, and use of spring water was discontinued. The state ranger facility has the rights to the first 8,000 gallons

(30283 liters) of water from the springs. The Army has the rights to the next 6,000 gallons (22,712 liters), and the remainder of the water is divided equally between the two agencies (C. H. Guernsey & Company 2001).

The pipe system at PTA was replaced in 1999 with PVC piping; the pipes at BAAF are scheduled to be replaced. A 60,000-gallon (227,125-liter) nonpotable water reservoir used for fire suppression at BAAF is filled by PTA personnel as needed (C. H. Guernsey & Company 2001).

### *Wastewater and Stormwater*

Wastewater flows at PTA derive from domestic wastewater generated by mess halls, latrines, and other administrative operations. Most of the flows from each of these facilities are disposed of in adjacent cesspools. Some facilities are grouped to one cesspool, and wastewater from grouped facilities is collected and transported through four-inch (10-centimeter) sewer lines to a cesspool for disposal. Three latrine/shower facilities (T-87, T-290, and T-121) recycle water used in the showers and sinks for use in the latrines. The wastewater from the latrines is then discharged to a septic tank and is finally disposed of in a seepage pit or leach field. Due to a revision in USEPA regulations, cesspools serving more than 20 people per day must be closed by April 5, 2005 (C. H. Guernsey & Company 2001).

### *Solid Waste Management*

Based on the waste and recycling streams generated during the third quarter of 2002, an estimated 296 tons of industrial solid waste is generated by PTA annually, which represents about 8.6 percent of the total estimated annual industrial waste stream generated by Army installations in the state of Hawai‘i (USARHAW 2002a). PTA has no recycling services (Ching 2002a).

### *Communications*

Telecommunications from the area between Mauna Kea and Mauna Loa are transmitted to Hilo through the Humu‘ula microwave station. Overhead trunk lines extend from this station to PTA, and distribution lines are located in the base camp, cantonment area, and BAAF. The trunk and distribution lines are owned by GTE Hawaiian Telephone, Inc. Telecommunications service to the Multi-Purpose Range Complex is supplied through a GTE cabinet at Saddle Road and is distributed from the terminal to the complex by overhead lines owned and maintained by the Army. As of 1996 the Humu‘ula microwave station was close to capacity. However, construction of a fiber optic cable system, extending from GTE’s Hilo office to the Humu‘ula microwave station via HELCO’s overhead power line poles, was scheduled for completion in 1996. The fiber optic network would allow for additional telecommunications capacity (Sato 1996). As of the time of publication of the Electric Utility Risk Assessment in 2001, PTA lacked broadband communications capabilities, and the existing communications infrastructure required complete replacement (C. H. Guernsey & Company 2001).

### *Electricity and Natural Gas*

HELCO supplies electric power to PTA through a single 12.47-kV delivery point from a HELCO-owned substation located outside the northeast fence of the cantonment area. The components of this system include metering equipment, 29 transformers, 20 miles (32.2 kilometers) of overhead lines, and 755 poles. Demand for electric power varies throughout the year, depending on troop population in the base camp. Usage varies from about 1,600 kilowatt hours per day (kWH/day) to 7,100 kWH/day (C. H. Guernsey & Company 2001); average consumption is approximately 4,553 kWH/day (C. H. Guernsey & Company 2002b). Monthly demand ranged from 162 kW in June 1995 to 456 kW in March 1998. The primary system is relatively new and meets standards, but excessive load has been observed on the secondary feeders (C. H. Guernsey & Company 2001).

HELCO's current system peak load is 183,500 kW and its total generation system capability is 233,700 kW. The existing dual 12,470-volt circuits from the substation feed a primary switchgear at PTA. Its reserve margin is 27 percent, and HELCO has been given approval to recommence construction of its Keahole Generation Expansion project. This expansion will add 39,800 kW of generation capacity in 2004.

### 8.14.2 Environmental Consequences

#### *Summary of Impacts*

Less than significant long-term adverse effects are expected from the Proposed Action as illustrated in Table 8-35. The additional building space and facilities to be constructed, as well as any increases in training, would increase demand on utilities and services. Additional utilities would be provided for the projects that would require increased capacity; otherwise, existing systems should have adequate capacity to provide for these changes. The Proposed Action could have beneficial effects on the telecommunications and electrical systems at PTA because the Proposed Action would provide telecommunications and electrical infrastructure, and no substantial increase in demand on these systems is expected because no new staff would be added.

No Action should have no impacts on public utilities. No changes to the provision of police, fire, and emergency services would occur. The demand for water, wastewater collection and treatment, solid waste collection and disposal, communications systems, and electricity would not change because no new facilities would be constructed, no additional training would occur, and no new personnel would be added.

#### *Proposed Action (Preferred Alternative)*

##### Less Than Significant Impacts

*Police, fire, and emergency medical services.* Minor long-term adverse effects on law enforcement, fire protection, and emergency medical services are expected. The increase in training activities could increase the demand for these services, but they should be adequate to accommodate such an increase. There would be no change in jurisdiction for any law enforcement agencies or fire departments.

**Table 8-35**
**Summary of Potential Public Services and Utilities Impacts at PTA**

| Impact Issues | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Impacts on police, fire, and emergency medical services | ⊙ | ⊙ | ○ |
| Impacts on water distribution | ⊙ | ⊙ | ○ |
| Wastewater and stormwater impacts | ⊙ | ⊙ | ○ |
| Solid waste management | ⊙ | ⊙ | ○ |
| Impacts on communications | ⊙+ | ⊙+ | ○ |
| Impacts on electricity and natural gas | ⊙ | ⊙ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

| | | | |
|---|---|---|---|
| ⊗ | = Significant | + | = Beneficial impact |
| ⃠ | = Significant but mitigable to less than significant | N/A | = Not applicable |
| ⊙ | = Less than significant | | |
| ○ | = No impact | | |

*Water distribution.* Minor long-term adverse effects would be expected from the Proposed Action due to increased water demand. Increased training maneuvers could increase the demand for potable water at PTA, but this should not have a significant adverse effect on the potable water supply system. The tactical vehicle wash would have wash stations using reclaimed water to minimize overall water usage, and the station would recycle water. A water line would be required to connect the tactical vehicle wash to an existing main on Kawaihae Road. The water demands of the tactical vehicle wash would be approximately 500,000 gallons (1,900,000 liters) per year, or a daily average of 1,370 gallons (5,186 liters) per day. This is about 0.01 percent of the current average daily demand and would be accommodated by the existing potable water supply system.

Water supplied to the AALFTR and the BAX would be brought in by truck, and no wells or distribution lines would be required. Water would be supplied to the new range maintenance building through a connection to existing distribution lines, located approximately 150 feet (45.7 meters) north of the building site. The upgrade of BAAF is projected to require 2.6 million gallons (100 million liters) per year, a daily average of 7,100 gallons (26,876 liters) a day. This is less than 0.01 percent of the current average daily demand and would be accommodated by the existing potable water supply system. The proposed military vehicle trail from Kawaihae Harbor to PTA would not affect the potable water system.

*Wastewater and stormwater.* Minor long-term adverse effects are expected from the Proposed Action. The tactical vehicle wash would have wash stations using reclaimed water to minimize overall water usage, and the station would recycle water to minimize wastewater disposal. Wastewater would flow through a sediment basin, an equalization basin, and a secondary treatment system, designed to remove oil, grease, and grit and to control organics.

Any wastewater not flowing through the main system would be sent to an oil-water separator. Concrete curbing and a trench drain would control the flow of wastewater. The facility would be covered to limit rain infiltration and disposal of excess wastewater. A sewer line serving restrooms in the wash rack area would tie into the sewer line conducting wastewater from the oil-water separator. The sanitary sewer would connect to the existing municipal system by a sewage pump station.

All sewage at the AALFTR and BAX would be collected in the aerated vault latrine that would be constructed on the site of the AALFTR. Sewage would be removed by pumper truck, and no new sewage lines or septic field would be required. Collection and treatment of sewage at the new range maintenance building would be provided by a septic system, including a septic tank and leach fields, that would be constructed to the west of the site. The sanitary sewer system for the BAAF runway upgrade and the ammunition storage area would connect to the installation sewer system by gravity flow; the system is projected to be adequate to handle this increase. Construction of PTA Trail would not generate additional wastewater, but paving the surface would increase the amount of impervious surface area between PTA and Kawaihae Harbor (which would require approximately 126.02 acres [49.8 hectares] of clearing and grubbing). Stormwater runoff from the road would be managed by drainage improvements, culverts at stream crossings, grass and concrete swales, and drainage structures and lines.

Several elements of the Proposed Action would create impervious surfaces covered by buildings and paving, including the proposed PTA Trail, the tactical vehicle wash, the AALFTR (which would require approximately 74.13 acres [30.0 hectares] of clearing and grubbing), the range maintenance building, the BAX, the BAAF runway upgrade (which would require approximately 2,016 acres [816 hectares] of clearing and grubbing), and the ammunition storage area. Drainage from these surfaces would be controlled using grading, curbs, drains and gutters, and other best management practices, such as retention ponds, to minimize stormwater pollution and runoff. The wastewater and stormwater collection and treatment systems at PTA are anticipated to have adequate capacity to handle increases in volume that could result from the Proposed Action.

*Solid waste management.* Minor long-term adverse effects would be expected from the Proposed Action. The building space and facilities to be constructed would generate construction and demolition waste that could reduce the useful life of the landfill, but this reduction should be negligible. In particular the AALFTR would require demolishing at least one structure and possibly foundations, concrete slabs, utility poles, utilities, and fencing; the BAX would require demolishing the assets at Range 12. This waste stream would be minimized by recycling. A minimal increase in solid waste is expected as a result of increases in training. These changes should be within the capacity of the existing waste collection and disposal system.

*Electricity.* Minor long-term adverse effects are expected from the Proposed Action. The HELCO substation and distribution system is estimated to be adequate to supply the anticipated 546,842 kWH/year energy demands of the tactical vehicle wash. The average daily energy demand of the tactical vehicle wash would be approximately 1,498.2 kW, which is an increase of about 33 percent over the existing average daily demand. The most energy efficient equipment compatible with the Army's needs would be used in order to minimize energy consumption. A new 12.47-kV, three-phase primary line would be constructed to connect to the line at the weather tower and bring electrical power to several locations on the AALFTR and BAX. Secondary power lines from these primary overhead lines would be extended underground to pad-mounted transformers on the site, from which range targets, lights, heat, and video would be powered. Electrical power at the range maintenance building would be provided from a 12.47-kV electrical line approximately 100 feet (30.5 meters) north of this site that should accommodate the additional demands of the range maintenance building. The HELCO substation and distribution system is estimated to be adequate to supply the anticipated 15,768 kWH/year energy demands of the BAAF runway upgrade. The average daily energy demand of the BAAF runway upgrade would be approximately 43.2 kW, which represents an increase of less than 1 percent in average daily demand. The HELCO substation and distribution system is estimated to be adequate to supply the anticipated 32,564 kWH/year energy demands of the ammunition storage area. The average daily energy demand of the ammunition storage area would be approximately 89.2 kW, which represents an increase of about 2 percent in average daily demand.

Electrical line easements may be required along the PTA Trail to maintain continued electrical service to the properties bisected by this roadway. The Army would consult with HELCO in order to make these arrangements prior to construction.

*Communications.* The Proposed Action would require additional telephone and telecommunications services but also would have beneficial effects on the telephone system at PTA. These changes would result in a less than significant impact. Many of the projects proposed under the Proposed Action involve providing new telephone and data lines to support more technical training maneuvers and the use of additional buildings. Construction for the AALFTR, the range maintenance building, the BAX, and the ammunition storage area includes telecommunications lines and fiber optic cabling among the support facilities that would be provided. These cables would extend service from existing locations. A mini-remote switching center would be established in one of the BAX to support telecommunications and information technology, and eleven FTI antennas would be located throughout PTA.

In an electromagnetic compatibility study for the Proposed Action, the Army considered over 65,500 frequency records from the civil sector and other federal government agencies. The results indicate no significant interference problems should be encountered on the island of Hawai'i from operating the FTI system (US Army Developmental Test Command 2003).

### Reduced Land Acquisition Alternative

#### Less than Significant Impacts

The public services and utilities impacts for the RLA Alternative would be similar to those described in detail under the Proposed Action. The additional range to be constructed (QTR2), as well as any increases in training at new and existing facilities, would increase demand on utilities and service under the RLA Alternative. Additional utilities would be provided for the projects that would require increased capacity; otherwise, the existing systems would be expected to have adequate capacity to provide for these changes. Slight differences in the impacts on the utilities identified below would occur under the RLA Alternative due to the construction of QTR2 at PTA.

The demand on law enforcement, fire protection, and emergency medical services would be slightly greater under the RLA Alternative than under the Proposed Action due to the construction of QTR2 at PTA. However, this impact would be expected to be negligible, and would result in a less than significant impact. Water used at QTR2 would be trucked in under the RLA Alternative. The sanitary wastewater volume to be collected in aerated vault latrines and removed by pumper truck would be greater under the RLA Alternative than under the Proposed Action. Additional new primary and secondary electrical lines would be required under the RLA Alternative than under the Proposed Action to QTR2. Additional telecommunications cabling would be provided under the RLA Alternative to support QTR2. This additional cabling would have beneficial effects on the telecommunications system at PTA and would represent a less than significant impact.

### *No Action Alternative*

*No Impacts*

Under the status quo of No Action, no changes would occur to the jurisdiction for any law enforcement agencies or fire departments, nor would there be increased demands on existing services. The demand for water, wastewater collection and treatment, solid waste collection and disposal, telephone systems, and electricity would not change because no new facilities would be constructed, no additional training would occur, and no new personnel would be added.

# CHAPTER 9
# CUMULATIVE IMPACTS

CEQ regulations implementing NEPA require that the cumulative impacts of a proposed action be assessed (40 CFR Parts 1500-1508). A cumulative impact is an "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions" (40 CFR § 1508.7). Cumulative impacts can result from individually minor but collectively significant actions taking place over time (40 CFR § 1508.7). AR 200-2 (32 CFR 651.51) also requires that cumulative actions, when viewed with other proposed actions that have cumulatively significant impacts, should be discussed in the same impact statement.

CEQ's guidance for considering cumulative effects states that NEPA documents "should compare the cumulative effects of multiple actions with appropriate national, regional, state, or community goals to determine whether the total effect is significant." (CEQ 1997). Section 9.2 discusses other projects on the islands of O'ahu and Hawai'i that may have cumulative effects when combined with impacts from the alternatives discussed in this EIS. Cumulative projects considered below are similar to the Proposed Action, large enough to have far-reaching effects, or are in proximity to the Proposed Action with similar types of impacts.

## 9.1 CUMULATIVE METHODOLOGY

CEQ's cumulative effects guidance sets out several different methods to determine the significance of cumulative effects, such as checklists, modeling, forecasting, and economic impact assessment, where changes in employment, income, and population are assessed (CEQ 1997). This EIS uses a variety of methods, depending on the resource area, to determine cumulative socioeconomic and environmental effects. Methods for gathering and assessing data on cumulative impacts include interviews, use of checklists, trends analysis, and forecasting. In general, past, present, and future foreseeable projects are assessed by resource area. Cumulative effects may arise from single or multiple actions and may result in additive or interactive effects. Interactive effects may be either countervailing, where the adverse cumulative effect is less than the sum of the individual effects, or synergistic, where the net adverse cumulative effect is greater than the sum of the individual effects (CEQ 1997). Where applicable, the resource sections below include a discussion of whether project impacts will accelerate any ongoing trends of resource degradation. The ROI for cumulative impacts is often larger than the ROI for direct and indirect impacts and the ROI for each specific resource is defined in Section 9.5. A summary of cumulative impacts in table form is provided in Section 9.5.

Based on public comments submitted on the EIS, the list of projects in Section 9.2 through 9.4 have been updated and expanded. In addition, the discussions of the cumulative impacts in Section 9.5 have been expanded and in some cases determinations have been changed to address comments raised during the EIS public review.

The projects listed under Sections 9.2 through 9.4 are anticipated to occur in the reasonably foreseeable future within the cumulative impact ROI for this project. The Army has considered the effects of these actions in combination with the impacts of the Proposed Action to determine the overall cumulative impact on the resources discussed in Section 9.5.

## 9.2 PROJECTS ON BOTH O'AHU AND HAWAI'I

Since the publication of the EIS all of these projects have been updated to their current status.

### *USFWS Designated Plant Critical Habitat in O'ahu and Hawai'i (Project 1)*

The USFWS has designated 54,203 acres (21,935hectares) as critical habitat on O'ahu for 101 threatened and endangered plant species. This acreage is about 14 percent of the island, and much of it is in the Ko'olau and Wai'anae Mountains. Fifty-two of the plant species exist nowhere else in the world.

The USFWS has designated 208,062 acres (84,200 hectares) of land as critical habitat on the island of Hawai'i for 46 threatened and endangered plant species. This acreage is about 8 percent of the island. Twenty-seven of the plants listed exist nowhere else in the world.

### *Open Burning Permit Program (Project 2)*

Open burning is allowed in Hawai'i, per Department of Health regulations (Hawai'i Administrative Rules, Air Pollution Control, Title 11, Section 11-60.1-51 to -57). Most such permits are granted for agricultural burning, although open burning on Army installations is also permitted. Permits are granted year–round, except for no burn periods, which normally fall during winter trade wind season. The state does not keep records on emissions from open burns (Young 2003).

### *Army Campaign Plan (Project 3)*

In late February 2004, HQDA issued a planning directive to initiate preparation of the Army Campaign Plan (ACP). The final ACP will direct the planning, preparation, and execution of Army operations and Army transformation within the context of current to future force. The planning directive initiated detailed planning and preparation for the full range of actions necessary to execute the ACP. Among the actions set forth for further planning is a proposal to transform the Army to a modular, capabilities-based configuration beginning in FY 2004. Proposed in the main effort is the conversion of 33 current active force Brigade Combat Teams (BCT) to 43 to 48 modular BCT Units of Action (UAs) and the transition of division base structures to modular designed Units of Employment (UEs) for command and control purposes. This conversion is independent of the proposed transformation to SBCTs in Hawai'i and other locations.

The planning directive discusses the possible addition of from one to three UAs to the 25th ID(L). It is not clear where these UAs may be stationed, but Hawai'i is a possibility. At this time, there is insufficient information regarding the potential structure, manning, capabilities, and equipment, of the UAs to analyze their impacts. The appropriate level of NEPA analysis and documentation would be prepared once the planning process has progressed beyond the conceptual phase and a proposed action is formulated.

### *Implementation of the Army Integrated Wildland Fire Management Plan - All Army Ranges (Project 4)*

This project outlines specific guidance, procedures, and protocols in the prevention and suppression of all wildfires on all Army training lands in Hawai'i. Its goal is to convey the methods and procedures necessary to minimize fire frequency, severity, size and fuels management strategies. At the same time it will allow military units a high level of combat readiness. The plan is organized around general wildfire management; installation specific information, requirements, and upgrades; and Standing Operating Procedures (SOPs) for wildfire management actions in all Fire Management Areas (FMAs) at each installation. The executive summary and chapter 1 of the IWFMP are provided in Appendix D of this FEIS.

### *Range Standing Operating Procedures - All Army Ranges (Project 5)*

Fire Management Areas (FMAs) and standing operating procedures are established for training areas on Army ranges for ongoing/current force training. $25^{th}$ ID(L) and USARHAW Regulation 210-6 addresses FMA procedures and is applicable to all Army ranges and training areas in Hawai'i.

## 9.3 PROJECTS ON O'AHU

Ongoing and proposed projects on O'ahu that could reasonably contribute to cumulative impacts are identified in Table 9-1 and their locations are shown on Figure 9-1.

### *Whole Barracks Renewal Program—O'ahu (Project 1)*

The Army proposes to upgrade unaccompanied enlisted personnel housing in Hawai'i. SBMR structures have an average age of 68 years. Over 50 percent of the barracks were built prior to 1922, and over 80 percent are eligible for the NRHP. Upgrades would take place on WAAF, SBMR, and Tripler Army Medical Center grounds. The program includes new guidelines for upgrading the barracks by increasing the housing square footage for Soldiers. Closet space will replace the current wardrobe locker system, and two-person bathrooms will replace gang latrine systems. The Army intends to complete upgrades in this seven-phase plan by 2010. Based on current estimates of SBCT troop increases and associated decreases in current force troops, no additional housing upgrades will occur outside of what is already planned.

**Table 9-1**
**Cumulative Projects on O'ahu**

| Project | Related Project Location | Project Sponsor | Project Description | Projected Completion Date |
|---|---|---|---|---|
| 1. Whole Barracks Renewal Program | SBMR | US Army | Upgrade barracks facilities. | 2010 |
| 2. Advanced Wastewater Treatment Upgrade | SBMR | US Army | Upgrade sewage treatment to an advanced treatment and effluent system. | 2005 |
| 3. Fire Station-SBMR | SBMR | US Army | Build a new fire station. Old fire station is historic and will be preserved. | 2005 |
| 4. Soldier and Family Readiness Center | SBMR | US Army | Build a new facility to house several services. | 2007 |
| 5. Information Systems Facility | SBMR Main Post | US Army | Construct a 38,138-square-foot (11,624-square-meter) building. Special electromagnetic field shielding precautions are compulsory. | 2005 |
| 6. Mission Support Training Facility | SBMR Main Post | US Army | Construct an 89,803-square-foot (27,372-square-meter) building to house war-fighting and digital classroom training. | 2005 |
| 7. Installation Information Infrastructure Architecture | SBMR Main Post | US Army | Install fiber optics cabling from the cantonment area to the ranges, motor pool, and other facilities within the installation. | 2004 |
| 8. Gate Alignments | SBMR/WAAF | US Army | Three gate alignments at SBMR and two at WAAF. | 2007-2008 |
| 9. Army Facility Strategy Program | SBMR/WAAF | US Army | Projects include an aviation motor pool complex at WAAF, 2 physical fitness centers (SBMR, WAAF), a general instruction building, and upgrades to SBER. | Unknown |
| 10. Kamehameha Highway Bridge Replacements | Kawela, Kaukonahua Road (near SBMR/SBER) | State of Hawai'i | Replace bridges. Kawela Stream bridge is near Kawela Camp Road, and Upper Poamoho Stream Bridge is in the Vicinity of Helemanō Plantation, near Kaukonahua Road. | Funded through 2004 |
| 11. Mākua Implementation Plan | MMR | US Army | Cooperative program with local landowners to stabilize endangered plants and animals with habitat at MMR. | 2036 |
| 12. Live-Fire Training | MMR | US Army | Resume routine live fire military training at MMR. | 2005 |
| 13. Controlled Burns at Army Installations in Hawai'i | MMR, SBMR (McCarthy Flats), PTA, DMR | US Army | Controlled burn of dangerous vegetation to reduce fuel load at ranges. This also facilitates UXO clearance and surveys for cultural sites. | Ongoing, seasonal |
| 14. Farrington Highway Improvements | Makaha (near MMR) | State of Hawai'i | Construct safety and operation improvements for Farrington Highway, including sidewalks, signalized pedestrian crosswalk or bridges, and continuous left turn fences. | Funded through 2004 |
| 15. Farrington Highway, Replacement of Makaha Bridges 3 and 3A | Makaha (near MMR) | State of Hawai'i | Replace two timber bridges in the vicinity of Mākaha Beach Park. | Funded through 2004 |
| 16. Kahuku Windmill and Hook Parcels Land Acquisition | KTA | US Army | Purchase 71.5 acres at KTA. | Completed |
| 17. Turtle Bay Resort Improvements | KTA | Turtle Bay Resort | Expand and renovate hotel. | 2004 |
| 18. Lā'ie Wastewater Collection System Expansion Phase II – Lā'ie | Lā'ie (adjacent to KTA) | Town of Lā'ie | Upgrade the existing sewage collection system. | 2004 |

**Table 9-1**
**Cumulative Projects on Oʻahu** *(continued)*

| Project | Related Project Location | Project Sponsor | Project Description | Projected Completion Date |
|---|---|---|---|---|
| 19. Drum Road Upgrade | Helemanō to Kahuku (near KTA) | US Army | Align, widen, and harden approximately 23 miles (37 kilometers) of the dirt and gravel road that runs from the end of the paved road at HMR to the end of the paved road at KTA. Road upgrade done to accommodate current force training. | 2005/2006 |
| 20. Kamehameha Highway Traffic Improvements | Kahaluu to Waimea Bay (near KTA) | State of Hawaiʻi | Construct passing lanes, construct turning lanes at intersections, modify existing traffic signals, and install signs, flashers, and other warning devices. | Funded through 2004 |
| 21. Hot Cargo Pad | HAFB | US Air Force | Construct facilities to simultaneously load 3 C-5/C-17 aircraft. | Unknown |
| 22. Troop Rigger Facility | HAFB | US Air Force | Construct a 10,872-square-foot (3,314-square-meter), two-story troop rigging facility as part of the Army/Air Force Joint Mobility Complex. | Unknown |
| 23. Ship Operations Building | Bishop Point near Pearl Harbor (near HAFB) | US Army | Construct a one-story ship operations building. | 2004 |
| 24. Dry-dock Waterfront Support Facility | Pearl Harbor (near HAFB) | US Navy | Construct two-story metal buildings, renovate an existing latrine, demolish several buildings. | 2003 |
| 25. Residential Communities Initiative | Army Installations on Oʻahu | US Army | Turn over approximately 7,700 units of housing on Oʻahu to private developer or consortium of developers for renovation and operation for a 50-year period. | Construction starts 2004. Lease/manageme nt period 2004-2053 |
| 26. 25th ID(L) & USARHAW Revitalization Program | Oʻahu | US Army | Construct or renovate water tanks and central ID Lab. | 2006-2008 |
| 27 Implementation of the Integrated Natural Resources Management Plan | Oʻahu | US Army | The Hawaiʻi area INRMP establishes a management program to preserve, protect, and enhance natural and cultural resources while improving the Army's capability to conduct training and maintain military readiness. | Not all projects funded. Plan 2002-2006 |
| 28. Implementation of the Integrated Cultural Resource Management Plan | Oʻahu | US Army | This project outlines stabilization and preservation strategies for protecting cultural and historical resources on US Army installations on Oʻahu. | Ongoing |
| 29. Implementation of Proposed Range and Training Land Program Development Plan actions | Oʻahu | US Army | A planning document for managing range facilities and training areas based on Army training doctrine and resource guidance. | Ongoing |
| 30. Implementation of the Central Oʻahu Sustainable Communities Plan | Oʻahu | City and County of Honolulu | A guideline for developing central Oʻahu. | Ongoing |
| 31. Basing of eight C-17 aircraft at HAFB and the departure of four C-130 aircraft from HAFB. | HAFB | USAF | The USAF proposes basing eight C-17 aircraft at HAFB and four C-130 aircraft leaving HAFB. A notice of intent has been issued for the preparation of an environmental assessment. | Unknown |
| 32. Land Transfer at DMR | Oʻahu | US Army | The Army will be returning the portion of the beach land in front of DMR to the State. | 2004 - 2005 |

**Figure 9-1**
Cumulative Projects on O'ahu

Funding and scheduling of this project are moving ahead. There is also a possibility of purchasing land currently included in the Residential Communities Initiative footprint for future barracks, headquarters, and motor pool sites (Bow 2002).

### *Advanced Wastewater Treatment Upgrade—Schofield Barracks (Project 2)*

SBMR needs to upgrade its current sewage treatment to an advanced treatment and effluent system. The Army plans to comply with Clean Water Act water quality regulations and to meet Hawai'i and federal reuse guidelines and Hawai'i water quality standards. The necessary upgrades are expected to be completed in 2005. Privatization studies have been completed and the contract has been awarded.

### *Fire Station SBMR—Schofield Barracks (Project 3)*

SBMR is planning to construct a new fire station, which will support SBMR, WAAF, Camp Stover, and HMR. The current station is considered undersized and termite damaged. The old station is a historic building and will be preserved. This project is funded through fiscal year 2005 (Shimabukuro 2002).

### *Soldier and Family Readiness Center—Schofield Barracks (Project 4)*

This project would construct facilities for the following services: Red Cross, Aloha Furniture, housing referral, passport and ID, retirement services, vehicle registration, and others. This project is funded for fiscal year 2007 (Shimabukuro 2002).

### *Information Systems Facility—SBMR Main Post (Project 5)*

The proposal is to construct a 38,138-square-foot (11,624-square-meter) information systems facility (ISF) with a ground floor and basement. The ISF would be constructed at the corner of Trimble and Beaver Roads on a site previously used for Army family housing. The ISF would support information data communication systems of telecommunication cables, conduit, fiber optics, relays, and junctions. Additionally, the ISF would provide connectivity to essential constructive, virtual, and real information systems now and in any future upgrades. Twenty-four hours per day, seven days a week, the ISF operations would support the tactical Internet management location, the local communications control center, secure and not secure main communications node of the network switching systems, the secure information vault, and the special compartmentalized information facility rooms. Special electromagnetic field shielding precautions are compulsory in portions of the facility. A 25-person situation readiness center, with a video teleconferencing center, would be included. Anti-terrorism/force protection measures are essential to protect this critical communication node. SBCT would use these training facilities as well. This project is required for current mission requirements of the 25th ID(L), is scheduled for completion in 2005, and would be needed regardless of SBCT implementation. An Environmental Assessment was published for the project in August 2003 and a FONSI was issued in January 2004.

### *Mission Support Training Facility—SBMR Main Post (Project 6)*

The proposal is to construct an 89,803-square-foot (27,153-square-meter) state-of-the-art mission support training facility to house war-fighting and digital classroom training for medium brigade, joint, and combined arms simulation training. The facility would include the following components:

- Reconfigurable tactical operations centers;
- Simulation work cells to support the Joint Army Navy Uniform Simulation/Force XXI Battle Command Brigade and Below;
- Exercise control;
- Simulation control;
- Corps battle simulation/opposing forces;
- Digital classrooms;
- Virtual leader effects trainer;
- Fire effects training;
- Reachback sensitive compartmented information facility;
- Technical shop;
- Conference room; and
- Office support facilities.

Additional facilities include paved walks, curbs and gutters, parking, information systems, state-of-the-art intracommunications and intercommunications systems, and site improvements. This project is required to provide a consolidated training facility for the training requirements of the 25th ID(L). The proposed mission support training facility would be sited on SBMR next to the proposed ISF, on a previously disturbed area that accommodated government housing. This project is required for current mission requirements of the 25th ID(L), is scheduled for completion in 2005, and would be needed regardless of SBCT implementation. An Environmental Assessment was published for the project in August 2003 and a FONSI was issued in January 2004.

### *Installation Information Infrastructure Architecture (I3A)—Schofield Barracks and Wheeler Army Airfield (Project 7)*

The Army proposes to install fiber optics cabling from the cantonment area to the ranges, motor pool, and other facilities within the installation. The I3A is required for current mission requirements of the 2nd Brigade, 25th ID(L) and would be needed regardless of SBCT implementation. These telecommunications requirements would furnish digital information necessary for interconnections between various ranges on SBMR, WAAF, HMR, KTA, and other locations on O'ahu. The I3A project could consist of underground and aboveground cable that would provide additional links to the facilities and to the range complexes by upgrading the e-mail system, asset visibility system, automated personnel processing system, and video teleconference capability. A draft Environmental Assessment is currently being written on the project and the project is funded through 2004.

### *Gate Alignments—Schofield Barracks/Wheeler Army Airfield (Project 8)*

*Foote Gate, SBMR*

This project will realign the road to allow "vehicle stacking" and will include a visitor center and search area with parking. The guardhouse will be updated and will include new lighting and surveillance equipment. Tentative funding is for fiscal year 2007.

*Macomb Gate, SBMR*

This project will realign the road to allow vehicle stacking and will include a visitor center and search area with parking. The guardhouse will be updated and will include new lighting and surveillance equipment. Tentative funding is for fiscal year 2007.

*Lyman Gate, SBMR*

This project will realign the road to allow vehicle stacking and will include a visitor center and search area with parking. The guardhouse will be updated and will include new lighting and surveillance equipment. Tentative funding is for fiscal year 2008.

*WAAF Gate Connections with SBMR*

This project will create a direct link between SBMR and WAAF. Signal lights and crosswalks should improve traffic safety for pedestrians and motorists. Tentative funding is for fiscal year 2008.

*Kawamura Gate, WAAF*

This project will realign the road to allow vehicle stacking and will include a visitor center and search area with parking. The guardhouse will be updated and will include new lighting and surveillance equipment. Tentative funding is for fiscal year 2007-2008. (Shimabukuro 2002).

### *Army Facility Strategy Program (AFS)—SBMR, Fort Shafter, WAAF (Project 9)*

The AFS program provides for construction of new facilities, including construction of a consolidated motor pool at Fort Shafter, an aviation motor pool complex at WAAF, two physical fitness centers (SBMR, WAAF), a general instruction building and upgrades to the range at SBER, and a chapel at Fort Shafter.

The current fuel storage facility at SBMR has a 60,000-gallon (227,125-liter) capacity. The Army is proposing to increase this capacity to 120,000-gallons (454,249-liters). At WAAF, an increase in fuel storage capacity for petroleum, oil, and lubricants storage is needed for the Aviation Brigade Motor Pool expansion (Bow 2002).

### *Kamehameha Highway Bridge Replacements—Kawela, Kaukaonahua Road (Project 10)*

The State of Hawai'i is planning to replace bridges on Kamehameha Highway with new bridges that meet current design standards. Kawela Stream Bridge is near Kawela Camp Road and Upper Poamoho Stream Bridge is in the vicinity of Helemanō Plantation, near Kaukonahua Road. The projects are funded through 2004 (OMPO 2002).

### *Mākua Implementation Plan—Mākua Military Reservation (Project 11)*

The US Army's Mākua Implementation Plan (MIP) is a 33-year plan to work with local landowners to stabilize endangered plant and animal species on Army training land at MMR. The land needed for stabilizing these plants and animals is divided into 32 management units on O'ahu and sites on Kaua'i, wherever the most important wild populations occur. Under the MIP, landowners enter into an agreement to implement species stabilization actions on their property, as determined by the Makua Implementation Team of experts. Stabilization is the goal of the program, and recovery is not the responsibility of the private participants or the Army. The MIP states, "Successful implementation of the MIP assures that the Army will be in compliance with the Endangered Species Act and still accomplish its training mission." (Mākua Implementation Team et al. 2002). The MIP was finalized in fall 2003 by the USFWS and work on urgent actions has been initiated.

### *Live-Fire Training—Mākua Military Reservation (Project 12)*

Under the Proposed Action, the Army would conduct routine company-level CALFEX training for the combat units assigned to the 25th ID(L) and would allow other military units to conduct similar training._CALFEX is a combat training exercise where the Army unit deploys several forces, such as infantry, aviation, artillery, and engineers, all at once to have a greater effect on an enemy. While all maneuver training areas and impact areas are within the 457-acre (185-hectare) CCAAC, the training area used at MMR for CALFEXs totals 1,034 acres (419 hectares). MMR would also incorporate wildland fire management, endangered species and cultural resources protection measures, and the ITAM program. There would be no disposal of hazardous wastes at MMR. This project is required for current mission requirements of the 25th ID(L) and SBCT training requirements are not dependent upon its use._SBCT forces may use MMR for dismounted CALFEX training only after completion of the MMR EIS and ROD._SBCT dismounted CALFEX training would be substantially similar to CALFEXs conducted by other forces.

In compliance with the settlement agreement and stipulated order between Mālama Mākua and USARHAW, the Army is preparing an EIS to evaluate conducting CALFEXs at MMR. The EIS is scheduled to be completed by February 2005. Numerous studies and surveys are associated with this project, along with general NEPA compliance.

### *Ongoing Prescribed Burns at Army Installations in Hawai'i (Project 13)*

Prescribed burns have been conducted at Army installations in Hawai'i in the past on small areas (typically 4 to 5 acres) at SBMR and about 800 to 900 acres at MMR. Controlled burns have recently been conducted on larger areas and on a more regular basis. Approximately 1,200 to 1,500 acres (486 to 607 hectares) are burned at SBMR (Battle Area Complex and Qualification Ranges) to reduce vegetation (fuel load) and to allow the Army to conduct UXO clearance and cultural survey activities. Aerial broadcast spraying of herbicide by helicopter is applied before some burns to reduce live vegetation prior to the prescribed burn. The first burn in this area was in May 2003 and would be conducted every year or two based on vegetation regrowth and fuel continuity. The Army is likely to also conduct controlled burns at DMR, MMR and PTA. At this time, it is not anticipated that burns will be needed in the SRAA or at KTA or KLOA.

Approximately 800 to 900 acres (324 to 364 hectares) at MMR were burned under the program to prevent large-scale wildfires, in compliance with the settlement agreement and stipulated order between Mālama Mākua and the US Army (USARHAW). The burn took place between the north and south firebreak roads and on small parcels outside the firebreak roads for four days between October 29 and November 1, 2002. The burn allowed for UXO cleanup and archaeological surveys. The EA was available for public and agency comment until October 8, 2002, and a FONSI was signed on October 28, 2002 (Miura 2002).

The most recent prescribed burn was conducted on July 22, 2003. Preparation and execution of the prescribed burn was performed according to the burn plan prepared by the Army (US Army, undated). The Army coordinated the prescribed burn with the USFWS; US Forest Service; State Department of Health, Clean Air Branch; State DNLR, Division of Forestry and Wildlife; Federal Fire Department; Honolulu Fire Department; Hickam Fire Department; and the National Weather Service. The prescribed burn was designed to burn between 800 and 900 acres (244 and 274 hectares) (Enriques 2003b). However, the prescribed burn area escaped the firebreak road due to a sudden 180 degree wind shift and an increase in wind speed from 9 miles per hour to 20 to 25 miles per hour within five to ten minutes. As a result, the fire burned uncontrolled for three days and burned 2,100 acres (640 hectares).

### *Farrington Highway Improvements— Nānākuli to Mākaha (Project 14)*

The State of Hawai'i is constructing safety and operation improvements to Farrington Highway, including sidewalks, signalized pedestrian crosswalk or bridges, and continuous left-turn fences. The project is funded through 2004 (OMPO 2002).

### *Farrington Highway, Replacement of Makaha Bridge Numbers 3 & 3A—Makaha (Project 15)*

The State of Hawai'i is planning to replace two timber bridges in the vicinity of Mākaha Beach Park. The project is funded through 2004 (OMPO 2002).

### *Kahuku Windmill and Hook Parcels Land Acquisition—Kahuku Training Area (Project 16)*

The US Army has acquired 71.5 acres (29 hectares) of land in holdings within KTA. This property is presently owned by the James E. Campbell Estate. The purpose of the acquisition is to consolidate KTA land holdings. Originally, the windmill parcel was being used to generate electricity. An environmental assessment was prepared by the Army. (Malaspina 2004.)

### *Turtle Bay Resort Improvements—Kahuku (Project 17)*

Turtle Bay resort is proposing to expand and renovate its hotel and resort in Kahuku. Construction is planned to begin in 2004 (State of Hawai'i 2002c).

### *Lā'ie Wastewater Collection System Expansion Phase II—Lā'ie (Project 18)*

This project will continue to upgrade the sewage collection system in Lā'ie (the town next to Kahuku). These upgrades will improve system reliability and will eliminate the potential for leaks and spills from aging cesspools, septic systems, and sewer lines. The proposed expansion is being developed to address concerns and to accommodate anticipated growth envisioned in the Koʻolauloa Sustainable Communities Plan. The resulting sewage effluent will be of reusable quality. The environmental assessment was finalized by the City and County of Honolulu, Department of Design and Construction and was received by the OEQC office on December 9, 2002. The OEQC office published the notice of availability of the City's Final Environmental Assessment and Finding of No Significant Impact in the December 23, 2002, edition of the Environmental Notice (Segundo 2004). Construction will be finished in October 2004.

#### *Drum Road Upgrade— Helemanō MR to Kahuku TA (Project 19)*

The proposal is to align, widen, and harden approximately 24 miles (37 kilometers) of the dirt and gravel road that runs from the end of the paved road at HMR to the end of the paved road at KTA. Work would include widening the road to 24 feet (7 meters) and providing three-foot (one-meter) compacted gravel shoulders on both sides, realigning dangerous blind curves, regrading to correct steep slopes, providing drainage improvements, and installing guardrails at drop-offs and storm drainage structures and lines to preclude excessive amounts of stormwater runoff from sheet flowing over the road and endangering traffic. Site work includes clearing, grubbing, grading, and stockpiling material for embankments and installing telecommunications conduits alongside the upgraded roadway. The projects are funded through 2005/2006. This project is required for current mission requirements of the 25th ID(L) and would be needed regardless of SBCT implementation. A Draft EA is scheduled for publication in 2004.

#### *Kamehameha Highway Traffic Improvements—Kahaluʻu to Waimea Bay (Project 20)*

The State of Hawaiʻi is planning to construct passing lanes, to construct turning lanes at intersections, to modify traffic signals, and to install signs, flashers, and other warning devices on Kamehameha Highway. The projects are funded through 2004. (OMPO 2002).

#### *Hot Cargo Pad—Hickam AFB (Project 21)*

This project involves constructing facilities to simultaneously load three C-5/C-17 aircraft. A staging area and service roads would also be required (Shimabukuro 2002). This project is required for current mission requirements of the 25th ID(L) and would be needed regardless of SBCT implementation.

#### *Troop Rigger Facility—Hickam AFB (Project 22)*

The proposal is to construct a 10,872-square-foot (3,314-square-meter), two-story troop rigging facility as part of the Army/Air Force Joint Mobility Complex. The proposed action would include facilities for parachute packing and repair, rig supply and equipment, a drying tower, administration, and a storage room. This proposed facility would be sited on Hickam AFB, between the taxiway and a football field along Moffet Street. This project is required for current mission requirements of the 25th ID(L) and would be needed regardless of SBCT implementation.

#### *Ship Operations Building—Bishop Point, Hickam AFB (Project 23)*

The US Army plans to construct a one-story ship operations building at Bishop Point near Pearl Harbor. The 545th Transportation Detachment and 548th Transportation Corps

Detachment, 9th Regional Support Command, would use this building for support vessels. Occupancy is scheduled for 2004 (Shimabukuro 2002).

### *Dry-dock 2 Waterfront Support Facility—Pearl Harbor (Project 24)*

The US Navy proposes to construct 2 two-story metal buildings, to renovate a latrine, to demolish several buildings and portable structures, and to provide electrical modifications to a building. The US Naval Facilities Engineering Command has prepared an EA/FONSI for the project.

### *Residential Communities Initiative (RCI) — Army Installations on O'ahu (Project 25)*

The US Army is proposing the full privatization of family housing at the following seven installations in O'ahu: SBMR, HMR, WAAF, Aliamanu Military Reservation, Fort Shafter,Tripler Army Medical Center, and the former Coast Guard housing at Red Hill. This initiative is a program for the Army to turn over approximately 8,000 units of housing on O'ahu to a private developer or consortium of developers for ownership and operation for a 50-year period. The land beneath these homes will be leased to the developer for the same term. This program is meant to eliminate inadequate housing and improve neighborhoods and communities. A developer (Actus Lend Lease) was selected in Aug 2003 to prepare the Community Development Management Plan (CDMP), which will be central to the design and implementation of the RCI Program. The Draft CDMP was submitted to HQ Army in February 2004 for review. Pursuant to the subsequent approval by Congress, projected for May 2004, the conveyance of the improvements and lease of these residential lands is scheduled for October 2004. The Final RCI EA and Draft FNSI were released in February 2004.

### *25th ID(L) and USARHAW Revitalization Program (Project 26)*

This compilation of projects includes construction of 2 two-million-gallon (7,570,824-liter) water tanks to ensure continued sanitary and reliable water service. The current tanks exhibit considerable corrosion at the roof areas. The new tank project includes a booster pump station and emergency generators. Also under this project is construction of an additional facility for the Central Identification Laboratory Hawai'i. Currently, the organization is housed in overcrowded and inadequate facilities, causing operations to be inefficient. The project will include a DNA lab and administrative space for command and support staff and search and recovery teams.

### *Implementation of the Army Integrated Natural Resource Management Plan—O'ahu (Project 27)*

This project outlines mandatory and optional natural resource stabilization and recovery methods for endangered, rare, and threatened species and communities existing on Army installations on O'ahu. Interagency consultation was initiated with USFWS, and public coordination efforts were made in compliance with the Sikes Act. The programs guaranteed funding are those that involve ESA Section 7 consultation, some watershed and pest management programs, and some conservation and community outreach programs.

### *Implementation of the Army Integrated Cultural Resource Management Plan—O'ahu (Project 28)*

This project outlines stabilization and preservation strategies for protecting cultural and historical resources on US Army installations on O'ahu. Interagency consultation was initiated with the Hawai'i State Historic Preservation Office.

### *Implementation of Proposed Range and Training Land Program Development Plan Actions (Project 29)*

This project would involve the implementation by the US Army of a planning document for managing range facilities and training areas based on Army training doctrine and resource guidance. This program identifies potential training shortfalls and includes a development plan for ranges to meet training needs for current forces.

### *Central O'ahu Sustainable Communities Plan—O'ahu (Project 30)*

This report serves as a vision for Central O'ahu. The 25-year development plan for Central O'ahu takes into account sustainability, open space, transit corridors, parks, and natural and cultural resources. Elements essential to the community_building plan include the revitalization of Waipahu and Wahiawa town centers, economic development for these communities, the urban community boundary and open/green space network of parks and other areas.

### *Basing of eight C-17 Aircraft at HAFB and Departure of four C-130 Aircraft from HAFB (Project 31)*

The USAF proposes to base eight C-17 aircraft at HAFB and to see the departure of four C-130 aircraft from HAFB. The proposed action would include aircraft beddown and operations at Hickam AFB, the construction of C-17 aircraft support facilities at Hickam AFB, personnel requirements to support the C-17 aircraft beddown, aircrew training requirements at existing facilities, and the possible construction of a new assault runway or use of existing runways. An EA was prepared and the FONSI was completed for the C-17 aircraft beddown on December 12, 2003. This project is scheduled to be completed in 2006.

### *Land Transfer —Dillingham Military Reservation (Project 32)*

The Army will be returning State ceded lands consisting of 73 acres of airfield and 14 acres of beach area including portions of Kealia Beach, Mokuleia Beach Park, and Mokuleia Army Beach (adjacent to Kealia beach). The conveyance deeds will be executed at the Secretariat level. The State will then lease the land back to the Army for continued training operations. The deed transferring the property is scheduled to be signed in 2004 -2005.

## 9.4 PROJECTS ON HAWAI'I

Concurrent ongoing and proposed projects on the island of Hawai'i that could reasonably contribute to cumulative impacts are identified in Table 9-2, and their locations are shown on Figure 9-2.

### *Kawaihae Deep Draft Harbor—Kawaihae Harbor (Project 1)*

The US Army Corps of Engineers and the State of Hawai'i, Department of Transportation, Harbors Division are proposing to modify the existing Kawaihae Harbor. The Federally constructed harbor project consists of an entrance channel, the harbor basin, and a "rubblemound" breakwater. Currently the harbor provides maritime access for commerce on the western side of the island of Hawai'i. Growing demand for cargo to support the rapidly expanding economy and state plans to pursue a larger share of the North American passenger cruise market will also increase pressure on the current harbor. Presently there are numerous operating inefficiencies at the harbor. Wave surge enters the harbor and damages

**Table 9-2**
**Cumulative Projects on Hawai'i**

| | Project | Location | Sponsor | Description | Projected Completion Date |
|---|---|---|---|---|---|
| 1. | Kawaihae Deep Draft Harbor | Kawaihae Harbor | The US Army Corps of Engineers and the State of Hawai'i | Deepening and expanding the Kawaihae Harbor. The project consists of an entrance channel, the harbor basin, and a breakwater. | 2008 |
| 2. | TSV Pier Use | Kawaihae Harbor | The US Army Corps of Engineers | Using existing piers at Kawaihae Harbor for TSV landings. | Unknown |
| 3. | PTA 1010 Land Acquisition | PTA | US Army | The US Army is negotiating with a private landowner to acquire an area to be used for ongoing training. | Unknown |
| 4. | Consolidated command and range control building | PTA | US Army | Constructing a consolidated command center at PTA for ongoing training. | 2004 |
| 5. | Saddle Road realignment | Across island of Hawai'i, near PTA | Federal Highways Administration (FHWA), State of Hawai'i | Long-term highway construction project that includes improving and modifying Saddle Road between Hilo side and Kona side of the island of Hawai'i. | Unknown |
| 6. | Kawaihae/Waimea Road | Waimea Park to Merriman's (near Kawaihae Harbor) | State of Hawai'i | State right-of-way and possible construction to replace road for the Kawaihae/Waimea Road. | Unknown |
| 7. | Waimea to Kawaihae Highway | South Kohala | FHWA | A 14-mile (23-kilometer) improved highway between Waimea town and Kawaihae Harbor in central and west Hawai'i. | Unknown |
| 8. | Former Waikoloa Maneuver Area and Nansay Sites UXO Cleanup | Hawai'i | The US Army Corps of Engineers | Clean up unexploded ordnance on lands used by US Navy and Marines as an artillery and naval gun firing range, troop maneuvers, and weapons practice. | 2015 |
| 9. | Theater Support Vessel (TSV) | O'ahu to the island of Hawai'i (Pearl Harbor to Kawaihae and waters in between) | US Army | High-speedtransport vessel may be used between O'ahu and Hawai'i. Design specifics and operating characteristics are not known at this time. | Unknown |
| 10. | Relocation of Kilauea Fire Station to PTA | Hawai'i/PTA | US Army | The Army proposes to move the fire station on the grounds of Hawai'i Volcanoes National Park to Pōhakuloa Training Area, 70 miles (113 kilometers) away by road. | January 2005 |
| 11. | RTLP Range Development Plan | Hawai'i/PTA | US Army | The Army is proposing to improve its existing firing ranges at PTA in four different components that all fall under the RTLP Range Development Plan | 2004-2005 |
| 12. | Outrigger Telescopes Project | Mauna Kea | NASA | NASA proposes to fund the construction and operation of six outrigger telescopes in the W. M. Keck Observatory site at the Mauna Kea Summit. | 2004-2007 |

Source: Tetra Tech 2002

**Figure 9-2**
Cumulative Projects on Hawai'i

vessels and piers and causes cargo-handling delays. The current harbor basin is approximately 35 feet (11 meters) deep, and accommodating the new vessels would require a harbor basin depth of at least 40 feet (12 meters). Possible alternatives include deepening of the existing entrance channel and harbor basin, extending the existing breakwater and constructing a new breakwater. The southwest part of the harbor is the primary port for military equipment, supplies and personnel destined for PTA. The harbor was first completed in 1962 and was enlarged in 1973. Submittal of the Environmental Impact Statement is scheduled to be completed in January 2006. This project is required for current mission requirements of the 25th ID(L) and would be needed regardless of SBCT implementation.

### *TSV Pier Use—Kawaihae Harbor (Project 2)*

As described in Chapter 2, the Army could replace the LSV landing craft with a TSV. The TSV would need to dock at a pier and to have cargo offloaded by either a ship-mounted or shore crane. Kawaihae Harbor is the main seaport for the Army to access PTA and would probably be the site of any TSV landings. The existing entrance channel, harbor depths and piers structures in Kawaihae Harbor could accommodate the TSV, but some modifications may need to be done to existing piers. Specific sites, plans, and specifications for pier modification are not available, so any impact analysis at this stage would be speculative. Such a project, whether within current force or SBCT operations, would be subject to later NEPA documentation.

### *Land Acquisition—Pōhakuloa Training Area (Project 3)*

In addition to the land that the Army is planning to acquire for SBCT, it has been leasing between 990 and 1,010 acres (401 hectares and 409 hectares) on the northwest of PTA from Parker Ranch. This lease ran out in 1998, and negotiations have been underway for the Army to acquire this land. The Army Real Estate Planning Report prepared for this acquisition states that the neighborhood of the acquisition is dominated by military training and pasture land use, though the report also says that "the land to be acquired has no significant impact on the local community." The State of Hawai'i DOT has proposed a new alignment of Saddle Road that would cross the boundary of the proposed acquisition and PTA. Restrictions have been placed on 70 acres (28.3 hectares) after the discovery of the endangered Hawaiian mint on the parcel. (These plants are currently fenced and restricted from training activities.) ESA Section 7 consultation is underway, and the Army is finalizing the EA for the purchase (Shimabukuro 2002; US Army Corps of Engineers 2002). This project is required for current mission requirements of the 2nd Brigade, 25th ID(L) and would be needed regardless of SBCT implementation.

### *Consolidated Command and Range Control Building—Pōhakuloa Training Area (Project 4)*

The US Army plans to construct a consolidated command center for the camp commander and others at PTA for ongoing training. Quonset hut buildings that would be vacated would be used for officer and NCO barracks and a task force HQ. Construction is to begin in January of 2003 for occupancy in January of 2004. An EA was completed in April 2002 (Shimabukuro 2002).

### *Saddle Road Realignment—Island of Hawai'i (Project 5)*

This is a long-term highway construction project that includes improvements and modifications to the Saddle Road between the Hilo side and Kona side of the island of Hawai'i (see www.saddleroad.com for more details on the project). Approximately 50 miles (80 kilometers) of road will be modernized to meet American Association State Highway and Transportation Officials standards. Constructed in 1942, Saddle Road does not meet design standards for roadways. It is the only road serving PTA and is subject to serious traffic congestion when military convoys are transporting ammunition or troops for training. It is also the only road serving Mauna Kea astronomical observatory complex, Waiki'i Ranch, Kilohana Girl Scout Camp, Mauna Kea State Recreation Area, and major hunting areas. An EIS was completed in the fall of 1999 (County of Hawai'i 2002b). The initial segment of construction will realign the portion of the Saddle Road that passes through PTA to a location north of the base. There is an Memorandum of Understanding (MOU) among the Federal Highway Administration, the Hawai'i Department of Transportation, and the DLNR to mitigate impacts on critical habitat of the Palila (see Appendix E) (FHWA 2003).

### *Kawaihae/Waimea Road—Island of Hawai'i (Project 6)*

Hawai'i County Public Works Department is investigating traffic mitigation measures along Kawaihae Road from Waimea Park to Merriman's. The intent is to use the existing road corridor and, after minor paving and other improvements, to re-mark the roads with through lanes and turning pockets. The county is also studying a project to provide for a state right-of-way for a road to replace the Kawaihae/Waimea Road (County of Hawai'i 2002b). There are no other County of Hawai'i road projects in the areas of Pōhakuloa, Kawaihae, or Waimea (Kuba 2002).

### *New Highway—Waimea to Kawaihae Harbor (Project 7)*

The FHWA has proposed constructing an improved 14-mile (23-kilometer) stretch of upgraded highway between the central and west Hawai'i town of Waimea to Kawaihae Harbor near the district of South Kohala. A notice of intent to prepare an EIS for the proposed project has been issued.

### *UXO Cleanup—Former Waikoloa Maneuver Area and Nansay Sites (Project 8)*

The Department of Defense has begun investigating and cleaning up UXO on lands formerly used by the US Navy and Marines under the auspices of the Defense Environmental Restoration Program, Formerly Used Defense Sites (DERP/FUDS). Starting in 1943, the Navy and the Marines acquired State of Hawai'i and private lands (Parker Ranch) through license agreements and used them for artillery and naval gun firing ranges, live-fire exercises, troop maneuvers, and weapons practice. Ordnance recently used or identified within the entire former maneuver area includes shells, rockets, grenades, mortars, cannons, and small arms. While use of most of the area for training and weapons practice ended in 1946 and 1953, the Pu'u Pa'a Maneuver Area is still used occasionally as an active US military training area. The Pu'u Pa'a area is leased to the Department of Defense by Parker Ranch. Current use of the former maneuver land on the Parker Ranch property is mainly cattle ranching and grazing and, in the areas near Waimea and Waiaka Village, residential, commercial, and industrial. UXO continues to be found in the former maneuver area, and preliminary investigations show that approximately 48,000 acres (19,440 hectares) could hold ordnance and explosives waste hazards. Units from SBMR have disposed of UXO, and the Corps of Engineers prepared the "Engineering Evaluation/Cost Analysis, Phase II" (1992) document discussing possible investigation and cleanup alternatives (USACE2001d). This report utilized the Ordnance and Explosives Risk Impact Assessment (OERIA) to assess and recommend cleanup in various areas in the former Maneuver Area. The Maneuver Area includes the Ke'amuku area (the WPAA) that may be acquired under the Proposed Action. Based on the OERIA, the Engineering Evaluation/Cost Analysis Phase II found that the Ke'amuku area was of low relative risk to human health and the environment from unexploded ordnance, and that mitigation would be primarily through application of institutional controls, such as public education, signage, brochures, etc. Initial visual screening investigation in the Ke'amuku area was conducted and three areas were identified within the Ke'amuku area as needing further geophysical study (see Figure 9-3). As part of the public education module, the DERP/FUDS program has also produced a safety video outlining proper procedures and potential risk for access into the former maneuver area including access to the Ke'amuku area. Identification of unexploded ordnance within the former maneuver area has been performed by the Corps of Engineers through the FUDS project with disposal conducted by military EOD units. The Engineering Evaluation/Cost Analysis Phase II report recommended ordnance clearance in certain areas of the former maneuver area. This current ordnance clearance project administered by the Corps of Engineers includes both the identification and the disposal of unexploded ordnance. In the event of an emergency situation with imminent risk to human health and safety, military EOD units would assist in the identification and disposal of unexploded ordnance.

### *Theater Support Vessel (Project 9)*

In the future, the Army is considering the use of TSVs to transport troops and supplies between O'ahu and the island of Hawai'i. TSVs would launch from Pearl Harbor with troops and equipment and would land at Kawaihae Harbor. The 25th ID(L) units would offload and transit from Kawaihae Harbor to PTA. Some of the transit areas for the vessels between the two islands are within or in close proximity to the Hawaiian Islands Humpback Whale National Marine Sanctuary waters. If and when this project would be implemented, the Army plans to comply with all appropriate environmental regulations including NEPA, the ESA and the Marine Mammal Protection Act.

### *Relocation of Kilauea Fire Station to PTA (Project 10)*

The Army fire station on the grounds of Hawai'i Volcanoes National Park will be moved to Pōhakuloa Training Area, 70 miles (112 kilometers) away by road, in January 2005. The Army originally planned to close the military camp fire station in mid-2004, but Hawai'i County Fire Department officials requested a delay to provide more time for the extensive training county firefighters will need before taking over the military camp coverage. The move will provide the national park with firefighting crews skilled in forest and brush fires.

### *RTLP Range Development Plan (Project 11)*

The Army is proposing to improve its firing ranges at PTA in four different components that all fall under the RTLP Range Development Plan project. Upcoming proposed projects identified so far to meet current force needs include converting the multi-purpose machine

**Figure 9-3**
Waikoloa Maneuver Area and Nansay Sites

gun lanes on R-8 to standard 10 lanes, constructing a new 10-lane modified record fire range, expanding the existing combat pistol qualification course on R-2 for 10-lane capability, and constructing a 25-lane known distance range on R-4 or R-1. An EA is being prepared for this project, which would be implemented in 2004-2005.

#### *Outrigger Telescopes Project (Project 12)*

NASA proposes to fund the construction, installation, and operation of six outrigger telescopes in the W. M. Keck Observatory at the Mauna Kea summit area. Construction of four telescopes is planned for 2004 and the remaining two in 2007.

## 9.5 ANALYSIS OF CUMULATIVE IMPACTS

The cumulative impacts of these developments are discussed by resource area below. Relevant significant and not mitigable, significant and mitigable to less than significant, and less than significant cumulative impacts also are described. Table 9-3 provides an overview of cumulative impacts by resource area.

### 9.5.1 Summary of Cumulative Impacts

Cumulative impacts from the Proposed Action and the Reduced Land Acquisition Alternative, and the No Action alternative would occur in all resource areas. Significant cumulative impacts would occur in the following resource areas: Land use, biological, cultural, and human health and safety hazards.

There would be significant cumulative impacts on land use from the acquisition and conversion of agricultural land independent of the Proposed Action, Reduced Land Acquisition Alternative, and No Action Alternative. Significant impacts on biological resources would occur from a cumulative increase in the potential for fire to occur on O'ahu and the island of Hawai'i as a result of SBCT and the projects listed in tables 9-1 and 9-2. There would be significant cumulative impacts on cultural resources from the projects listed in Tables 9-1 and 9-2 and the construction and training associated with the Proposed Action or Reduced Land Acquisition Alternative.

The implementation of the Proposed Action or Reduced Land Acquisition Alternative would result in significant cumulative impacts on human health and safety hazards from the introduction of more ammunition and unexploded ordnance considering the existing levels of ammunition and unexploded ordnance from the projects listed in Tables 9-1 and 9-2 . There would be significant but mitigable to less than significant long term cumulative impacts on surface water quality from suspended sediment resulting from training activities at SBMR and KTA, from the potential for chemical residues or spills at SBMR, and from sediment loading following wildfires at SBMR, KTA, and PTA.

There would be a significant but mitigable to less than significant long term cumulative impact on socioeconomics and environmental justice from the projects listed in Tables 9-1 and 9-2 in association with the Proposed Action and Reduced Land Acquisition Alternative for population, schools and housing. The Army proposes to mitigate these cumulative impacts through measures discussed in Section 4.13 including notification to the Hawai'i Department of Education at the earliest point when practicable of any known increases of students to schools on or near SBMR and WAAF, supplementing the Hawai'i Department of

Education budget through the US Department of Education Federal Impact Aid Program, and long-range procurement planning for supply and demand issues related to construction activities.

**Table 9-3**
**Summary of Potential Cumulative Impacts**

| Resource Area | Proposed Action | Reduced Land Acquisition | No Action |
|---|---|---|---|
| Land Use/Recreation | ⊗ | ⊗ | ○ |
| Visual Resources | ⊙ | ⊙ | ○ |
| Airspace | ⊙ | ⊙ | ○ |
| Air quality | ⊙ | ⊙ | ○ |
| Noise | ⊙ | ⊙ | ○ |
| Traffic | ⊙ | ⊙ | ○ |
| Water Resources | ⊘ | ⊘ | ○ |
| Geologic, Soils, and Seismicity | ⊙ | ⊙ | ○ |
| Biological Resources | ⊗ | ⊗ | ⊗ |
| Cultural Resources | ⊗ | ⊗ | ⊙ |
| Human Health and Safety Hazards | ⊗ | ⊗ | ⊘ |
| Socioeconomic and Environmental Justice | ⊘ | ⊘ | ○ |
| Public Service and Utilities | ⊙ | ⊙ | ○ |

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:
⊗ = Significant
⊘ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact
N/A = Not applicable

### 9.5.2 Cumulative Impacts by Resource Category

#### *Land Use and Recreation*

For the evaluation of cumulative impacts relative to land use and recreation, the ROIs are as follows:

- For acquisition of land for military use and conversion from agricultural to nonagricultural use, the ROI is statewide or island-wide;
- For reduction in the amount of land available for hunting, the ROI is island-wide.

The major historic influence on land use and recreation in the ROI has been the rapid development since World War II. Initially, the largest land use changes included construction of military lands including cantonment areas and training lands. After WW II the tourism boom resulted in the development of resort and support services connected to the tourism industry. The resulting land use changes included significant conversion of agriculture land to urban and military uses, and in the case of resort areas, loss of coastal areas and limited beach access. These land use changes significantly altered the character of the ROI, particularly on O'ahu, from rural and agricultural in nature to land dominated by urban sprawl, military facilities, and resort areas.

Future land use and recreation trends for the O'ahu sites are reflected in the sustainable community plans prepared by the City and County of Honolulu for those regions; future trends for the island of Hawai'i sites are reflected in the General Plan for Hawai'i County and the proposed draft revision to the General Plan for Hawai'i County. The above documents recognize the statewide decline in large-scale plantation agriculture for various economic reasons but express the desire to preserve existing agricultural land, particularly prime agricultural land, for current and future agricultural businesses. Residential development has also risen in recent years in coastal areas of O'ahu. Since 1978, there has been a one percent decline in total agricultural lands of importance to the state. Trends associated with recreational resources include providing continued, and where possible, increased access to recreational resources.

### *Proposed Action (Preferred Alternative)*

*Cumulative impacts from converting agricultural land to training land.* The Proposed Action includes the Army's acquisition of land on O'ahu and the island of Hawai'i. Proposed O'ahu acquisitions include 1,402 acres (567 hectares) for the SRAA, 13 acres (5 hectares) for the Helemanō Trail easement, and 36 acres (14.6 hectares) for the Dillingham Trail easement. Proposed acquisitions on the island of Hawai'i include the 23,000-acre (9,308-hectare) WPAA and a 132-acre (53.4-hectare) easement for the PTA Trail. These acquisitions total 24,604 acres (9,957 hectares) statewide. When combined with the acquisition of 71.5 acres (29 hectares) for the Kahuku Windmill and Hook parcels, adjacent to KTA, and the 1,010 acres (409 hectares) northwest of PTA, the total area to be acquired by the Army statewide is 25,686 acres (10,395 hectares). These acquisitions would increase the state-wide decline in farmland since 1978 from one percent to 2.7 percent and would contribute to the diminishing amount of agricultural land in the state. From a cumulative, state-wide perspective, this is a relatively small increase, especially in the context of the proposed release of military land to civilian use. The Army is returning approximately 50 acres (20.2 hectares) of land at DMR to the State of Hawai'i. Other proposed transfers to civilian ownership include the Barbers Point and Waikele parcels as part of the Navy's proposed Ford Island development. Individually, the proposed action would not result in significant impacts on the conversion of agricultural land. However, in the State of Hawai'i, there is an ongoing loss of agricultural land due to development. In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the cumulative impacts would be significant.

*Cumulative impacts on natural resources management and recreational land use.* Training and operation of the proposed QTR2 on the SRAA could affect land use within a portion of the Honouliuli Preserve. Approximately 100 acres (40.5 hectares) within the SRAA are part of the TNC-managed lands that are available for intensive natural resources management and hiking. In response to comments received early in the EIS process, the Army reoriented QTR2 so that the SDZ would no longer affect any lands within the Honouliuli Preserve. Army will grant TNC personnel and TNC-sponsored personnel daily controlled access to the TNC-managed lands along a route to be determined by the Army in consultation with the TNC. Access controls will be developed and implemented to ensure the safety of all personnel. Signs will posted at the boundary to prevent unauthorized use/trespass. As discussed in Section 5.2, there would not be a significant cumulative impact with the reorientation of QTR2 because there would be minimal changes recreational and land use management at the Honouliuli Preserve, which is 0.06 percent of the Conservation District land on O'ahu and is a fraction of a percent of the total Conservation District land in the state.

Operation of the CACTF at KTA would prohibit any traffic (on foot or in unprotected vehicles) within the SDZ. Presently, traffic – such as unauthorized public access - is not strictly controlled at KTA. The addition of fencing and signs restricting unauthorized access when the range is in use would be a less than significant cumulative impact because it would affect existing military training land within an installation. Existing public recreation areas would not be affected. Recreation opportunities at Army installations on O'ahu have declined in the past few years due to increased security and decreased personnel available to manage check-in stations. The land use in some coastal areas has also changed due to residential development. Because the Proposed Action does not include new development of coastal areas, it would not combine with residential development to cumulatively affect land use.

Under the Proposed Action, recreational land use would be increased because approximately 23,000 acres (9,308 hectares) of private hunting land would be opened to the public for hunting game birds and game mammals when the land is not used for training. Trends associated with recreational resources should not be affected by the cumulative impacts of these projects. Individually, the proposed action would not result in significant impacts on natural resources management and recreational lands. In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the cumulative impacts on recreational land use and natural resource management would not be significant.

### *Reduced Land Acquisition Alternative*

*Cumulative impacts from converting agricultural land to training land.* Land acquisitions associated with the Reduced Land Acquisition Alternative are similar to the Proposed Action, except that the SRAA would be reduced to 100 acres (40.5 hectares). The statewide land acquisitions would total approximately 24,281 acres (9,826 hectares). These acquisitions would increase the state-wide decline in farmland since 1978 from one percent to 2.6 percent and would contribute to the diminishing amount of agricultural land in the state. The acquisitions would also increase the state-wide amount of land owned or leased by the military from 10.8 percent to 11.4 percent.

The cumulative impacts of land acquisition and conversion to nonagricultural use on O'ahu would not be significant. In addition, on the island of Hawai'i the Army is considering establishing a cooperative relationship to allow continued grazing at the WPAA in conjunction with training. Individually, the proposed action would not result in significant impacts on the conversion of agricultural land. However, in the State of Hawai'i, there is an ongoing loss of agricultural land due to development. In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the cumulative impacts would be significant.

*Impacts on natural resources management and recreational land use.* Under the Reduced Land Acquisition, the cumulative impacts on the access to natural resources management and recreation resources would not change from the current conditions. Under Reduced Land Acquisition, cumulative impacts on the island of Hawai'i relative to hunting would be the same as those for the Proposed Action. Individually, the proposed action would not result in significant impacts on natural resources management and recreational lands. In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the cumulative impacts on recreational land use and natural resource management would not be significant.

#### *No Action Alternative*

Under No Action, there would be no cumulative impacts on land use and recreation because the land acquisitions and the proposed construction and training described in Chapter 2 would not occur. The acquisition of 72 acres (29 hectares) for the Kahuku Windmill and Hook parcels, adjacent to KTA, and the 1,010 acres (409 hectares) northwest of PTA would be addressed under their respective NEPA documents. Access to natural resources management areas and recreational land use would not change.

### *Visual Resources*

Historically, there has been a steady change in the visual character in the ROI due largely to the land use changes identified above. The development of resort areas adversely affected large portions of the near shore areas in the ROI. There has been a steady loss of unobstructed views of the shore as resort and urban development encroached in the viewshed. Along with this development came the necessary infrastructure such as roads and power/telephone poles and lines that also intrude on views of the mountains and open areas. Historic conversion of open lands to agricultural uses changed the character of much of the land in the ROI particularly in the flatter areas suitable for large scale farming of pineapples and sugarcane. With this development came a steady increase in light pollution. The large urban and downtown areas create large concentrated sources of light pollution affecting night time viewing of the skies and in some cases affecting birds migrating along the shores at night.

Increasing activities and building new structures on O'ahu and Hawai'i will continue to reduce the quantity and quality of visual resources over time. This is because the developments would be on islands with finite land resources that are incapable of supporting increasing population. These impacts on visual resources become more significant as the extent of developed land increases. Most of the cumulative projects listed above for O'ahu and Hawai'i would occur in previously disturbed areas, thereby limiting the level of disturbance to natural areas and views.

The ROI for cumulative visual impacts is the ROI for the Proposed Action and the regions affected by the cumulative projects listed above for O'ahu and Hawai'i. These regions include areas such as travel corridors or coastline areas where projects may occur that, although not within a single viewshed, may be viewed in succession or proximity and result in a cumulative visual impact.

Overall, cumulative impacts would be less than significant because the proposed project and the cumulative projects listed above would be spread out over a large area and would not be confined to one region in particular. Consequently, any impacts on visual resources are more likely to be localized. Also, the Proposed Action and the cumulative projects listed above would occur at different times, and some of the projects would replace existing infrastructure instead of constructing new infrastructure that would affect visual resources.

### *Proposed Action*

*Modification of existing view*. Many of the other projects proposed within the ROI that may have cumulative effects would occur in areas of similar development and would be visually consistent with the existing facilities and SBCT-related projects. The assumption is that these other projects that may have cumulative effects would be developed in a manner that is consistent with installation master plans to ensure compatibility with surrounding uses, which could be negatively affected by visually incompatible development.

Other cumulative actions would occur in the vicinity of SBCT installations but would be sufficiently removed from SBCT-related actions that there would be no visual relationship between the actions. SBCT-related construction and training activities at KTA, in combination with other projects, would not result in cumulative impacts because many of these actions are of limited duration, the actions are dissimilar and unlikely to be visually perceived in combination, and the actions have negligible visual relationship because of separation.

Other projects that may have cumulative effects would occur in the same location but at different times, and potential visual impacts would be such that they would not result in a sequential cumulative impact. For example, SBCT-related training and prescribed burning at MMR and other ranges may have similar visual impacts as a result of smoke; however, these impacts would be of limited duration and are expected to be substantially separated in time, such that there would not be a reasonable cumulative link between the visual impacts of the two actions. As a result, the Proposed Action, in combination with other projects that may have cumulative effects, would not result in any cumulatively significant impacts on existing views.

Finally, the Army believes the fugitive dust and soil mitigation identified in Section 4.5 Air Quality and Section 4.9 Geology, Soils, and Seismicity would be implemented to keep soil erosion and compaction to a minimum, thereby minimizing visible fugitive dust. It is reasonable to predict that other construction and operation projects listed above would implement similar soil control practices, resulting in less than significant cumulative impacts to visual resources.

Individually, the proposed action would not result in significant impacts on existing views and viewsheds. In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the cumulative impacts to the modification of existing views would not be significant.

*Impairment of view during the construction phase.* No significant cumulative impacts as a result of visual impairment during construction are expected. Construction in the SRAA would result in a significant but mitigable impact on visual resources; however, other projects that may have cumulative effects in the SBMR viewshed would occur in developed areas and at different times from the South Range construction and are not expected to cumulatively add to this impact.

Construction of the Helemanō Trail, which is expected to occur between August 2005 and August 2006, could occur simultaneously with the Kamehameha Highway bridge replacement near the Helemanō Plantation, which is expected to occur at the end of 2004. It is unlikely that construction would result in a cumulatively significant impact on visual resources because of the limited nature of construction involved for each project, the transient nature of construction activities, and the active agricultural use of the area that is similar in kind to the anticipated construction activities. The Kamehameha Highway traffic and drainage improvements, in conjunction with construction of the Helemanō Trail, are not likely to result in a cumulatively significant impact because these actions would also be transient and would have a negligible visual relationship because of separation.

Similarly, construction of PTA Trail, which is expected to occur between March 2008 and March 2009, may occur simultaneously with other construction activities on Saddle Road and Kawaihae/Waimea Road, which are not currently scheduled. It is unlikely that construction activities would result in a cumulatively significant impact on visual resources because of the limited nature of construction involved for each project, the transient nature of construction, and the fact that most of these activities would have negligible visual relationship because of separation.

Individually, the construction activities would have no impacts on existing views and viewsheds. In light of historic, ongoing, and reasonably foreseeable future actions and the transient nature of construction projects the Army concludes that the cumulative impacts on impairment of views during construction would not be significant.

*Alteration of landscape character.* Projects listed in Tables 9-1 and 9-2 may result in alteration of the landscape character. However, these projects occur in areas of similar development or at different times than the Proposed Action or Reduced Land Acquisition Alternative such that there would be no visual link between them. As discussed in Section 4.3, the Army will implement mitigation measures to reduce the impacts on visual resources from the construction of the Proposed Action on a project-wide basis to less than significant. In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the cumulative impacts on the alteration of landscape character would not be significant.

*Consistency with visual resource policies.* As discussed in Section 4.3, the Proposed Action and Reduced Land Acquisition Alternative would not be substantially inconsistent with any visual resource policies. The Army has not been informed of any projects listed in Tables 9-1 and 9-2 that have not considered visual resource policies in their design and implementation. In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the cumulative impacts on consistency with visual resource policies would not be significant.

*Alter nighttime light and glare.* Under the Proposed Action, the use of nighttime lighting devices, such as flares, during training might increase slightly. The use of these devices is not expected to increase dramatically because training with night vision goggles would be conducted. There would be nighttime use of the cantonment areas and there would be lights which could contribute to light pollution, however these lights would be shielded.

Cumulative projects listed above that could contribute to cumulative nighttime light and glare impacts include construction and renovation of buildings and facilities at SBMR, which is already relatively developed. The Army assumes that excessive lighting would not be installed at new buildings and facilities, and renovation would only replace existing lighting with lighting of similar intensity and not increase lighting. These facilities are expected to properly orient and shield light fixtures.

Cumulative projects listed above that could contribute to cumulative nighttime light and glare impacts at PTA include the consolidated command and range control building, the relocation of Kilauea Fire Station to PTA, and the RTLP Range Development Plan Projects. Similar to SBCT PTA facilities, these facilities are expected to use low sodium vapor lighting. Also, these facilities are expected to properly orient and shield light fixtures. Cumulative visual impacts with respect to nighttime light and glare would be less than significant.

Individually, the impacts from light and light glare would have less a than significant impacts on natural existing views and viewsheds. In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the cumulative impacts that would alter nighttime light and glare would be less than significant.

#### *Reduced Land Acquisition*

The potential for cumulative impacts on visual resources would be similar to that described above for the Proposed Action.

#### *No Action*

No cumulative impacts on visual resources are expected under No Action.

### ***Airspace***

Initially the development of military lands just prior to and after World War II had the biggest impact on airspace in the ROI. The expansion of military airfields continued as larger and more military aircraft were stationed in Hawai'i. Following World War II the increase in tourism resulted in an expansion of civilian airfields and airports. As with the military, the civilian aircraft increased in numbers and size requiring expansion of the existing airports. This historic development resulted in close monitoring of airspace as the land area is small in Hawai'i with limited airspace.

#### *Proposed Action*

Because the Proposed Action, with the possible exception of a shift in the instrument approach path to BAAF on PTA, would have no impact on airspace use in the ROI, there is no potential for incremental additive impact on airspace use. No other projects in the various airspace use ROIs have been identified that would have the potential for incremental, additive cumulative impacts on controlled or uncontrolled airspace, special use airspace, military training routes, en route airways and jet routes, airports/airfields, or air traffic control in the ROI. The less than significant impacts from extending and reorienting the runway at BAAF would not lead to any airspace use cumulative impact.

Similarly, while the airspace over SBMR and WAAF is considered congested for general aviation aircraft and is likely to become more congested over time, procedures are in place that, although not mandatory, allow general aviation to function satisfactorily. Moreover, the WAAF tower provides traffic advisories to general aviation pilots when it is open. On weekends, when the tower is closed, pilots tune in to the common advisory frequency to monitor other traffic and to broadcast their position, thus minimizing the likelihood of adverse cumulative impacts on airspace.

The required consultation and review process with the FAA on all matters affecting airspace use would eliminate the possibility of direct adverse impacts on airspace use in the various ROIs. All aircraft operations at WAAF and BAAF and Hickam AFB are subject to air traffic control clearances and instructions. For example, the maximum height of each individual FTI antenna will be 100 feet or the FAA-approved height, whichever is lower. Prior to final design, the Army will coordinate with the FAA to ensure that each antenna does not obstruct air navigation, including approach and departure clearance near any runway or airfield. In addition, for those UAV flights that could not be contained wholly within restricted areas or warning areas, operations would be conducted in accordance with well-defined FAA procedures for remotely operated aircraft. The required scheduling process for the special use airspace by the military would eliminate the potential for adverse cumulative impacts. Military pilots operating outside special use airspace would still follow FAA regulations, thus minimizing the potential for adverse cumulative airspace use impacts. Individually, the proposed action would have no impact on airspace. In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the cumulative impacts on airspace would not be significant.

#### *Reduced Land Acquisition*

For the same reasons described for the Proposed Action, there would be no cumulative impacts on airspace under the RLA Alternative.

#### *No Action*

There would be no cumulative impacts on airspace under No Action.

### ***Air Quality***

As noted in Section 3.5, air pollution levels in Hawai'i generally are low due to the small size and isolation of the state. Historic air quality monitoring data do not show any recent upward or downward trends in average air quality conditions on O'ahu or Hawai'i. The only identifiable trend has been an apparent increase in the peak 24-hour average $PM_{10}$ concentrations on O'ahu attributed to fireworks use during New Year's celebrations (Hawai'i Department of Health 2000, 2001a, 2002). As discussed in Section 3.5, the state 1-hour ozone standard was rescinded in September 2001 and replaced with an 8-hour ozone standard. Data for maximum 8-hour average ozone levels have not been published, but maximum 1-hour ozone level data show that the 8-hour standard has not been exceeded.

Maximum 8-hour ozone concentrations probably have been about 55 to 60 percent of the 8-hour standard in recent years.

As noted in Section 3.5, the ROI for air quality issues depends on the pollutant and emission sources that are under consideration. The ROI for a regional secondary pollutant, such as ozone (which is not emitted directly but is formed by chemical reactions among precursor compounds), generally will be island-wide. The ROI for directly emitted primary pollutants is much more localized because dispersion processes reduce pollutant concentrations as emissions are transported away from the point of emission. Cumulative air quality impacts would occur when multiple emission sources affect the same geographic areas simultaneously or when sequential projects extend the duration of air quality impacts on a given area over a longer period of time.

Because the geographic scale of the ROI differs for regional secondary pollutants and directly emitted primary pollutants, it is convenient to separate the discussion of cumulative air quality impacts by type of pollutant. The major emissions associated with the Proposed Action and the RLA Alternative include ozone precursors (reactive organic compounds and nitrogen oxides) and directly emitted $PM_{10}$. Emission quantities of other pollutants are too low to pose air quality concerns.

### *Proposed Action*

*Ozone precursor emissions.* Combustion processes are the dominant source of ozone precursor emissions. Construction equipment, motor vehicle traffic, and aircraft flight activity are important sources of ozone precursor emissions. Tables 9-1 and 9-2 include several construction projects that would at least partially overlap the time frame of construction projects identified for the Proposed Action. In a cumulative perspective, the Proposed Action would do little to alter overall vehicle traffic or air traffic activity on O'ahu or Hawai'i. Federal ozone standards have not been exceeded in Hawai'i during the past decade, despite the cumulative emissions from highway traffic, commercial and military aircraft operations, commercial and industrial facility operations, agricultural operations, and construction projects in both urban and rural areas. Given historical air quality conditions, the cumulative impact of emissions associated with the Proposed Action in combination with other construction projects and the continuing emissions from highway traffic and other sources is not expected to violate any state or federal ozone standards. Consequently, in light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the cumulative air quality impacts on ozone or other secondary pollutants would be less than significant under the Proposed Action.

*$PM_{10}$ emissions.* Fugitive dust sources and wildfires are the major contributors to $PM_{10}$ emissions. Fugitive dust sources include construction activity, vehicle traffic on unpaved roads or off-road areas, and wind erosion from areas with exposed soils. Tables 9-1 and 9-2 include several construction projects that would at least partially overlap the time frame of construction projects identified for the Proposed Action. However, spatial separation among these various construction projects would minimize or eliminate cumulative $PM_{10}$ impacts from those projects with overlapping construction time frames. Very few of the projects identified in the tables are in close proximity to training areas that would be affected by military vehicle traffic or wind erosion from military vehicle maneuver areas. While

agricultural burning, wildfires, and controlled burns could create temporary localized areas of high $PM_{10}$ concentrations, such events in the past have not violated federal $PM_{10}$ standards. As discussed in Chapters 4 through 8, there may be localized, direct significant impacts from $PM_{10}$ emissions. However, given historical air quality conditions, the cumulative impact of emissions associated with the Proposed Action, in combination with other construction projects and the continuing emissions from other emission sources, is not expected to violate state or federal ozone standards. Consequently, in light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the cumulative air quality impacts from primary air pollutants, such as $PM_{10}$, would be less than significant under the Proposed Action.

#### *Reduced Land Acquisition*

The cumulative impact issues discussed above for the Proposed Action also would apply to the RLA Alternative; consequently, cumulative air quality impacts under the RLA Alternative would be less than significant.

#### *No Action*

Under No Action, there would be no cumulative impacts involving air quality.

### ***Noise***

Historic trends that have affected noise in the ROI has been the steady development in the state. Urban and military development produced significant noise generators from vehicles, aircraft, military training, and construction activities. There has been no routine monitoring of ambient noise conditions, so data are not directly available for evaluating specific trends, but in general, noise conditions in the vicinity of USARHAW installations are not likely to have significantly changed in recent years because activity levels for major noise sources have not grown or declined significantly.

Noise impacts are inherently localized because sound levels decrease relatively quickly with increasing distance from the source. Cumulative noise impacts would occur when multiple projects affect the same geographic areas simultaneously or when sequential projects extend the duration of noise impacts on a given area over a longer period of time.

#### *Proposed Action*

Cumulative noise impacts under the Proposed Action would stem primarily from temporary construction activities and military training. Land acquisition or transfer projects and resource management plan activities listed in tables 9-1 and 9-2 would have no meaningful noise impacts and thus no potential for cumulative noise impacts under the Proposed Action. Private development construction projects, highway improvement projects, and military construction projects at sites other than USARHAW installations would not produce cumulative noise impacts under the Proposed Action, due to distance or differences in construction timing.

Tables 9-1 and 9-2 include several construction projects at SBMR or PTA that would partially overlap the time frame of construction projects identified for the Proposed Action. Uncertainty in the timing of some highway construction projects near PTA precludes any meaningful evaluation of cumulative noise impacts related to those projects. However, spatial separation among these various construction projects would minimize or eliminate cumulative noise impacts or noise-sensitive land uses. Consequently, no cumulatively significant noise impacts would occur from planned construction projects at or adjacent to Army installations.

Military training projects at MMR are too far removed from SBMR, SBER, KTA, KLOA, or DMR to have any cumulative noise impacts under the Proposed Action. Although noise impacts on a project level are significant, due to the type and location of projects identified in tables 9-1 and 9-2, cumulative noise impacts affecting the same geographic areas or extending the duration of noise impacts on a given area over a longer period of time would be unlikely to occur. Consequently, in light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the cumulative noise impacts under the Proposed Action would be less than significant.

*Reduced Land Acquisition*

The cumulative impact issues discussed above for the Proposed Action also would apply to the RLA Alternative. Consequently, in light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the cumulative noise impacts under the RLA Alternative would be less than significant.

*No Action*

Under No Action, in light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that there would be no cumulative impacts involving noise.

***Traffic***

There has been a steady increase in traffic in Hawai'i over the last 50 years. Much of the increase in traffic on O'ahu is due to urban sprawl. Historically people tended to live close to where they worked and local road networks were adequate to handle local and weekend traffic. However, as areas such as Ewa Beach, windward O'ahu, and Hawai'i -Kai developed and people moved to these developing communities, commute traffic began to overload major roadways into Waikiki and Honolulu. In general, highway development in these areas has barely stayed ahead of these traffic increases. On other parts of the island and on the island of Hawai'i, tourist traffic created problems in the more popular destinations, overloading local roads mainly on weekends. Military traffic has remained relatively stable over the years with the exception of travel to and from SBMR and Ewa Beach, a popular location for off-base housing. Recent trends have noted a decrease in military personnel in Hawai'i, as the military has downsized and closed some facilities.

*Proposed Action*

Traffic trends differ by region. Peak-hour traffic along the major roadways on O'ahu is expected to increase at an average growth rate of 1.6 percent per year until 2020 (Kaku Associates 1995). For the same period, peak-hour traffic along residential streets is expected to increase 0.4 percent per year. Comparable data for the roadway network on the island of Hawai'i is not provided in either the current or previous transportation plans. Comparing historical traffic counts along Mamalahoa Highway and Kawaihae Road provides an indication of past growth. Between 1996 and 2000, daily traffic increased approximately 0.1 percent per year, which implies minimal growth along this roadway. For the same period, traffic along Kawaihae Road, between Mamalahoa Highway and Queen Kaahumanu Highway, has increased an average of 4.5 percent per year. This growth is considered robust and is comparable to calculated growth rates for traffic in the Kailua-Kona area, which is on the same side of the island as the project.

The Proposed Action has several traffic-related impacts. The first relates to the construction of the military vehicle trails and the second to the individual projects at SBMR.

The Proposed Action separates military traffic from civilian traffic as much as possible, so there would be a beneficial impact on traffic because the volume of military traffic on the state and county road system would not be greater than current hourly volumes. The hourly volume of convoy traffic is limited by operational considerations (no more than 24 vehicles per convoy and a minimum interval of 15 minutes between convoys). Unless this operational procedure is changed, the maximum hourly volumes of convoy traffic would remain the same. The threshold of 100 peak-hour trips in the peak direction would not be reached for existing or cumulative conditions, so the impact from Army use of military vehicle trails would be less than significant.

The second aspect of traffic impacts of the military vehicle trails relates to the trail crossings of public roadways. The traffic impact of these crossings was analyzed using the methodology for intersections without signals, with the convoy traffic yielding to public traffic along the highway. Thus, the operation of traffic along the military vehicle trail would have minimal or no impact on traffic operations along the public roadways as long as they are two lane and two way. Any future improvement of the highways may result in the trail crossing a four-lane highway. In other areas where trails (or plantation roads) have crossed highways greater than two lanes wide, either traffic signals have been installed or a grade crossing has been constructed. Because there are several highway improvement projects on the list of cumulative impacts, the resulting cumulative impacts of the widening plus military vehicle trail crossing would have to been assessed on a case-by-case basis. This would have to be performed as part of the environmental assessment of the highway project. Design year traffic volumes are typically not available until the EA is performed for the highway improvement project. At this time, cumulative traffic impacts are predicted to less than significant.

The individual projects on SBMR either have separate NEPA documents prepared or do not generate sufficient traffic to warrant a traffic impact analysis. With few exceptions, the projects have minimal traffic impacts in the immediate vicinity of the project because traffic is being redistributed within a confined area.

Potential traffic impacts could occur due to increased use of PTA, along with the increased traffic and development caused by the Saddle Road realignment. Increased traffic, as described in the Saddle Road EIS, could have indirect impacts on cultural, socioeconomic, and biological resources. Further, expanded use of PTA could combine with other local land acquisition and development projects to conflict with right-of-way acquisition needs for Saddle Road.

The proposed alignment for Saddle Road through WPAA is currently not funded. If the Army decides to implement the proposed action, the Army will coordinate with DOT to minimize impacts on traffic crossings on the new Saddle Road from the PTA military vehicle trail. The Saddle Road project could have two impacts on the Proposed Action. The first is that traffic operating conditions, and therefore the level of service, will improve because the deficiencies will be corrected by the improved alignment and higher (and newer) design standards. These higher standards include improved sight distances, sufficient lane widths, and adequate shoulders. The higher design standards will also result in higher operating speeds. As stated in the EIS for the Saddle Road project, the projected 2014 ADT is 14,000 vehicles per day. The incremental impact of the Proposed Action on future traffic conditions with the Saddle Road project completed would be negligible because traffic volumes along Saddle Road would increase insignificantly as a result of increased use of PTA.

The second impact of the Saddle Road project relates to the impact of right-of-way acquisition on the expansion of PTA. While the road project may affect PTA expansion, SBCT project actions at PTA would not contribute to right-of-way impacts on Saddle Road.

On O'ahu, the traffic growth rates discussed above consider growth in the population, employment, and housing, including those related to increased military activity. The estimated projections are based on historical growth and specific projects that were known at the time the study was prepared. Therefore, it is reasonable to assume that a modest increase in military activity is included in the traffic forecasts. This also implies that the Proposed Action would not lead to a significant cumulative impact as long as the number of new personnel is consistent with past trends. Lastly, it should also be noted that traffic will be separated from the public when using the military vehicle trails. On the island of Hawai'i, traffic along the roadways within the study area should increase within the growth rates noted above. In light of past, present, and reasonably foreseeable future actions, the Army determined that the Proposed Action will not result in significant cumulative impacts on traffic.

#### *Reduced Land Acquisition*
No significantly cumulative impacts are expected for this alternative for the same reasons described in the Proposed Action. Other impacts of a cumulative nature are the same as those under the Proposed Action.

#### *No Action*
Under No Action, there would be no cumulative impacts involving traffic in light of past, present, and reasonably foreseeable future actions.

### *Water Resources*
Cumulative impacts on water resources may occur in four categories: water supply, surface water quality, groundwater quality, and flooding. The ROI for the cumulative effects on water resources is the sum of the regions of influence of the combined projects. For the Proposed Action, the ROI is the same as that described in each of the preceding chapters and includes the region within the installation boundaries or easements where the Proposed Action will be implemented, the watershed downstream of the installation boundaries (for surface water impacts), or the aquifer(s) downgradient of the installation boundaries (for

groundwater impacts). The ROI of the projects outside the Proposed Action vary in size and may not be well defined. In general, the cumulative impact assessment is intended to be descriptive rather than quantitative.

Among the trends that should be considered in the analysis of cumulative impacts on water resources in Hawai'i are increases in demand for potable water, due to an increasing population and expansion of urban areas, and an accompanying increase in sources of pollution. In the past, demand for water for agriculture spurred the development of a network of tunnels, pipelines, and canals to transfer water from areas of abundance (usually in mountainous areas with high level water) to the major agricultural areas. This did not come without consequences in the form of lowered water levels in the high level aquifers. Potable water was also supplied through drilling wells to tap abundant groundwater resources. But drilling and pumping are expensive, and over pumping can lower groundwater levels, and cause salt water intrusion in coastal areas. To prevent overdrawing groundwater resources, the State of Hawai'i has attempted to estimate the long-term sustainable yield of the major aquifers and to issue permits for groundwater extraction so as not to exceed the sustainable yield. Groundwater quality has been affected by industrial chemical releases and by septic systems, as well as by pollutants infiltrating urban runoff. These pollutants can threaten the available water supplies and may require expensive treatment to make the water usable. Similarly, urban expansion and industrial and agricultural development have all had an effect on surface water quality. Nutrients, sediment, toxic chemicals, and debris from disbursed nonpoint sources are collected by runoff in streams and eventually discharge to lakes, estuaries, or the ocean. These pollutants can adversely affect aquatic species or they can affect the aesthetic qualities that make Hawai'i a desirable place to live. The State of Hawai'i has increasingly addressed efforts at reducing and preventing this type of pollution, through monitoring, setting water quality goals, and permitting and through public education and information campaigns. These trends are expected to continue.

### *Proposed Action*

*Water supply.* The demand for freshwater on O'ahu is increasing, and in parts of O'ahu is nearing the available supply. For example, the Honolulu Board of Water Supply estimates that permits have been issued for over 95 percent of the estimated sustainable yield of the Central and Pearl Harbor aquifers. The board is considering plans to build new conveyances to link areas with surplus water (windward side of the island) to areas with inadequate supplies and plans for future growth in demand (for example, the Ewa area). The Proposed Action would increase the number of Army personnel and their families compared to No Action, and this would increase water demand. In addition, operating certain proposed new facilities, such as the vehicle wash facilities, would increase water use compared to No Action. These increases are not expected to be significant with respect to the overall demand for water in the hydrologic units in which the Proposed Action would occur. The greatest future growth in demand for water is likely to occur in the Pearl Harbor hydrologic unit due to urban development and expansion. A relatively minor increase in demand for groundwater from the Central Plateau aquifer at SBMR, which spills over to the Pearl Harbor aquifer, is not likely to significantly reduce available water supplies in the Pearl Harbor aquifer. Demand for water at PTA to support the tactical vehicle wash would require a large percentage increase in water deliveries to PTA, but the water would be supplied from areas with abundant freshwater, so in light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the cumulative impact on water supply would be negligible and therefore less than significant.

*Surface water quality impacts from nonpoint source pollution.* Nonpoint source pollution is recognized as one of the principal causes of surface water quality degradation. The State of Hawai‘i is developing TMDLs for its impaired surface waters in response to requirements of the Clean Water Act. Enforcing stormwater management regulations will help reduce pollutant loadings to surface waters by requiring industrial facilities, municipalities, and military and other facilities to implement stormwater management practices to reduce their individual nonpoint source contributions of pollutants. Until TMDLs are developed for receiving waters, loadings from individual sources identified, and maximum loads allocated to these sources, it will be difficult to quantify the relative contribution of Army training activities compared to other sources. Qualitatively, any contribution to pollutant loading from a source in the watershed of an impaired water body, if it is greater than natural background levels, can be regarded as significant. With the implementation of required Regulatory and Administrative mitigation measures for the Proposed Action under the Clean Water Act as discussed in Section 5.8 and in light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the impacts on surface water quality from nonpoint source pollutants would significant but mitigable to less than significant.

*Surface water quality impacts from contaminated suspended sediment.* There would be significant but mitigable to less than significant long term cumulative impacts on surface water quality from suspended sediment resulting from training activities at SBMR and KTA, and from sediment loading following wildfires at SBMR, KTA, and PTA. These water quality impacts would affect streams that have been identified by the State of Hawai‘i as “impaired water bodies.” Impairment is a cumulative effect resulting from contaminant contributions from multiple sources in a watershed. Therefore, the direct surface water impacts described in sections 5.8, 7.8 and 8.8, related to parameters on which the impairment is based (sediment, pathogens, nutrients, etc.), are also considered to be cumulative impacts

Trace levels of explosives residues could be transported by runoff from training ranges to streams. The chemical constituents of explosives have various degrees of toxicity and represent different health risks. Most break down rapidly in the environment, but some are more resistant to degradation. Their ultimate chemical degradation products include nitrogen compounds, which stimulate plant or algal growth if present in sufficiently high concentrations. The trace concentrations that have been found to be present in soils and that may be transported by runoff into stream waters are not expected to be significant relative to background concentrations of natural organic compounds.

Based on the analysis in Section 5.9, explosive chemical concentrations present in soils on training ranges at SBMR are unlikely to be transported to receiving waters at concentrations high enough to degrade surface water quality. The concentrations would be considered to contribute to a cumulative impact on surface water quality, which would be significant if the concentrations were subject to regulation under the State’s antidegradation policy, or contributed to an impairment of surface water quality under Section 303(d) of the Clean Water Act. While there is a potential for this to be a significant cumulative impact, there are insufficient data to accurately predict whether the impact would occur.

With the implementation of required Regulatory and Administrative mitigation measures for the Proposed Action under the Clean Water Act as discussed in Section 5.8 and in light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the impacts on surface water quality from contaminated sediment suspension would significant but mitigable to less than significant.

*Surface water quality impacts from soil loss and suspended sediments.* Anecdotal evidence suggests that sediment from upslope human activities may be affecting coral offshore in the vicinity of Kawaihae Harbor. Sediment deposition and decreased water clarity, which affects photosynthesis, can affect coral colonies. In general, urban runoff is considered one of the principal threats to coastal water quality. As discussed in Section 5.8 Water Resources and Section 5.9 Geology, Soils and Seismicity, our analysis demonstrates that the soil loss from the Proposed Action will not add substantially to the overall trend of sedimentation.

Preliminary results of ATTACC modeling indicate that the Proposed Action will increase soil erosion in the training ranges. This impact probably cannot be fully mitigated through improved land management practices because of the limited land area available. Increased erosion will result in larger volumes of sediment being transported to streams by runoff. This erosion could adversely affect stream water quality by making the water more turbid.

Construction projects also generally result in soil disturbance and expose soils to erosion. Construction projects under the Proposed Action that involve disturbance of more than one acre (0.4 hectare) of land will be required to comply with stringent stormwater pollution prevention requirements, including use of best management practices identified prior to construction in stormwater pollution prevention plans, to minimize soil erosion. Other construction projects besides those identified under the Proposed Action could also contribute to sediment erosion and could have impacts on surface water quality. These projects would also be subject to the same stringent nonpoint source permitting requirements, requiring the use of BMPs to prevent water quality impacts. The cumulative effects of sediment loading from many sources would include an increase in the total load of sediment discharged into a stream, and either an increase in the amount of sediment transported to downstream waters (lakes, estuaries, or the ocean), or an accumulation of sediment deposits in the stream channel (if the sediment loading were greater than can be transported by the stream).

As with the impacts of sediment loading, the effects of chemical contaminant loading could also contribute to cumulative impacts on stream water quality. However, implementing construction BMPs for stormwater would also address the potential for contaminant transport. Complying with the regulatory requirements that would apply to construction projects and to federal facilities under the Phase 2 stormwater management regulations to be implemented would ensure that the contributions of sediments and pollutants from the Proposed Action would be kept at a minimum. In most cases, complying with these regulations is expected to improve surface water quality compared to current conditions and to keep potential cumulative impacts from exceeding significant levels. Monitoring and the requirement to define and document progress toward meeting pollutant reduction goals would help to ensure that water quality is not degraded further.

With the implementation of required Regulatory and Administrative mitigation measures for the Proposed Action under the Clean Water Act as discussed in Section 5.8 and in light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the impacts on surface water quality from soil loss and suspended sediment would significant but mitigable to less than significant.

*Surface water quality impacts from watershed impairments.* Studies in some urban coastal areas have shown that the cumulative contribution of contaminants from many dispersed sources, rather than from any single point, is one of the major factors affecting coastal water quality. Among the causes of these impacts are increased loading of nutrients, toxic chemicals, and suspended sediments, but another important contributing factor is alteration of stream channels. Natural channels tend to widen out or meander on the coastal plain, and may contain abundant vegetation. This slows stream flows and traps sediments and nutrients before they enter the ocean. Unfortunately, these characteristics also can lead to the coastal plain flooding in high flow conditions. To prevent flooding and to increase the habitable land area, stream channels have been straightened, narrowed, and confined to permanent concrete channels or pipes and vegetation has been removed, preventing the streams from functioning to remove sediment and nutrients.

Each watershed differs in its size, shape, amount of runoff, nature and degree of development, and in the types of problems and solutions appropriate to address those problems. Increasingly, watershed managers recognize that an integrated approach is needed to address problems in watersheds, not only to eliminate sources but to restore watershed functions. In addition to reducing sources of surface water pollutants on lands managed by the Army, the Army would continue to cooperate with other entities, including state and local agencies, local land owners, scientists, and local organizations, to plan and implement new approaches to improve watersheds and coastal water quality. One such cooperative effort is the Ko'olau Mountains Watershed Partnership, sponsored by the Hawai'i Department of Land and Natural Resources and involving numerous stakeholders. There are no proposed significant impacts on watershed impairments or stream crossings from the Proposed Action. In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the impacts on surface water quality from watershed impairments would be less than significant.

*Groundwater quality.* The Army continues to address potential groundwater contaminants resulting from past practices through its Installation Restoration Program, which is discussed in more detail in the hazardous materials sections of this document. Infiltrating surface water containing nonpoint source pollutants is not likely to have a significant impact on groundwater quality because the pollutants are typically highly dilute and tend to be adsorbed or biodegraded during infiltration through soils.

Spills and other accidental releases may occur from time to time and could have more significant local impacts on groundwater quality. Their occurrence cannot be predicted, but standard operating procedures are in place to reduce the potential and impacts of accidental spills and releases. These include training spill response personnel and those who handle or manage hazardous materials or wastes, provide spill response equipment and supplies, reduce the use of hazardous chemicals and other waste minimization procedures, and use engineering controls (such as secondary containment) to reduce the potential for releases. If spills occur, the extent of the spill is expected to be fully investigated and characterized and then remediated, in compliance with regulatory requirements. The Proposed Action is not expected to significantly increase the cumulative potential for spills that could affect groundwater quality, relative to No Action, and if spills were to occur, they would be remediated immediately, as described under No Action. Because implementation of SOPs will address containment and remediation of spills, nonpoint source pollutants are not likely to interact with or accelerate any decreases in groundwater quality due to septic tank or industrial releases; therefore, in light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the cumulative impact on ground water quality would be less than significant.

*Increased Flood Potential.* Construction projects involving paving, new structures, and other impermeable surfaces can increase flooding potential by reducing the retention time of runoff and concentrating runoff at selected discharge points, rather than dispersing it over a wide area. The Proposed Action is not expected to contribute significantly to an increase in the potential for flooding, relative to No Action. Impacts from construction projects under the Proposed Action are not expected to significantly decrease the amount of stormwater runoff retained by soils in the high-intensity short-duration storms that cause most flooding in Hawaiian watersheds. Each construction project would be designed to accommodate the additional runoff. Phase 2 stormwater management regulations would require MS4s, including federal facilities, to control runoff in new developments and prevent impacts such as flooding or high stream flows that increase erosion. Therefore, in light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the cumulative impact on increased flood potential would be less than significant.

### *Reduced Land Acquisition*

*Water supply.* The impacts of Reduced Land Acquisition on the water supply would be equivalent to the impacts from the Proposed Action and would be less than significant.

*Surface water quality.* Reduced Land Acquisition would result in minor differences in water quality impacts compared to the Proposed Action. Therefore, cumulative impacts would be approximately the same as those described for the Proposed Action and would be less than significant.

*Groundwater quality.* The cumulative impacts would not differ substantially from those for the Proposed Action and are not expected to be significant.

*Increased Flood Potential.* The cumulative impacts on flooding of Reduced Land Acquisition would be approximately equivalent to those under the Proposed Action. This project would have less than significant cumulative impacts on flooding.

### *No Action*

*Water supply.* Under No Action, Army demand for water is expected to remain approximately at current levels, but with cyclical or periodic fluctuations. In times of shortage, if significant additional growth in water demand occurs on the island, water shortages could occur. However, because Army demand is expected to remain at approximately current levels, its water use is not considered to contribute to this potential future impact. Therefore, in light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the impact of No Action on regional water supply is expected to be less than significant.

*Surface water quality.* Continued activities under the No Action Alternative would contribute minor quantities of sediment and explosives residues to surface waters, via stormwater runoff that drains from ranges or future construction sites. Currently, the magnitude of the contribution of nonpoint source pollutants from the project Army installations on O'ahu is suspected to be small, compared to contributions from urban areas and from agricultural sources, although data are insufficient to fully quantify or confirm this conclusion. Therefore, in light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the impact of No Action on surface water quality is expected to be less than significant.

*Groundwater quality.* Activities under No Action would continue to contribute small quantities of chemical pollutants, including explosives residues, solvents, and petroleum hydrocarbons, to groundwater through the infiltration of surface water, accidental spills or releases of chemicals, or leaching of hazardous wastes resulting from past disposal practices. Because spill control and response programs address the potential for future releases, and compliance with regulatory requirements addresses past releases, the No Action Alternative is not expected to result in any additional significant impacts on groundwater quality. Continued implementation of these measures is expected to reduce the potential for impacts on groundwater quality in the future. in light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that when combined with other contributions to groundwater pollutants in the recharge areas of the aquifers in which the installations are located, the long-term cumulative impacts of No Action are not expected to be significant.

*Increased Flood Potential..* New construction projects could increase the impermeable areas covered by pavement, structures, or other surfaces that are less permeable than the existing land surface. The projects could change the drainage pattern at a site, causing stormwater to run off more quickly than under current conditions or to direct larger volumes to a channel or conveyance than it has capacity to retain. Flows in excess of conveyance capacity can lead to flooding or erosion. Each of the construction projects listed in tables 9-1 and 9-2 would take drainage capacity into consideration in the design of the project. It is standard engineering practice to design for excess drainage capacity and to take into account existing and proposed drainage capacity requirements when designing new facilities. Standard engineering practice also requires that drainage system design be reviewed before building permits are approved. Similarly, regional projects may increase stormwater runoff volumes, and may route to stream channels more quickly, as an area becomes more developed. In the past, urban development projects have modified stream channels to accommodate flood flows. While more rapid routing of storm drainage from areas of construction at Army installations such as SBMR could contribute to increased downstream flood flows, the increases are not likely to be significant relative to the effects of increased urban development overall.

If necessary, various engineering approaches are available to slow or retain runoff to reduce the potential for flooding. Also, in large intense storms of short-duration, which cause most flooding in Hawai'i, soil infiltration capacity has relatively little effect on flood magnitude because there is too little time for infiltration to occur, and the bulk of the water runs off quickly regardless of ground cover.

One of the best strategies for avoiding the effects of flooding under these circumstances is to avoid building in flood-prone areas. Army projects that would be constructed under No Action would be unlikely to contribute significantly to increased flood potential because of the relatively small amount of increased impermeable surface area and the relatively small effect of this increase on runoff volumes under peak runoff conditions. Several of the anticipated future civilian projects under No Action (bridge replacement and drainage improvement projects by the State of Hawai'i) are likely to reduce the potential adverse effects of flooding by increasing channel capacity and efficiency. Therefore, in light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the No Action is expected to result in less than significant cumulative impacts on increased flood potential.

### *Geology and Soils*

The project is likely to contribute to cumulative impacts from soil erosion. The major historic influence on soil erosion in the ROI is the disturbance of soils, modification of slopes and drainage features, and loss or disturbance of vegetation due to agricultural conversion, military activities, fires, roads, and development. Soil disturbance alters the soil profile, exposes soils directly to rain and runoff, and in other ways increases the potential for erosion. Without vegetated cover, soils are more subject to the erosive forces of wind and water as well as general down slope movement of unstable soils. Although it is difficult to quantify historic soil loss, many of the lower slopes of the islands of O'ahu and Hawai'i have been subject to vegetation removal and subsequent increased soil erosion rates. Modification of slopes and drainage features It is important to note that soil erosion and deposition is a naturally occurring phenomena in any landscape. However, adverse impacts may occur when erosion rates are accelerated by human or natural disturbances. Impacts associated with this include loss of productive topsoil, loss of fragile soils supporting unique plant species, loss of unique and/or endangered habitats, water quality impacts, and down slope movement of soils.

The historic trend of soil erosion and/or loss has been modified in recent years by better management of agricultural lands, better stormwater controls on urbanized lands, a trend towards revegetation of disturbed lands, and a better understanding of the importance of vegetative cover within the landscape. However, activities that disturb or remove vegetative cover are presently occurring or will occur in the reasonably foreseeable future, which will continue to result in greater soil erosion and loss than without these activities. Areas with well developed (deep) soils have the potential to be revegetated and stabilized, however, areas with newly formed soils or shallow soil profiles may not be able to recover from soil erosion or soil loss impacts.

Large construction projects, including road construction projects listed in Table 9-1, are examples of potential soil-disturbing projects that in the past might have contributed significantly to soil erosion. In addition, many smaller projects and activities not listed in Table 9-1 also contribute to the cumulative loss of soils. Today, there are increasingly strict regulations at the federal and state level that require implementation of management practices to reduce erosion from construction sites to protect water resources. Increasingly widespread application of these practices has the indirect effect of reducing soil erosion at the source. Similar practices can be applied, and are increasingly applied, to all ground-disturbing activities, as awareness of the effects of erosion on downslope and downstream resources increases, and the forward trend in soil erosion is expected to be a continued decrease in erosion from human activities.

Introducing either different land use activities or increasing the level of disturbance activities at the proposed project sites will increase the potential for erosion and soil loss within the ROI. In areas of the PTA where soils can be thin and fragile, the effects of soil loss may be irreversible. Impacts on water quality from this project and other reasonably foreseeable projects can be mitigated with stormwater management and runoff controls. However, maintaining a persistent vegetative cover in areas of intensive use or development will not be possible because of the nature of the proposed use. In light of historic, on-going, and reasonably foreseeable actions, the cumulative impacts associated with the proposed project are significant.

### *Proposed Action*

Use of the training ranges is likely to result in continued enhanced soil wind erosion in some areas; these effects are expected to be locally significant. However, at the regional level, the effects are not expected to be significant, compared to natural rates of erosion. The contribution of soil wind erosion from training ranges at SBMR to cumulative soil loss or sedimentation in the Pearl Harbor or Kaukonahua watersheds, for example, is expected to be minor relative to the contributions from agricultural and urban lands. In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the Short-term erosion from construction at other project sites would be reduced at each construction site through implementation of best management practices, as required under federal and state regulations, and the effects would not be significant, either alone or in combination with other projects.

Seismic or volcanic eruption hazards could result in cumulative effects if, for example, evacuation of personnel or treatment of casualties were to overwhelm the capacity of the available infrastructure. The most likely site for severe seismic or volcanic impacts to occur is at PTA, where the seismic and volcanic hazards are greatest. However, the Army is expected to have internal capacity to evacuate its personnel and to support civilian emergency response efforts in a seismic or volcanic emergency. The presence of trained personnel and equipment resources at PTA would reduce the potential impacts of a natural disaster in the region and therefore, in light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the proposed action would not cause significant cumulative impacts regarding seismic and volcanic hazards..

No other cumulative geologic impacts are expected from the Proposed Action.

### *Reduced Land Acquisition*

Impacts from the RLA Alternative would resemble impacts from the Proposed Action.

*No Action*

Existing erosion conditions would remain, and no significant cumulative impact is anticipated from projects across O‘ahu and Hawai‘i.

### Biological Resources

During the last century the introduction of nonnative species has increased exponentially as a result of intentional and incidental introductions. Nonnative introductions are estimated to occur now at a million times the natural rate (Juvik 1998). Nonnative species disrupt ecosystems by consuming or destroying native species and habitats, spreading diseases, and outcompeting native species for local resources. There have been human-induced flora and fauna extinctions dating back thousands of years ago to the beginning of human use of the Hawaiian Islands, but the extinction rate on O‘ahu and the island of Hawai‘i has accelerated over the past century. The hardest hit terrestrial species are birds, snails, and plants. Of the known Hawaiian species, approximately 70 percent of the land snails are extinct, 40 percent of the birds are extinct, with another 45 percent federally listed as endangered, and roughly 10 percent of the vascular plants are extinct, with an additional 20 percent considered at risk of becoming extinct in the near future (USGS 1999c). Marine species and habitats have also been degraded by human activity over the last century. Several factors contribute to stress in the marine environment in Hawaiian waters, including acoustic pressures and increasing interference with marine wildlife from tourism and recreation. Hawaiian waters have been identified as “acoustic hot spots” (NRDC 1999), i.e., ecologically significant and exposed to high levels of human-made noise. At various times, there may be military projects that emit low frequency sounds in Hawaiian waters (such as those from the North Pacific Acoustic Laboratory).

*Proposed Action*

The ROI for cumulative impacts on biological resources corresponds with the SBCT ROI, Figure 3-12. The following describes impacts on biological resources that would result from SBCT actions in conjunction with those projects described in tables 9-1 and 9-2. The extensive disturbance and reduction of native habitats, as discussed above and in Section 3.10, has caused the extinction of many native Hawaiian species and has placed in peril most of those that remain. Development, heightened human activities, fire, and the introduction of nonnative species have been the main causes of habitat degradation and loss and the subsequent loss and endangerment of native species.

*Impacts from fire on sensitive species and sensitive habitat.* There would be a cumulative increase in the potential for fire on O‘ahu and the island of Hawai‘i as a result of SBCT and the projects listed in tables 9-1 and 9-2. Human-induced fires would increase through live-fire activities proposed at MMR, part of the reinstatement of current force activities, and the spread of nonnatives, such as the highly flammable fountain grass and molasses grass. The increased use of improved roads would lead to a higher probability of fire starting from a catalytic converter or discarded cigarette. The Army has developed an IWFMP for all installations on the islands of O‘ahu and Hawai‘i to prevent and control fires. These plans would greatly reduce fire damage but are unlikely to fully prevent and contain fires in and immediately around Army training ranges. The USFWS would be notified if a fire were to occur outside of the firebreak roads. The potential loss to listed species, species of concern, and sensitive habitat would be substantially mitigated by the Mākua Implementation Plan, Pōhakuloa

Implementation Plan, and the Oʻahu Implementation Plan. The Mākua Implementation Plan was completed in the Fall 2003 and will be in effect as long as routine training is resumed at MMR. The Mākua Implementation Plan identifies listed species and important habitat in need of stabilization and identifies specific measures needed to recover these species, such as replanting, invasive plant eradication and predator removal. Both the Pohakuloa and Oʻahu Implementation Plans will be modeled on the Makua document.

The Army has completed ESA Section 7 consultation with the USFWS for both current force and SBCT training on the islands of Oʻahu and Hawaiʻi. In compliance with the Biological Opinion of "no jeopardy" issued by the USFWS for Oʻahu , the Army will develop implementation plans for the island of Oʻahu (not including Mākua), as well as PTA no later than October 2006. The Army will abide by all terms and conditions outlined in the biological opinion of "no jeopardy" issued by USFWS for current force and SBCT training on the island of Hawaiʻi.

The Army believes it is highly likely that the project-wide impacts on biological resources over time would be mitigated to a less than significant level with the full implementation of the terms and conditions of the Biological Opinions for SBCT and current force activities on the islands of Oʻahu and Hawaiʻi (dated October 2003 and December 2003, respectively), and with the full implementation of the Wildland Fire Management Plan (dated October 2003). The Army has three years to develop and execute the Oʻahu Implementation Plan as directed by USFWS in the Biological Opinion. The Army has two years to execute the terms and conditions defined in the Biological Opinion for PTA. However, the Army has made a conservative determination that although the mitigation will considerably reduce the impacts on biological resources, the impacts may not be reduced to a less than significant level. Non-Army projects with potential fire producing activities (such as road construction and development) are numerous and outside the control of the Army. These projects increase the potential for fires to impact sensitive species and habitat by reducing the amount of native and nonnative vegetation in areas and increasing access to areas previously undeveloped. The Army cannot mitigate for all potential scenarios. Thus, in light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the cumulative impacts from fire on sensitive vegetation and habitat are considered to be significant.

*Impact on sensitive species resulting from the spread of nonnative species.* There would be a cumulative increase in the number of nonnative species as a result of the SBCT Proposed Action or RLA and the projects shown on tables 9-1 and 9-2. Construction and increased use of roads would introduce additional nonnative species and further spread those that already occur on Oʻahu and the island of Hawaiʻi. The disturbance caused by construction and demolition and the increased use of improved roads would leave the surrounding habitats vulnerable to nonnative species that can thrive in conditions where native species cannot. Further stress on the land would be caused by the displacement of land and removal of vegetation that would occur as a result of I3A construction at SBMR and PTA and CAACTF construction at KTA. Mitigation and conservation measures associated with SBCT, the Saddle Road Realignment, and Oʻahu and PTA INRMPs would limit the spread of nonnative species by washing construction and military vehicles, and incoming equipment into Oʻahu and the island of Hawaiʻi. Nonnative wildlife, such as ungulates, mongeese, snakes, ants, and rodents, which cause problems to native plants and animals, are being monitored, restricted, and eradicated when possible, as part of O'ahu and PTA INRMPs and yearly inventory of O'ahu and the island of Hawai'i training installations. ESA Section 7 consultation is being conducted in order to identify ways to minimize impacts on ongoing Army training at PTA and O'ahu installations, and mitigation measures would be added into current force actions in order to avoid jeopardizing any listed species. In light of historic, ongoing, and reasonably foreseeable future actions, the Army concludes that while on a project-wide basis the Proposed Action's impact on the spread of non-native species would be significant and mitigable to less than significant, the overall cumulative impact from the spread of non-native species from projects listed in Tables 9-1 and 9-2 in association with the Proposed Action would be significant.

*Impacts on marine wildlife and habitat* The use of TSVs could have a potential impact on marine wildlife and habitat. This impact is predominantly due to the potential for collisions between high speed vessels and marine wildlife, contaminants and their effect on the overall marine ecosystem, and wave impacts on coral. As TSVs may be routed near some of the Hawaiian Islands Humpback Whale National Marine Sanctuary waters, potential impacts are expected during the humpback whale calving and mating season (January 1 to April 30). As described in Chapter 8, impacts on marine mammals from use of LSVs under the Proposed Action are less than significant due to the low speed and infrequent use of the LSVs. The Army conducted informal consultation with NOAA Fisheries in accordance with Section 7 of ESA. NOAA Fisheries concurred with the Army's determination that the Proposed Action is not likely to adversely affect federally listed species, marine mammals or designated essential fish habitat (See Appendix E).

A temporal cumulative impact could occur, where combined traffic from LSVs and TSVs could, over time, cause harm to marine wildlife. However, it is too speculative to determine the extent of this potential impact because the Army has no plans or proposals for purchasing TSVs and therefore the number and timing of phase-in of TSVs is extremely uncertain. Cumulative impacts could be reduced with the implementation of specific standard operating procedures designed to reduce impacts from vessel operations on marine species. There are some measures in place that address fuel spills and ballast discharge. The US Coast Guard requires SOPs to address these impacts. In addition, regulations exist in Hawai'i to prohibit any boats from approaching within 100 yards (91 meters) of adult whales and within 300 yards (274 meters) of mother/calf pairs (NOAA 1997). A no-wake zone already exists within the harbor entrance area, which would reduce impacts from TSV wakes in that area. Because of the speculative nature of TSV implementation and the potential to implement existing regulations or SOPs to reduce impacts, and in light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the cumulative impact on marine wildlife and habitat is less than significant.

*Impacts on federally listed species and their federally designated or proposed critical habitat.* Projects listed in tables 9-1 and 9-2 would result in direct and indirect negative impacts on listed species and their federally designated or proposed critical habitat. The projects would involve construction, demolition, and associated increased use of roads and areas around listed plant species or where listed wildlife nest or forage. The increase in training, especially live-fire training at SBMR and PTA, could threaten designated and proposed critical habitat and result in the direct loss or take of species through fire. Other factors that would further decrease the success of listed species are the cumulative loss of suitable habitat, the production of fugitive dust or other such habitat degradation, the introduction and spread of nonnative species that compete for prey and that prey on listed species and that are possible disease and parasite vectors. The Army has developed an IWFMP for all installations on the islands of O'ahu and Hawai'i to prevent and control fires. The O'ahu INRMP, the Endangered Species Stabilization Plan, and the Makua Implementation Plan identify conservation measures that USARHAW would implement to help the recovery of some listed species in the ROI. ESA Section 7 consultation over USARHAW's routine training and SBCT actions on O'ahu and the island of Hawai'i would further protect and benefit listed species and habitat. In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the net cumulative effects of the projects on listed species and critical habitat is t considered significant but mitigable to less than significant.

*Loss and degradation of sensitive species and habitat.* The cumulative impact on sensitive species that would result from project-related habitat loss and degradation would be significant. Development of land throughout the state has led to a degradation of biological resources, but habitats throughout the state continue to support common and sensitive species of plants and wildlife. A spread of invasive plants could cause landscape changes and thereby modify habitats important to sensitive species, such as the O'ahu tree snails. Elevated activity levels in and around wildlife areas provide conduits for alien species movement. The Kawaihae Harbor deepening project would temporarily degrade the quality of the water in the harbor and diminish its value to aquatic species, including protected marine mammals.

Proposed and recent projects on O'ahu and the island of Hawai'i would involve development in areas that are extremely valuable to sensitive species. Wind and soil erosion would result from increased and more extensive Army activities, and road projects such as the Saddle Road Realignment. Soil erosion results in water runoff and sedimentation. Training-related fires, described earlier, would also lead to an increase in soil erosion. Dismounted maneuvers, part of ongoing current force actions, as well as the proposed SBCT action would result in elevated soil erosion, lowered water quality, continued habitat fragmentation, and lowered habitat value. Mounted training or military vehicle use, part of SBCT and current force actions, and the expansion of training by the Army would disturb soils. The destruction of plants by foot or vehicle travel exacerbates the problem of eroding and windblown soils. Additional road construction projects on the highly erodible soils of the island of Hawai'i (Saddle Road and Kawaihae/Waimea Road) could create dust that would settle on sensitive plant species and may inhibit photosynthesis, though further study is required to determine how the rate of photosynthesis is altered. The increase in dust would degrade the water and generally lower value of habitat to sensitive species, such as the nene, Hawaiian hoary bat, and native snails. Increased use of vessels, helicopters, and general transportation would result from the Proposed Action, the continuation of current force actions on O'ahu and the island of Hawai'i, and the potential increase in vehicles that would occur with the availability of better, less clogged roads. This would lead to the increased emission of contaminants, which could pollute the air and water and diminish the prevalence of natural resources. There also would be a loss of natural habitat through projects such as the Turtle Bay Resort expansion.

These impacts would be mitigated on a project-wide basis, as described in the Army's PTA and O'ahu INRMPs, the implementation of terms and conditions in the USFWS Biological Opinions issued in accordance with Section 7 of ESA  for current force and proposed SBCT training on the islands of O'ahu and Hawai'i, , the Mākua Endangered Species Stabilization Plan, the Mākua Implementation Plan , and other project-specific measures. In light of historic, ongoing, and reasonably foreseeable future actions, the Army concludes that while on a project-wide basis the Proposed Action's impact on the loss and degradation of sensitive species and habitat would be significant and mitigable to less than significant, the overall cumulative impact from the loss and degradation of sensitive species and habitat from projects listed in Tables 9-1 and 9-2 in association with the Proposed Action would be significant.

*Threat to migratory birds.* The towers that have been developed and that are projected to be developed in the near future as part of the project listed in tables 9-1 and 9-2 would be a significant impact on birds. Towers pose a threat to birds that inadvertently collide with them. The death of migratory bird species as a result of collision is considered a violation of the MBTA, which prohibits the taking or killing of migratory birds. The construction of large towers or any tower in important breeding or flying corridors would obstruct the flying patterns of migratory birds. Presently antenna construction is not restricted or strictly regulated, although there are suggested guidelines that have been designed by the USFWS to help avoid many of these impacts (Appendix I-3). Limiting the height of these towers, eliminating guy wires, and reducing the amount of lighting, particularly red lights (USFWS 2002), would greatly minimize the severity of these impacts on migratory birds. Therefore, in light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the extent of this cumulative impact is considered less than significant..

*Noise and visual impacts on marine wildlife.* The cumulative noise and visual impacts on marine wildlife would be less than significant. The US Army Corps of Engineers and the State of Hawai'i are proposing to deepen and expand the Kawaihae Harbor in the PTA ROI. This project would have some noise and construction-related impacts on marine wildlife that could pass through the waters. The relatively sparse distribution of marine mammals in the portion of the ROI that abuts the coastline and the seasonality of many species in the project area combine to make the probability of significant impacts on marine mammals extremely low and not adverse. Additionally, any spills would be mitigated by spill control procedures already in place. The Army initiated informal consultation with NOAA Fisheries in accordance with Section 7 of ESA and NOAA Fisheries issued a letter of concurrence that SBCT activities were not likely to adversely affect listed species (Appendix E). Because SBCT project activities on PTA have a less than significant impact on marine wildlife. In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the e addition of this project is not expected to result in significant cumulative impacts on marine wildlife.

*Impacts on general vegetation, habitat and wildlife.* The cumulative noise and visual impacts on general vegetation, habitat and wildlife would be less than significant. Noise levels are not expected to increase to such a degree that it would be harmful to terrestrial wildlife. . General vegetation and wildlife would be disturbed by vegetation removal. This would deter wildlife from foraging and would combine with other adverse effects from the projects listed in tables 9-1 and 9-2, such as live-fire training and building and highway construction projects.

Habitat within the ROI is for the most part disturbed natural and introduced landscapes. Activities limited to this area would mostly affect nonnative species adapted to stressed or nonnative environments. However, the further degradation of land and the loss of even small portions of land is problematic for native species, because of the great extent of habitat loss and disturbance that has altered native habitats. Projects such as the Turtle Bay Resort expansion, the construction of new roads, and the increase in use at MMR would have detrimental affects on habitat in their vicinity, and consequently on the species that have been supported by these habitats. In light of historic, ongoing, and reasonably foreseeable future actions, the Army concludes that the addition of this project is not expected to result in significant cumulative impacts on general vegetation, habitat or wildlife.

*Increased energy use and pollution and their impact on biological resources.* The construction activities and the use of additional facilities and their upkeep would lead to increased consumption of natural resources that would negatively affect wildlife and vegetation. The amount of natural resources is an important factor that shapes the carrying capacity and amount of vegetation and wildlife on a piece of land or water. More nonrenewable fossil fuels would be used to power construction and to maintain new facilities as directed in EO 13123, Greening the Government Through Efficient Energy Management (June 4, 1999).. Increased contamination would occur through the burning of fossil fuels and could lead to the need for further energy generation facilities.

Increased usage of large fuel inefficient vehicles such as the Stryker would lead to an increase in fuel usage. Road construction projects could encourage further use of vehicles but could result in better gas efficiency by alleviating traffic and improving road conditions. Although SBCT and the projects in tables 9-1 and 9-2 would not cause significant impacts on biological resources by themselves, in that no sensitive species or habitat would be directly threatened, there would be negative impacts that, when combined, would be significant. The cumulative impacts of increased energy use and energy related pollution would be the depletion and degradation of natural resources, which would result in the loss of sensitive species and habitats. Solar and passive solar construction would help avoid the drain on natural resources that these projects might otherwise have. It is not possible to determine whether energy saving devices and strategies would be used, but there are many options of mitigating and minimizing these impacts, such as the use of renewable sources of energy to power these facilities. Attaching solar panels or wind turbines would allow units to generate their own energy, without creating toxic emissions or draining natural resources that are shared with vegetation and wildlife. The design and materials used in the facilities would also reduce the amount of energy needed to build and maintain the proposed facilities. Passive solar design techniques can significantly reduce the amount of energy necessary to light and regulate the temperature in buildings. This would help minimize nonrenewable energy consumption and the air and water pollution that results in burning or producing these resources. In light of historic, ongoing, and reasonably foreseeable future actions, the Army concludes that the addition of this project is not expected to result in significant cumulative impacts on increased energy use and pollution and their impact on biological resources.

*Runoff impacts on marine wildlife and coral ecosystems*. In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the cumulative impact of runoff on marine and coral ecosystems is not significant. Road construction and increased use that could result from cumulative projects would contribute to runoff but are not likely to exceed the fluctuations in erosion and sedimentation that results from wind, rain and natural drainage. The Army initiated informal consultation with NOAA Fisheries in accordance with Section 7 of ESA, and NOAA Fisheries issued a letter of concurrence that SBCT activities were not likely to adversely affect listed species (Appendix E).

*Summary*. Given the cumulative impacts described above, the Proposed Action, along with the projects listed in tables 9-1 and 9-2, would exacerbate the trend of habitat loss, habitat degradation, likelihood of fire, introduction of nonnative species and the subsequent endangerment and loss of endemic and native species. The conservation and recovery actions of federal and state agencies, such as those outlined in the MIP, would significantly reduce the impacts on native biological resources and would help to minimize or reverse the trend toward native habitat and species extinctions. Military projects add low frequency sounds in Hawaiian waters. The Proposed Action is not expected to add to noise pollution in the marine environment and impacts from TSVs are too speculative to ascertain long-term effects for marine wildlife. The overall cumulative impact on biological resources would be significant, particularly on sensitive species and sensitive habitats. The proposed development and heightened human activities in O'ahu and the island of Hawai'i would reduce viable habitat and would reduce the population of sensitive species, as designated by federal and state agencies, or of a species with regional and local significance. It would alter or destroy high to moderate value habitat, which would prevent native biological communities from reestablishing, and would introduce or increase the prevalence of undesirable nonnative species. Although the Proposed Action will not jeopardize the continued existence of threatened or endangered species, Army training and construction activities are likely to cause the "take" of a highly sensitive resource, such as a threatened and endangered species. In light of historic, ongoing, and reasonably foreseeable future actions, the Army concludes that the addition of this project would result in a significant cumulative impact on biological resources.

### *Reduced Land Acquisition*

Cumulative impacts would resemble impacts from the Proposed Action. The RLA Alternative would involve siting QTR2 at PTA and limiting the amount of land acquired as part of the SRLA. This would reduce the impacts on sensitive species and habitat on O'ahu, but it could slightly increase the impacts on these same resources on the island of Hawai'i. In light of historic, ongoing, and reasonably foreseeable future actions, the Army concludes that the addition of this project would result in a significant cumulative impact on biological resources.

As described under the Proposed Action, less than significant cumulative impacts on marine wildlife are expected.

### *No Action*

Impacts from No Action would combine with impacts from the projects in tables 9-1 and 9-2 to continue habitat degradation and loss of habitat due to development and human activities. This would add to the decline of native species abundance and diversity. The impact on sensitive species and habitat would be significantly affected by No Action activities. The impact on general species and habitat would be less than significant. As described under the Proposed Action, less than significant cumulative impacts on marine wildlife are expected. Term and conditions described in the in the 2003 BOs for Routine Military Training and Transformation of the 2nd Brigade 25th ID(L) at US Army Installations on the island of Oʻahu (USFWS 2003d) and on the island of Hawaiʻi (USFWS 2003e) will be implemented under this alternative as well. In light of historic, ongoing, and reasonably foreseeable future actions, the Army concludes that the No Action would result in significant cumulative impacts on biological resources.

### Cultural Resources

Many factors were considered for this analysis, including public comments for this project and from projects listed above. Most of the public comments related to access to traditional areas and the potential destruction of cultural sites and landscapes from training. For cumulative impacts on cultural resources, the ROI includes the islands of Oʻahu and Hawaiʻi. Since contact times, residential, commercial, and military development throughout the state has destroyed or damaged many cultural resource sites, but Hawaiʻi's rich history produced a dense collection of historic properties, many of which are as yet undiscovered. Today we know more about cultural resources, their importance and how to minimize impacts on them. However, based on historic trends and losses any project of this size will have a noticeable adverse affect on the remaining resources.  In light of on past, present or reasonably foreseeable future actions, the Army determines that the cumulative impact on cultural resources is significant.

#### *Proposed Action*

Military construction projects at MMR, SBMR, WAAF, and HAFB could result in a significant cumulative impact on cultural resources, including significant historic buildings, on military installations in Oʻahu. Barracks upgrades, the fire station, water tank, and laboratory construction, gate alignments, and construction of the MSTF/ISF, and Drum Road could damage archaeological resources. Navy construction projects at Pearl Harbor and the RCI could affect archaeological resources and historic buildings. I3A construction at SBMR could have an adverse effect on a historic landscape as well, and local highway projects and bridge replacements could damage archaeological resources along the road alignments.  RCI involves the transfer of historic family housing to private ownership, and this is considered an impact on historic properties. The proposed resumption of military training at MMR could result in significant cumulative impacts on cultural and historic sites in the valley, which is rich with archaeological sites and considered of vital significance to Native Hawaiians.

Construction projects on the island of Hawaiʻi could result in significant cumulative impacts on cultural resources. Public comments indicate that there are significant Native Hawaiian resources in the area around Kawaihae Harbor, including an underwater heiau; the harbor deepening and the new highway from Waimea to Kawaihae Harbor could significantly affect these resources. Construction of the new range control building at PTA could have significant impacts on cultural resources, depending on its location.

The Army intends to implement an ICRMP for all its installations in the state. This plan would provide an inventory of cultural resources on Army properties and would provide management protocols for Army activities in order to protect and preserve cultural resources and comply with federal laws and regulations regarding cultural resources.

Although each of these civilian or military projects would be accompanied by an MOA or PA, in compliance with Section 106 of the NHPA, or documented and mitigated in compliance with state requirements, the cumulative impact on cultural resources on both O'ahu and Hawai'i could be significant because archaeological sites, TCPs, and historic buildings would be damaged or destroyed by these projects. These impacts could be limited to a greater or lesser extent, depending on the ability of project proponents to avoid or mitigate the damage.

Mitigation for these cumulative impacts would be to avoid archaeological sites and other cultural resources, to prohibit demolition of significant historic buildings and structures, to reuse these properties following the Secretary of the Interior's *Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings*, and to treat historic and prehistoric archaeological resources appropriately, should such resources be uncovered. In addition, Historic properties should be documented before being destroyed, in accordance with Department of Interior standards and Section 106 of the NHPA.

Given the damage or destruction of cultural resources from the cumulative impact of the Proposed Action and the other projects listed in this chapter, the Proposed Action would accelerate the trend of damage to cultural resources in Hawai'i. Cumulative impacts on ATIs and archaeological sites under all of the alternatives, combined with the projects listed above, would result in significant cumulative impacts on cultural resources. Although specific actions proposed under SBCT can be mitigated on a case-by-case basis, the overall effect of increased training, reduced access, and continued development throughout O'ahu and Hawai'i will result in substantial alteration and restriction of native use of traditional areas and the potential destruction of numerous archaeological sites. In light of historic, ongoing, and reasonably foreseeable future actions, the Army concludes that the addition of the Proposed Action would result in a significant cumulative impact on cultural resources.

### *Reduced Land Acquisition*

The RLA Alternative would result in roughly the same cumulative impacts on cultural resources as the Proposed Action. The total impacts are likely to be fewer because the project-specific impacts under the RLA Alternative are fewer, but this would have a positive effect on O'ahu, and the change is not expected to greatly reduce the cumulative impact of the project. In light of historic, ongoing, and reasonably foreseeable future actions, the Army concludes that the addition of the Reduced Land Acquisition Alternative would result in a significant cumulative impact on cultural resources.

### *No Action*

No Action will have less than significant cumulative impacts on cultural resources.

### *Human Health and Safety Hazards*

Hazardous material and waste data are reported to the state and federal environmental entities on an annual basis allowing these agencies to track trends of material use, waste generation, and release occurrences. Historically, these levels have fluctuated giving little insight to specific trends, however these reports show movements in the industrial and commercial community highlighting new large and small quantity generators, as well as changes in management techniques allowing for ongoing analysis and amendments to environmental laws and reporting requirements. The results of the ongoing analyses give the agencies a continual current status of the state of the environment, such as quality of domestic water used by the public, the quality of air within the state or specific ROIs, and the potential resource or management areas needing improvement. These conclusions are developed and published in an Environmental Report Card by the State of Hawai'i Office of Environmental Quality Control on an annual basis. These results can be compared to previous years or to other states or regions that have similar rating systems. In general, Hawai'i has excellent air and water quality and very good terrestrial quality. These levels have remained consistent over the years.

Cumulative impacts on human health and safety hazards may occur for various environmental issues. For the Proposed Action, the ROI is defined as the boundary of the installations, the military vehicle trail areas, and the lands immediately adjacent to the installations and military vehicle trail areas. The ROI for the cumulative effects on human health and safety hazards is the sum of the regions of influence of the Proposed Action and the areas affected by the cumulative projects listed above, with the exception of ammunition, UXO, and general training; the ROI for these military-specific impact issues would be the sum of the regions of influence of the Proposed Action and the areas affected by the cumulative projects listed above that would occur on military installations. The regions of influence for the cumulative projects listed above outside the Proposed Action vary in size and may not be well defined. In general, the cumulative impact assessment is intended to be descriptive rather than quantitative.

#### *Proposed Action*

Data from 1996 to 2000 show an overall declining trend in toxic releases to air, water, and land in Hawai'i. This declining trend is positive because air, water, and land are all environmentally connected (HDOH 2003). Specific trend information is provided under each subsection, as available.

*Hazardous materials management.* Chemical release data is reported yearly to the HDOH. No clear trend exists in the number of chemical releases from 1997 to 2001. Data from 1997 to 2001 shows that chemical releases on Hawai'i increased from 205 to 271. However, an increase in the number of releases does not necessarily correlate with an increase in damage to the environment because reporting does not include release volumes (HDOH 2003).

The Proposed Action and most of the projects identified in tables 9-1 and 9-2 (the only exceptions being the land acquisitions, training, and planning documents) would involve the transport, storage, and use of hazardous construction materials, such as diesel fuel or solvents. Because the transport, storage, and use of these hazardous construction materials would increase, cumulative impacts would include increasing the potential for these materials to be involved in an accidental release or an exposure. These projects would be required to transport, store, and use hazardous construction material according to material safety data sheet and label instructions, as well as applicable state and federal regulations. These impacts exist and are handled using best management practices and state and federal regulations, such as US DOT regulation 49 CFR 100-109, which ensures proper handling by shipping personnel and identification by emergency personnel if an accident involving hazardous materials should occur. No new regulations would need to be established to support the elevated level of hazardous material management from these cumulative projects. In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the cumulative hazardous material impacts would be less than significant. Based on limited historical chemical and hazardous material release data for the Hawaiian Islands, it is not possible to predict future hazardous material release trends.

*Hazardous waste management.* Hazardous waste generation is reported to the EPA by "large quantity generators" biennially in odd years. Overall, the quantity of hazardous waste generated in Hawai'i from 1991 to 1999 varied from 1,300 to 3,000 tons. From 1991 to 1999 the trend in hazardous waste generation has generally decreased after a slight increase between 1993 and 1997. Waste generation data from small quantity generators were included in the survey in 1995 and could be responsible for the increased amount (HDOH 2003).

The Proposed Action and the projects identified in tables 9-1 and 9-2 (with the exception of the land acquisition, training, and planning document projects) would result in hazardous wastes from construction and renovation. All of the projects would be required to comply with state and federal hazardous waste disposal regulations, such as disposing of hazardous waste in an appropriate landfill. Therefore, as no new regulations would need to be implemented and waste management would continue to follow existing protocol, cumulative impacts on hazardous waste management would be less than significant during construction and renovation.

In addition, the upgrade to the advanced wastewater treatment facility would provide a beneficial impact in supporting the growth in personnel and preventing waste backup or system malfunction.

In light of historic, ongoing, and reasonably foreseeable future actions and based on limited historical hazardous waste accumulation data for the installations and the Hawaiian islands the Army concludes that it is likely that waste generation would decrease and the Proposed Action would therefore have no significant cumulative impacts.

*Ammunition.* MMR training would include the continued or increased use of ammunition. There would be a significant increase in cumulative ammunition storage, use, transportation, and disposal among these projects because of the Proposed Action. An EIS is being prepared for training at MMR. Since the publication of the DEIS, the US Marines canceled plans for proposed training at Waikane Valley. The EIS for MMR addresses activities involving ammunition storage, use, and transportation and would recommend appropriate mitigation measures. In addition, the 120mm mortar would likely be used by future current forces not associated with the Proposed Action. For any project using ammunition, the storage, use, or transport of ammunition requires strict adherence to established regulations.

In light of historic, ongoing, and reasonably foreseeable future actions and although no new regulations or policies would need to be established, and the Army concludes that the cumulative impact is considered significant due to the 25 percent increase in ammunition included in the Proposed Action.

Because future ammunition needs, such as those for wartime, or technology are unknown, it is not possible to predict future ammunition trends.

*Unexploded ordnance.* The presence of UXO could affect the Proposed Action projects and some projects listed on tables 9-1 and 9-2, such as the Kahuku Windmill and Hook Parcel and PTA 1010 Land Acquisitions, the Saddle Road Realignment Project, and the controlled burn projects at Army ranges. Construction or other activities could take place in areas that contain UXO, which could lead to a significant, short-term adverse safety impact. Training could contaminate ranges with UXO, creating a safety risk to personnel. In addition, the 120mm mortar, which could produce UXO, would likely be used by future current forces not associated with the Proposed Action. Although UXO presents a significant impact, proper abatement and removal techniques under EPA and USARHAW guidelines would mitigate the impact. With regard to the former Waikoloa Maneuver Area and Nansay Sites UXO Cleanup, the Saddle Road corridor was categorized as a medium risk, based on an engineering evaluation/cost analysis conducted for the area, which includes a risk-based analysis for human and environmental health. A UXO clearance would be needed prior to Army maneuvers and trail alignment under the Proposed Action in order to avoid remnants of past live-fire training. Officials should check with Navy training schedules and the training area layout on the Pu'u Pa Maneuver Area to avoid affecting or being affected by ongoing training. In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that there would be a significant cumulative impact regarding UXOs.

Beneficially, the controlled burn projects, listed on Table 9-1, specifically at MMR, identifies and removes UXO from the land. Plans to make the burn an annual event are under discussion. Based on historical data and increased technology, it is possible to predict a decrease in UXO casualties.

*General training.* Most of the projects identified in tables 9-1 and 9-2 do not involve training; for these projects, there would be no cumulative training impacts. However, a few of the projects occur on or near installation training areas, and, for them, both training and construction would be coordinated to prevent conflicts between the Proposed Action and the other projects identified in tables 9-1 and 9-2.

The land acquisition area proposed for KTA, listed on Table 9-1, would introduce elevated levels of training on this land. SRTA is the only live-fire ammunition that will be used at KTA. The PTA 1010 land acquisition area, listed on Table 9-2, has supported training in the past under a lease agreement with the land owner and would likely continue at the same level, so no new impacts would be introduced to this area. Each of these parcels would be used for training regardless of the approval of the Proposed Action. Therefore, in light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the cumulative impacts with respect to general training is considered less than significant because adverse impacts would be minimal. Because future training needs are unknown, it is not possible to predict future training trends.

*Installation Restoration Program (IRP) sites.* Although some of the cumulative projects listed on tables 9-1 and 9-2 are near IRP sites, no projects are known to overlay these sites and therefore are not expected to disrupt restoration progress of the sites. With implementation of mitigation the impact from this IRP site can be reduced to less than significant, therefore, in light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that there would be no significant cumulative impact on IRP sites.

Based on increased technology and government regulation it is possible to predict an increase in IRP site cleanup.

*Lead.* The Proposed Action and most projects identified in tables 9-1 and 9-2, with the exception of land acquisitions, training and planning document projects, could expose workers to lead at project sites. This impact would be relevant at any installation where structures would be renovated or demolished. The impact is considered significant but mitigable because lead surveys of facilities and structures included in the impact area would be updated before construction began, and best management practices are expected to be implemented to protect workers, as per USARHAW and OSHA guidelines. Beneficially, the new structures would not contain lead-based paint or construction materials, thus eliminating potential future exposure to the public or the environment. Based on increased technology and government regulation and because the use of lead-based paint has been discontinued, it is possible to predict a decrease in lead-based paint contamination on a cumulative level.

*Asbestos.* The Proposed Action and most projects identified in tables 9-1 and 9-2, with the exception of land acquisitions, training, and planning document projects, could expose workers to asbestos at project sites. This impact would be relevant at any installation where renovation, demolition, or grading takes place. The impact is considered significant but mitigable because asbestos surveys of facilities and structures included in the impact area would be updated before construction began, and BMPs are expected to be implemented to protect workers, as per USARHAW and OSHA guidelines. Asbestos-containing construction materials would be avoided where possible to reduce future exposure to asbestos. Based on increased technology and government regulations and because the use of ACM in construction materials has decreased, it is possible to predict a decrease in ACM contamination on a cumulative level.

*Polychlorinated biphenyls (PCBs).* All projects listed on tables 9-1 and 9-2 are not suspected to be affected by PCB-containing devices or PCB-contaminated soils because the Army has been dedicated to retrofilling and upgrading all equipment suspected to contain PCBs. Cumulative project sites would be surveyed for PCB contamination and managed according to EPA and USARHAW guidelines to reduce the impact. As discussed in Section 4.12, the Proposed Action would have a less than significant impact on exposure to PCB contamination. In light of historic, ongoing, and reasonably foreseeable future, the Army concludes that the there would not be a significant cumulative impact as this isolated potential PCB exposure source would not affect the sum of the areas of influence of all the above projects. Based on increased technology and government regulations and because the use of PCBs has decreased, it is possible to predict a decrease in PCB contamination.

*Electromagnetic fields (EMF).* The ROI for cumulative EMF impacts is the ROI for the Proposed Action and the regions affected by the cumulative projects listed on tables 9-1 and 9-2. Because electricity and communications equipment would be used in some projects described above, such as the Information System Facility, the Mission Support Training Facility, or Installation Information Infrastructure Architecture, EMF would be produced. Assuming the public is not allowed unsupervised access to areas where these structures and equipment would be located, there would be less than significant impacts from exposure of EMF to the public. Signs would be posted around the perimeter of potentially harmful EMF sources, and the Army would continue to follow guidelines and regulations pertaining to EMF exposure. There would be no significant impact expected from EMF. The cumulative projects listed on tables 9-1 and 9-2 do not indicate the presence of equipment capable of significantly increasing EMF exposure trends on the islands. In light of historic, ongoing, and reasonably foreseeable future, the Army concludes that there would not be a significant cumulative impact from increased exposure to electromagnetic fields.

*Petroleum, oils, and lubricants (POLs).* Oil release data is reported yearly to the HDOH. No clear trend exists in the number of oil releases from 1997 to 2001, the data from which shows that oil releases on Hawai'i decreased from 295 to 171. However, a decrease in the number of releases does not necessarily correlate with a decrease in damage to the environment because reporting does not include volumes (HDOH 2003).

The EPA certified that there were 1,702 confirmed releases from USTs from 1987 to 2002. By 2002, 77 percent of the UST releases had been completely cleaned up, 17 percent had been partially cleaned up, and 6 percent had yet to be addressed. The overall trend shows that cleanups of LUSTs have increased, while the number of new releases has decreased (HDOH 2003).

The Proposed Action and the other projects identified in tables 9-1 and 9-2 could expose workers to POLs during construction and operation. Best management practices and EPA and USARHAW protocols are expected to be followed during the use and handling of POLs under each cumulative project. Two roadways, Saddle Road and Drum Road, included on tables 9-1 and 9-2 would be traveled by military vehicles. The Proposed Action would increase the use of these highways, thus increasing the potential for accidental spill or vehicle breakdown. BMPs would be used to prevent accidents during transportation activities. Beneficially, these roadways would reduce military traffic on public highways, thus minimizing these potential releases to the public environment.

Each installation maintains strict standard operating procedures and spill contingency plans for hazardous materials and waste identifying specific operating responsibilities and procedures. In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the cumulative impact from increased exposure to POLs would be less than significant. Based on historical data, increased technology, and increased environmental regulation, it is possible to predict a decrease in POL releases and an increase in POL cleanups.

*Pesticides/Herbicides.* Pesticides, fertilizers, herbicides, and other chemicals that are applied to the ground eventually seep into the drinking water aquifers. Analysis of safe drinking water data gives an indicator of clean water management. Data from 1994 to 2001 show that the percentage of the Hawaiian population served water below maximum contaminant levels increased from 95 to 100 percent.

There would be an increased use of pesticides/herbicides by the Army for pest management on the land acquisition areas identified in the Proposed Action, the Kahuku Windmill Hook Parcel, and the PTA 1010 Land Purchase parcel adjacent to PTA. This application would be a less than significant impact because pesticides/herbicides would be used for their intended purpose of pest management, and their usage would follow the strictly enforced federal, state, and Army regulations mandated in the USAG-HI IPMP. In addition, in conjunction with the prescribed burn of training ranges in Hawai'i (Project 13) to control vegetative fuel load, pesticides would be applied by aerial broadcast spray prior to the burning activities to reduce live vegetation. This practice could present a significant but mitigable impact by following proper abatement procedures and Army protocol. The burn management plan is being finalized and highlights specific BMPs (such as postponing sprays during periods of high wind) and designates required spray safety distances from developed areas, in accordance with Army Regulation 200-5, Pesticide Management. The relevant installation-specific pest management plans would be updated following the proposed land acquisition activities to include these areas. Pesticides would continue to be stored in designated storage sites. Based on increased technology and stricter environmental regulations, it is possible to predict a decrease in pesticide/herbicide releases and an increase in pesticide/herbicide contamination remediation. In light of historic, ongoing, and reasonably foreseeable future, the Army concludes that the cumulative impact from pesticides/herbicides would be significant but mitigable to less than significant.

*Biomedical waste.* The Proposed Action presents an increase of 810 Soldiers, 502 spouses, and 1,053 children to be stationed at SBMR, which could increase demand for medical care. The impact is considered less than significant, however, because the method of management and disposal would not change. In addition, most projects identified in tables 9-1 and 9-2 would involve upgrading and maintaining Army facilities and procedures and would not significantly increase the need for medical care. In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that there would be no significant cumulative impacts regarding medical waste.

*Radon.* Radon occurs in low concentration in the Hawaiian Islands below EPA's recommended action levels. Radon has not been identified at any of the Proposed Action sites and surrounding areas. The Proposed Action and projects listed in tables 9-1 and 9-2 are not expected to be affected by radon. Therefore, in light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that there would be no significant cumulative impacts from exposure to radon. Based on historical radon data for the installations and the islands within the state of Hawai'i, it is possible to predict that future radon levels will not be an issue.

*Wildfires.* Based on available data, approximately 90, 110, and 130 fires were identified at SBMR in 1998, 1999, and 2000, respectively. A small number of large fires are responsible for most of the acreage burned at PTA; eight individual fires of 100 acres (40.5 hectares) or more burned over 97 percent of the acres damaged by fire from 1987 to 1999. No wildfire trend data is available for DMR, KTA, and KLOA. Between fiscal years 1997 and 2002, between seven and 20 fires yearly on O'ahu and between 42 and 80 fires yearly on Hawai'i were reported to the Division of Forestry and Wildlife's Fire Management Program. The number of fires per year for both islands fluctuated. The mission of the Division of Forestry and Wildlife's Fire Management Program is to provide fire protection to forest reserves, natural area reserves, wildlife and plant sanctuaries, and public hunting areas. Combined with cooperative zones that are also protected by other fire management service providers, the Division of Forestry and Wildlife is involved with approximately 81 percent of the state's land area (DLNR 2003e). Based on limited historical wildfire data for the installations and the fluctuating numbers of fires reported to the Division of Forestry and Wildlife, it is not possible to predict future wildfire trends.

The ROI for cumulative wildfire impacts is the ROI for the Proposed Action and the regions affected by the cumulative projects listed on tables 9-1 and 9-2. With respect to specified cumulative projects listed on the tables, some of the other projects would occur in or adjacent to areas where wildland fires could occur. As with the Proposed Action, the cumulative projects are expected to contain mitigation measures and SOPs to minimize potential environmental impacts involving wildfires. The EIS being prepared for MMR would address activities that could ignite wildfires and would include recommendations for mitigation measures. Roadway improvement projects could involve activities and materials capable of starting a wildfire and would be required to adhere to Hawai'i Department of Transportation safety requirements to protect the public and environment. Similar to the roadway construction projects, construction projects on the installations could involve activities and materials capable of starting a wildfire and therefore Army BMPs and SOPs would be required to reduce the potential for starting a wildfire. The Army has developed an IWFMP for all installations on the islands of O'ahu and Hawai'i to prevent and control fires. The standard operating procedures within the IWFMP will reduce the potential impacts involving wildfires. Upgrading the SBMR fire station would also have a beneficial impact on wildfires at the installation. In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the cumulative impacts involving wildfires are expected to be less than significant because of the steps all project owners are expected to take to prevent and control wildfires from threatening to public safety.

*Emergency Evacuations.* None of the construction projects or proposed training should affect any emergency evacuation plans in place. However, the construction of Drum Road and Dillingham Trail will allow for improved emergency evacuations from the north shore in the event the public highways are closed as a result of a natural disaster. In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the proposed project would contribute positively to the cumulative impacts on emergency evacuations. The State will consult with property owners in the same manner as they do currently.

*Summary.* The only significant unmitigable cumulative impacts to arise from the Proposed Action would be those from ammunition and unexploded ordnance. Due to construction activities, significant impacts may arise from existing IRP sties, or pesticides during the aerial broadcast spraying of range areas. With proper abatement procedures following existing regulations, these impacts are mitigable resulting in less than significant effects. All other issues are considered less than significant as either no impacts would be encountered or the resulting impacts would be handled or addressed in accordance with existing BMPs and SOPs, thus introducing no new impacts on the public or environment. In light of historic, ongoing, and reasonably foreseeable future, the Army concludes that the overall cumulative impact on human health and safety hazards would be significant.

*Reduced Land Acquisition*

All of the cumulative impacts identified above for the Proposed Action would be the same for Reduced Land Acquisition, which still involves the same overall impact issues as the Proposed Action. In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the significant cumulative impacts from the Reduced Land Acquisition Alternative would involve ammunition and UXO, while IRP sites and pesticides would be significant yet mitigable to less than significant.

*No Action*

Under No Action impacts involving human health and safety hazards would still be possible under the identified development, planning, and training projects. All of the cumulative impacts identified in tables 9-1 and 9-2 for the Proposed Action would be the same for the No Action, with the exception of impacts resulting from implementing the Proposed Action, which includes ammunition, UXO, and IRPs. These impact issues would present less than significant cumulative impacts under No Action. Otherwise, No Action still involves the same overall impact issues as the Proposed Action. In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that there would be no significant cumulative impacts involving human health and safety hazards, with the exception of lead, asbestos, and pesticides, which are significant yet mitigable.

### Socioeconomics

Historically Hawai‘i’s economy has been dependent on the dominant industry at the time. Early dependence on whaling gave way to sugar cane and pineapple cultivation. Military development that began in the early 1940’s and later tourism boosted Hawai‘i’s economy by providing a fairly stable job market. In more recent years, because of the reduction in the sugarcane and pineapple industries and in military activities, Hawai‘i’s economy has become more dependent on tourism.

The population of Hawai‘i has grown fairly steadily since the late 1800’s to it’s present population of a little over a million. Approximately 75 percent of the population live on O‘ahu while over 95 percent of those people live in the greater Honolulu area. Approximately 120,000 people live on the island of Hawai‘i, most living in Hilo or Kailua-Kona.

There has always been a gap between the cost of living and average family income in Hawai‘i that persists today with nearly 15 percent living in poverty. However, despite this, Hawai‘i continually ranks high in quality of life studies.

*Proposed Action*

Long-term direct and indirect beneficial cumulative effects are expected as a result of the Proposed Action, which is expected to increase employment and sales volume in the ROI (the ROI includes Hawai'i and Honolulu Counties; see Section 4.13.1). Additional increases in employment, income, and sales could also occur from other actions, which include the Whole Barracks Renewal Program at SBMR, the RCI Program, construction of a new Soldier and family readiness center at SBMR, the Kamehameha Highway bridge replacement, the Farrington Highway improvements, and the Turtle Bay Resort improvements. The beneficial economic effects (i.e., increased employment, income, and spending) of these actions are expected to last for the duration of the projects, but they could extend beyond that.

The increase in population from the SBCT Proposed Action would increase ROI population by less than one percent. This increase in population and the subsequent spending would be within historical limits and would not adversely affect the ROI economy (see Table 4-18 and Appendix L, EIFS Model). Other known actions are not expected to increase ROI population. Furthermore, population projections through 2020 generated by the State of Hawai'i indicate continued slow growth in Honolulu and Hawai'i Counties, as well as in the State of Hawai'i (DBEDT 2000, 2003). Projections for residential population growth, including and excluding armed forces, indicate a decrease in growth rates throughout the forecast period. For example, the projections indicate the annual population growth decreases from a rate of one percent from 2000 to 2005 to 0.9 percent from 2005 to 2020.

Long-term minor adverse cumulative effects on schools could occur, but this cannot be definitively determined at this time. The proposed SBCT action addressed in this EIS would increase the primary and secondary school population by approximately 760 children. A separate proposed action, the RCI, could also affect school enrollments. RCI could result in more military families living at SBMR, which would increase the enrollment of Solomon and Hale-Kula Elementary Schools and the off-post schools serving SBMR, Wheeler Intermediate School and Leilehua High School. However, at this time it is not known how the number of on-post housing units would change under RCI. The proposed quantity and type of family housing on SBMR will not be determined until a private developer is selected, so the number of school children affected by RCI is also not known. One can assume that if RCI would increase the number of families living on SBMR, the number of school-age children would increase as well, resulting in cumulative adverse effects on schools serving SBMR. However, this is speculative at this time. As part of the RCI program, however, RCI will notify the Hawai'i Department of Education at the earliest point when practicable of any known increases of students to schools on or near SBMR and WAAF.

As noted above, the State of Hawai'i projects slowing population growth until 2020. This projection more specifically indicates a decrease in some school-age population during this period. For example, the population of school-age children 5 to 11 is projected to decrease at an annual rate of 1.2 percent from 2000 to 2005 (DBEDT 2000). The population of school-age children 12 to 13 is projected to decrease at an average annual rate of 2.6 percent from 2005 to 2010. While local school districts or individual schools may experience population pressures at variance from these averages, the overall demographic trends for Hawai'i indicate that the state's educational system will not face significant increases in student enrollment during the period of project implementation and may in fact experience declining enrollments in some schools.

ROI housing could be affected by several actions. The SBCT action is expected to increase demand for on- and off-post housing. However, the whole barracks renewal program and RCI would improve the quality of housing available to Soldiers and their families, which could encourage families to relocate to base housing and reduce the demand for off-post housing in the ROI. It is not yet known what the exact net number of housing units on SBMR would be after the whole barracks renewal program and RCI are completed, but there would still not be enough housing units for every Soldier stationed at SBMR and there still would be a demand for off-post housing. As noted above, because residential population growth for Hawai'i is projected to be slow from 2000 to 2020, overall population pressures on the housing market should have little or no cumulative effect.

No adverse cumulative effects on the protection of children would be expected. Noise sources associated with Proposed Action construction projects, or construction projects from other actions occurring in the ROI would not result in a significant change from No Action. Increases in traffic would result in a minor increase in the risk of adverse health affects on children. To minimize effects, strict adherence to applicable safety regulations and procedures would continue. Construction and training activities under the Proposed Action would, for the most part, take place in areas that are off-limits to the general public. Restricted areas would continue to be posted with signs, enclosed by a fence, or stationed with guards.

In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that given the cumulative impacts described above for population, schools, and housing, the Proposed Action would not substantially alter the current and projected trends for these socioeconomic indicators and would be significant but mitigable to less than significant.

*Reduced Land Acquisition*

Reduced Land Acquisition would result in similar impacts on socioeconomic resources as those described under the Proposed Action.

*No Action*

No Action would not contribute incremental impacts on the cumulative socioeconomic effects of ongoing and proposed projects on O'ahu and Hawai'i. This is because implementing No Action would not change the local economy, population, or housing, and it would not alter the existing health and safety, housing, or economic conditions of children, minority, or low-income populations in Hawai'i or Honolulu Counties.

### *Utilities and Public Services*

The demand for utilities and public services has grown along with the general population in Hawai'i. In addition to population increases, per capita use has increased for utilities such as water, electricity and fuel. Public services have seen a similar linear increase which follows the population trends. Keeping up for demands for fuel, for vehicles and to generate electricity, have been a challenge since all fuels have to be brought to the islands by ship. Other services such as waste disposal are limited by availability of land. These demands have increased to such levels that providers are barely able to keep up. Public and private sectors in Hawai'i have reduced energy demand in recent decades. Between 1980 and 1995, growth in energy use lagged far behind population growth. Due to alternative energy sources and increased conservation, per capita energy demand is decreasing. Demand for water has been growing in the Ewa area of O'ahu, but the windward side of the island currently has sufficient supplies. Wastewater in Hawai'i is treated by wastewater treatment plants and by underground injection control (Juvik 1998, 2002). Also, as discussed in Chapter 3 and in this chapter under Socioeconomics, projections for residential population growth including and excluding armed forces indicate a decrease in growth rates throughout the forecast period. Trends regarding demand for utilities and public services normally reflect population growth, which is minimal.

### *Proposed Action*

In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the Proposed Action could contribute cumulative effects on public services and utilities. The ROI for the cumulative effects would include the islands of O'ahu and Hawai'i, since these would be the regions influenced by the Proposed Action in combination with the cumulative projects listed above. The additional population and the building space and facilities to be constructed at SBMR and PTA under the Proposed Action, as well as any increases in training at new and existing facilities, would increase demand on utilities and services. These demands would be in addition to the demands that ongoing and proposed construction and training would place on these services and systems.

*Police, fire, and emergency medical services.* The potentially increased demand placed on fire protection services at SBMR under the Proposed Action could be somewhat offset by the upgrade of the SBMR fire station and the development of fire management areas and SOPs. The Army will have the military police appropriately staffed for any increases in soldiers to address crime issues on base. In addition, counseling services are on base through Army Community Services for domestic abuse victims or to assist Soldiers and their families struggling with illegal drug or alcohol abuse. In light of historic, ongoing, and reasonably foreseeable future, the Army concludes that there would be no significant cumulative impacts on police, fire and emergency medical services.

*Water distribution.* The Proposed Action would increase the number of Army personnel and their families, and this would increase the demand for potable water at SBMR and on O'ahu, where the demand for potable water is increasing in some areas almost to the capacity of the available supply. In addition, operation of the vehicle wash facilities would increase water use compared to No Action. These increases are not expected to be significant with respect to the overall demand for water. Increases in the overall demand for water on O'ahu could be offset if the Honolulu Board of Water Supply undertakes plans that are now under consideration to link areas of surplus water to those with inadequate supplies. In light of historic, ongoing, and reasonably foreseeable future, the Army concludes that there would be no significant cumulative impacts on water distribution.

*Wastewater and stormwater.* Implementation of the advanced wastewater treatment upgrade at SBMR could offset the (less than significant) impacts caused by the increased Army personnel and their families at SBMR. Since wastewater is treated internally at SBMR, it would not contribute to any island or state-wide trends regarding any increased demand for treatment facilities. General development around the state, as well as specific projects increasing paved surfaces, would contribute to cumulative impacts on stormwater. As discussed under Water Resources, the Army would implement best management techniques to limit these effects, but statewide increases in polluted stormwater runoff are likely. In light of historic, ongoing, and reasonably foreseeable future, the Army concludes that there would be no significant cumulative impacts on wastewater and stormwater.

*Solid waste management.* Cumulative construction activities from the Proposed Action and regional construction projects, such as highway construction, would place an increased demand on the solid waste disposal system from construction/demolition debris. This increase would be temporary and would be minimized to a less than significant level through recycling and converting waste to energy. SBCT activities would also contribute incrementally to the total area of impervious surfaces created by cumulative construction activities. The contribution of the Proposed Action to stormwater runoff impacts would be minimized to less than significant levels by implementing such standard construction practices as grading and installing curbs, drains, and gutters. Construction of new facilities at SBMR and PTA in combination with other construction projects, such as the fire station, Soldier and family readiness center, mission support training facility, and physical fitness facility at SBMR, Farrington Highway improvements, Turtle Bay Resort improvements, Drum Road Upgrade, Kamehameha Highway improvements, troop rigger facility, the Saddle Road realignment, the Kawaihae/Waimea Road, and the Waimea to Kawaihae Highway, would increase impervious surfaces, would contribute incrementally to increased impervious surfaces and increased runoff. However, each construction project would be designed to accommodate additional runoff and facilities on SBMR and PTA would be designed to comply with Phase 2 stormwater management regulations (described in the Water Resources Sections) to control runoff. In light of historic, ongoing, and reasonably foreseeable future, the Army concludes that there would be no significant cumulative impacts on solid waste management.

*Communications.* Proposed Action requirements for additional computer and server equipment, combined with information system and support training projects identified in Tables 9-1 and 9-2, could increase demand for fiber optic lines. However, this increase in demand is not significant, and increases in capacity of fiber optic lines on Army installations and in the Hawai'i area are expected to accommodate new demand. In light of historic, ongoing, and reasonably foreseeable future, the Army concludes that there would be no significant cumulative impacts on communications.

*Electricity and natural gas.* Electricity demand is expected to increase as a result of cumulative construction projects and would place an additional demand on these utility systems. While the Proposed Action and other proposed Army projects include construction of new buildings, much of this construction, such as that for RCI Housing, would result in more energy-efficient buildings. Construction for the Proposed Action would use modern, energy-efficient materials and would comply with EO 13123. Therefore, new delivery lines would have to be installed to supply new facilities with electricity.

The Proposed Action, in combination with ongoing and proposed projects, would have beneficial cumulative effects on public services and utilities. New utility infrastructure constructed in support of the Proposed Action, in addition to the cumulative infrastructure and fire service improvement projects, would improve public services and utilities in the region. In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that given the cumulative impacts described above, the Proposed Action would result in no significant impacts to energy use in Hawai'i .

*Reduced Land Acquisition*

Reduced Land Acquisition would result in similar cumulative impacts on public services and utilities as those described in greater detail under the Proposed Action. In light of historic, ongoing, and reasonably foreseeable future, the Army concludes that there would be no significant cumulative impacts from the Reduced Land Acquisition Alternative to public utilities and services.

*No Action*

In light of historic, ongoing, and reasonably foreseeable future actions the Army concludes that the No Action alternative would not contribute significant impacts on the cumulative effects on public services and utilities of ongoing and proposed projects on O'ahu and the island of Hawai'i because implementing No Action would not change the provision of public services or utilities.

# CHAPTER 10

# ENVIRONMENTAL JUSTICE AND OTHER REQUIRED NEPA ANALYSES

# CHAPTER 10
# ENVIRONMENTAL JUSTICE AND OTHER REQUIRED NEPA ANALYSES

## 10.1 INTRODUCTION

In addition to the analyses discussed in Chapters 4 through 9, NEPA requires additional evaluation of the project's impacts with regard to the following:

- Disproportionate impacts on minority or low-income populations (also known as an environmental justice analysis);
- Significant unavoidable adverse impacts;
- The relationship between local short-term uses of the environment and long-term productivity; and
- Any irreversible or irretrievable commitment of resources.

## 10.2 ENVIRONMENTAL JUSTICE ANALYSIS

### 10.2.1 Overview of Environmental Justice Issues

On February 11, 1994, President Clinton issued EO 12898, entitled Federal Actions to Address Environmental Justice in Minority and Low-Income Populations. This order requires that "each federal agency make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities, on minority populations and low-income populations" (EO 12898, 59 FR 7629 [Section 1-101]). Environmental justice requires the fair treatment of all people regardless of race, color, national origin, or income level and that no group should bear a disproportionate share of the environmental cost or other burdens of federal, state, or local projects or programs. The Army has done the following to comply with the order:

- Met with the public, including the Native Hawaiian and other minority communities, in an extensive series of meetings and workshops, to learn public concerns and to identify significant issues for the Proposed Action;
- Gathered economic, racial, and demographic information generated to identify areas of low-income and high minority populations (those who are in the minority of the population of the US as a whole, consisting of Blacks or African Americans, Native Americans, Eskimos, Aleuts, Asians, Pacific Islanders, other, and two or more races) in and around the project area; and
- Assessed the alternatives for disproportionate impacts resulting from on-site activities associated with the Proposed Action.

#### *Public Outreach*

The closeness of the Hawaiian community presented an opportunity for USARHAW to reach out to numerous organizations to gather input on the NEPA process. The Army met with dozens of civic and community organizations from January 2002 through April 2003, including the Rotary and Chamber of Commerce, Military Affairs Committee, veterans groups, retired military, state and city government officials, congressional delegates, and neighborhood boards. Special interest groups, including Malu Aina Group and Waiki'i Ranch Homeowners, the Office of Hawaiian Affairs, Royal Order of Kamehameha, and the Hawaiian Civic Clubs, were also asked for input into the NEPA process. Native Hawaiian translation services were made available at the public scoping meetings held in April 2002.

Additionally, as the NEPA process continues, the Army will update the general public, minority and Native Hawaiian communities, and interested parties on the project status by way of targeted mailings, news releases, television, radio, and print advertising, and Web site updates.

Ongoing consultation includes workshops with the Native Hawaiian community regarding impacts on cultural resources within the project area, in compliance with Section 106 of the NHPA. Organizations involved in this consultation process include the ACHP, OHA, Hawai‘i SHPO, Hui Mālama I Nā Kūpuna O Hawai‘i Nei, the Royal Order of Kamehameha, Mālama Mākua, Native Hawaiian community organizations and civic clubs, and elders in the Native Hawaiian community.

### 10.2.2 Summary of Environmental Justice Analysis

Racial and ethnic data for the state, Hawai‘i County, and Honolulu County for 1990 and 2000 are illustrated in Table 10-1. The dominant ethnic group in 2000 in the state and both Hawai‘i and Honolulu counties was the Asian and Pacific Islander group, with 51.0, 38.0, and 54.9 percent of the population, respectively. The population in almost all racial/ethnic categories declined between 1990 and 2000, with the exception of the “other and two or more races” category. This population group expanded exponentially, indicating that many who would have been categorized in another group in 1990 were able to identify themselves as “two or more races” in 2000 (a new designation in the 2000 Census). Between 1990 and 2000 the Hispanic population increased in the state and both project area counties, but Hawai‘i County experienced a much higher increase (26.7 percent) than the state average (7.8

percent) or Honolulu County (3.2 percent). The Black or African American population in Hawai‘i County experienced a substantial increase (13.5 percent) between 1990 and 2000 (US Census Bureau 1990a, 2000a).

Within Hawai‘i County the Hilo and Pāpa‘ikou-Wailea CCDs had the highest minority populations (minority includes all categories except White and Hispanic, which is considered an ethnic group rather than a racial category); however, all CCDs were composed of greater than 50 percent minority populations. The North Kohala, Kea‘au-Mountain View, and Pāhoa-Kalapana CCDs had the highest percentage of Hispanic populations in Hawai‘i County, with 13.5, 13.2, and 12.3 percent. Within Honolulu County the Wai‘anae, ‘Ewa, and Honolulu CCDs had the highest minority populations, with 88.8, 82.7, and 80.3 percent of the population. All CCDs in Honolulu County were composed of 67 percent or greater minority populations. The Wai‘anae and Wahiawā CCDs had the highest percentage Hispanic populations in Honolulu County, with 13.9 and 12.8 percent (US Census Bureau 1990a, 2000a).

**Table 10-1**
**Population Percentage by Race/Ethnicity**

| | Hawai‘i | | | Hawai‘i County | | | Honolulu County | | |
|---|---|---|---|---|---|---|---|---|---|
| **Race/Ethnicity** | **1990** | **2000** | **Percent Change 1990 to 2000** | **1990** | **2000** | **Percent Change 1990 to 2000** | **1990** | **2000** | **Percent Change 1990 to 2000** |
| White | 33.4 | 24.3 | -20.4 | 39.7 | 31.5 | -1.7 | 31.6 | 21.3 | -29.5 |
| Black or African American | 2.5 | 1.8 | -19.1 | 0.5 | 0.5 | 13.5 | 3.1 | 2.4 | -20.3 |
| Native American, Eskimo, Aleut | 0.5 | 0.3 | -30.7 | 0.7 | 0.4 | -23.3 | 0.4 | 0.2 | -38.3 |
| Asian and Pacific Islander | 61.8 | 51.0 | -9.9 | 57.1 | 38.0 | -17.9 | 63.0 | 54.9 | -8.6 |
| Other, and Two or More Races | 1.9 | 22.7 | 1,201.9 | 2.0 | 29.6 | 1,733.4 | 1.9 | 21.2 | 1,061.9 |
| Hispanic[1] | 7.3 | 7.2 | 7.8 | 9.3 | 9.5 | 26.7 | 6.8 | 6.7 | 3.2 |

Source: US Census Bureau 1990a, 2000a
[1] Persons of Hispanic origin may be of any race.

The US Census Bureau uses a set of money income thresholds that vary by family size and composition to determine which families are poor. If a family’s total income is less than its threshold, then that family, and every individual in it, is considered poor. The poverty thresholds do not vary geographically, but they are updated annually for inflation using the Consumer Price Index. For example, in 2000 the average estimated poverty threshold for an individual was an annual income of $8,787, and for a four-person household it was $17,601 (Dalaker and Proctor 2000). Census estimates for 1998 indicate that approximately 10.5 percent of the population of the state, 15.1 percent of Hawai‘i County, and 9.7 percent of Honolulu County was below the poverty line in 1998 (US Census Bureau 2001). This represents a 27.8 and a 36.9 percent increase, respectively, in the number of individuals below the poverty line in Hawai‘i and Honolulu counties from 1990 levels (US Census Bureau 1990b, 2001). Within Hawai‘i County, Hilo had the highest total number of families below the poverty line in 1999 (1,128 families), and the areas with the highest percentage of families below the poverty line were Nānāwale Estates (28.9 percent), Laupāhoehoe (28.4 percent), Orchidlands Estates (24.1 percent), Hawaiian Beaches (23.8 percent), Mountain View (23.6 percent), and Hawaiian Acres (22.5 percent). In Honolulu County in 1999, Honolulu had the largest total number of families below the poverty line, and the Mākaha Valley (32.4 percent), Mākaha (22.3 percent), Nānākuli (19.2 percent), Mā'ili (19.3 percent), and Wai'anae (17.2 percent) had the highest percentage of families below the poverty line (HDBEDT, no date [b] and [d]).

### *Summary of Impacts*

Short-term and long-term minor adverse indirect effects on environmental justice populations could occur. No minority or low-income residences would be displaced by training modifications, new construction, or land acquisition for expanded training areas or road construction, but noise from construction project sites or vehicle maneuver areas could have minor adverse noise impacts on nearby schools or private residences (see Section 4.6, Summary of Noise Impacts). Noise from construction would last only for the duration of the construction project. Construction would be limited to daytime hours. Noise impacts from vehicle maneuver training would be long-term, but this type of training is currently occurring at the installations.

Potential impacts on Native Hawaiian cultural resources include potential impacts on Areas of Traditional Importance (ATIs) at SBMR, DMR, and PTA. Potential impacts related to construction of training facilities could include destroying or damaging ATIs, including shrines, archaeological sites, burials, or elements of Native Hawaiian cultural landscapes. Purchasing the SRAA at SBMR and the WPAA at PTA for military training could limit Native Hawaiian access to and use of sites on these parcels for traditional or religious purposes. Mitigation would reduce the impact to less than significant.

Constructing FTI antennas at SBMR, including on Mount Ka'ala and at PTA, may result in visual impacts on cultural landscapes. Because some sites would require construction, they could have an adverse effect on the nature of the cultural landscape.

Activities relating to the construction of Dillingham Trail from DMR to SBMR could also result in significant impacts on such cultural properties, but identified mitigations, including identification and avoidance, would likely reduce the impact to less than significant.

There would be no significant environmental justice impacts on ATIs resulting from increased noise at SBMR because the noise contour maps show no noise impacts near identified ATIs, and public access to these locations would be limited to times when no ordnance would be firing. There would be no environmental justice noise impacts on ATIs at Mauna Kea (adjacent to PTA) because the noise analysis shown in Section 8.6 indicates that noise contours relating to ordnance use and construction under SBCT would not extend much beyond the PTA boundaries. There would be no significant environmental justice impacts on low-income or Native Hawaiian populations from increased fugitive dust emissions at SBMR because such emissions would not be significant, because of prevailing wind patterns, and because such communities are not near the SBMR training areas.

### 10.2.3 Impacts at Schofield Barracks Military Reservation and Wheeler Army Airfield

#### *Proposed Action*

*Significant Impacts*

*Impact 1: Environmental Justice Impacts on Areas of Traditional Importance.* SRP (2003) conducted a TCP survey, as defined in Section 3.11.2, at SBMR, including the associated ranges. Archaeological surveys of construction areas and the range areas may not have identified TCPs or ATIs to Native Hawaiians, even though some archaeological sites may constitute an ATI. Activities relating to the construction of the BAX, UACTF, and QTR1, and the use of QTR2, could destroy or damage or restrict access to previously unknown ATIs to Native Hawaiians. Native Hawaiians consider range and training activities inappropriate and disrespectful uses of the land that disturb and change the character and feeling of spiritual places.

Acquisition of the SRAA and its subsequent use for military training could interfere with Native Hawaiian access to and use of sites on the parcel for traditional or religious purposes. Oral testimony indicates there are ATIs on the property, and some of these resources qualify as TCPs. Converting the area to military training purposes could result in limited Native Hawaiian access to some sites and might result in inadvertent physical damage or destruction of the sites. In order to protect such resources, a survey of the proposed construction and range areas for TCPs or ATIs has been conducted via pedestrian survey, archival research, oral interviews, and site visits with knowledgeable Native Hawaiians. USARHAW is taking a proactive role in trying to identify ATIs through its community outreach programs and activities, and it plans to continue with these activities.

Two FTI antenna support structures will be placed on Mount Ka‘ala and one near Kolekole Pass. While the proposed FTI antenna support structures have been located to avoid archaeological resources, these areas have been identified as important elements of the cultural landscape of Wai‘anae Uka. While the Kolekole antenna would be erected on top of an existing antenna support structure, the Mount Ka‘ala sites would require new construction and may be considered to have an adverse visual effect.

Construction of the UACTF is identified for an area near Kolekole Pass, on or adjacent to the Elou Cliff Trail, a traditional trail identified as a potential ATI. Previous reconnaissance surveys have failed to identify any remnants of the trail. The mitigation measures below will reduce the severity of the impact but not to less than significant levels.

*Regulatory and Administrative Mitigation 1.* Facility construction or training area uses will be designed to avoid identified traditional places and limit visual impacts on TCPs by site location, design, and orientation, where feasible.

If avoiding identified TCPs or ATIs is not feasible because of interference with the military mission or risk to public safety, the Army will consult with the SHPO and Native Hawaiians in accordance with the PA to identify impacts and to develop appropriate mitigation measures. Mitigation for impacts on the cultural landscape could include consulting with Native Hawaiians and having a cultural monitor oversee construction.

The Army will continue to provide Native Hawaiians with access to traditional religious and cultural properties, in accordance with AIRFA and Executive Order 13007, on a case-by-case basis. This access program will be expanded to include new land acquisitions.

The Army previously identified Native Hawaiian burial sites in the SBCT ROI. The Army completed notification and consultation for these burial sites, in accordance with NAGPRA, and left these human remains in place. To address any impacts on any burial sites, or an inadvertent discovery of Native Hawaiian human remains or funerary objects, the Army will abide by all notification and consultation requirements outlined in Section 3 of NAGPRA.

### *Less than Significant Impacts*

*Environmental Justice impacts from noise.* Short-term and long-term indirect minor adverse effects on environmental justice populations could occur from noise. No minority or low-income residences would be displaced by land acquisition, training modifications, or new construction as a result of the Proposed Action. However, noise from construction project sites or vehicle maneuver areas could have adverse noise impacts on nearby private residences or schools (see Section 4.6.3, Summary of Noise Impacts). Noise from construction would be short-term, lasting only for the duration of the construction project. Noise impacts from vehicle maneuver training would be long-term. However, this type of training is currently occurring at SBMR. The magnitude of the noise would not be expected to warrant mitigation measures (see Section 4.6.3, Summary of Noise Impacts, and Section 5.13, Environmental Justice and Protection of Children).

*Environmental Justice impacts from air quality.* Short-term indirect minor adverse effects on environmental justice populations could occur from impacts on air quality. As discussed in more detail in Section 5.5, the substantial increase in fugitive $PM_{10}$ emissions from military vehicle use at SBMR, the likelihood of exceeding the federal 24-hour standard, and the potential impacts on quality of life on surrounding communities combined may result in a significant air quality impact at SBMR under the Proposed Action. As discussed in Section 4.5, the Army will implement mitigation measures to reduce the impact to a less than significant level. Based on dispersion modeling, the air quality impacts way affect the residential communities of Mililani Town and Wahiawa because of their proximity to the SBMR training areas and because of prevailing wind patterns. These communities do house some Army families stationed at SBMR and WAAF, many of whom are Hispanic or Asian. However, neither Wahiawa nor Mililani has a greater proportion of low-income or minority members than most communities in Hawai'i. Kunia Village and Poamoho Village do have large percentages of Native Hawaiian and low-income residents, but these communities will not be significantly affected by fugitive $PM_{10}$ emissions due to their distance from SBMR training areas. Therefore, air emissions would not disproportionately affect native Hawaiian, low-income, or other local ethnic minority groups.

*Environmental justice impacts – protection of children.* Although the risk is low, it is possible for the health of children to be affected by the Proposed Action through exposure to smoke. Risks to children inherent in training and day-to-day operations would be minimized or avoided by adhering to Army-wide, unit and installation, and other applicable safety regulations and procedures. Exercises at SBMR use pyrotechnics and blank ammunition. The last training incident involving the public occurred three years ago at the northwest end of SBMR (see Section 5.12, Hazardous Materials). Smoke from a smoke grenade blew into a residential community and some children had to be examined at a hospital (Borja 2002b).

Construction and training activities would, for the most part, take place in areas that are off-limits to the general public. Restricted areas would continue to be posted with signs, enclosed by a fence, or stationed with guards. Strict adherence to applicable safety regulations and procedures would continue to protect the health and safety of children. The environmental justice impact to the health and safety of children will be less than significant.

*Environmental justice impacts from traffic.* Increased military traffic on public roads around SBMR would also accompany the Proposed Action. When military actions are conducted in areas accessible to the public, such as public roadways, the risk associated with the operations could extend to civilians. Risks to the public and military personnel inherent in training and day-to-day operations would be minimized or avoided through adherence to existing Army-wide, unit and installation, and other applicable safety regulations and procedures. The environmental justice impacts from traffic will be less than significant.

*No Impacts*

*Environmental justice impacts from noise to Areas of Traditional Importance.* There would be no significant environmental justice impacts on Native Hawaiian ATIs resulting from increased noise under the Proposed Action. Noise impacts described in Section 5.6 would not have an impact on potential ATIs at Mount Ka‘ala and Kolekole Pass because the noise contour maps show no noise impacts in these areas, and public access to these locations would be limited to times when no ordnance would be firing.

#### *Reduced Land Acquisition*

Significant impacts would be the same as those under the Proposed Action.

#### *No Action*

*No Impacts*

No effects on environmental justice are expected. No Action would not alter the existing health and safety, housing, or economic conditions of minority or low-income populations in Wahiawā CCD or Honolulu County.

### 10.2.4 Impacts at Dillingham Military Reservation

#### *Proposed Action*

*Significant Impacts Mitigable*

*Impact 2: Environmental justice impacts on Areas of Traditional Importance.* The archaeological survey of the proposed alignment has not necessarily identified TCPs or ATIs, although some of the archaeological sites identified might be considered ATIs, including gravesites and temples or heiau. Site 191 in the southeast of DMR, Kawailoa Heiau, is sacred. Construction activities and use of Dillingham Trail could damage or destroy such resources as a result of direct or indirect activities, as described in Impact 1. The mitigation measures below will reduce the severity of the impact but not to less than significant levels.

*Regulatory and Administrative Mitigation 2.* Facility construction or training area uses will be designed to avoid identified traditional places and limit visual impacts on TCPs by site location, design, and orientation, where feasible.

If avoiding identified TCPs or ATIs is not feasible because of interference with the military mission or risk to public safety, the Army will consult with the SHPO and Native Hawaiians in accordance with the PA to identify impacts and to develop appropriate mitigation measures. Mitigation for impacts on the cultural landscape could include consulting with Native Hawaiians and having a cultural monitor oversee construction.

The Army will continue to provide Native Hawaiians with access to traditional religious and cultural properties, in accordance with AIRFA and Executive Order 13007, on a case-by-case basis. This access program will be expanded to include new land acquisitions.

The Army previously identified Native Hawaiian burial sites in the SBCT ROI. The Army completed notification and consultation for these burial sites, in accordance with NAGPRA, and left these human remains in place. To address any impacts on any burial sites or an inadvertent discovery of Native Hawaiian human remains or funerary objects, the Army will abide by all notification and consultation requirements outlined in Section 3 of NAGPRA.

#### *Less than Significant Impacts*

*Environmental justice economic impacts.* Short- and long-term indirect minor adverse effects on environmental justice populations could occur. Approximately 78.7 percent of Honolulu County and 69.6 percent of Waialua CCD was made up of minority ethnic populations (US Census Bureau 2000a), and 9.7 percent of Honolulu County had income levels below the poverty line (US Census Bureau 2001). DMR is located in an isolated portion of O‘ahu, and no military or civilian personnel are permanently stationed at DMR. However, increased military traffic on public roads between DMR and SBMR would accompany the Proposed Action. Military vehicles could travel through predominantly minority residential neighborhoods. When military actions are conducted in areas accessible to the public, such as public roadways, the risk associated with the operations could extend to civilians. Noise from vehicle maneuvers could also disturb nearby residents. Risks to the public and military personnel inherent in training and day-to-day operations would be minimized or avoided through adherence to existing Army-wide, unit and installation, and other applicable safety regulations and procedures.

### ***Reduced Land Acquisition***

The impacts associated with RLA would be identical to those described for the Proposed Action.

### No Action

No effects on environmental justice are expected.

## 10.2.5 Impacts at Kahuku Training Area/Kawailoa Training Area

### Proposed Action

Less than Significant Impacts

*Environmental justice impacts on Areas of Traditional Importance*. The ATIs that have been identified at KTA are outside the boundaries of the project areas for the construction and use of the CACTF and tactical vehicle wash. However, further oral historical and archival research might identify ATIs that could be affected by these projects. Any identified ATIs will be avoided where feasible. Construction or training area uses will be designed to avoid identified traditional places and to minimize visual impacts on traditional cultural landscapes by site location, design, and orientation, where feasible.

If identified ATIs cannot be avoided because of interference with the military mission or risk to public safety, USARHAW will consult to identify impacts and to develop appropriate mitigation measures. Such mitigation will be developed in consultation with the SHPO and Native Hawaiians, in accordance with the provisions of the PA.

The Army has identified Native Hawaiian burial sites in the Proposed Action's ROI. The Army completed notification and consultation for these burial sites in accordance with NAGPRA and left these human remains in place. If impacts are identified that may affect any burial sites, or if there is an inadvertent discovery of Native Hawaiian human remains or funerary objects, the Army will abide by all notification and consultation requirements, as outlined in NAGPRA.

*Environmental justice economic impacts.* Short-term and long-term indirect minor adverse effects on environmental justice populations could occur. Approximately 78.7 percent of Honolulu County and 69.0 percent of the Ko'olauloa CCD was made up of minority ethnic populations (US Census Bureau 2000a), and 9.7 percent of Honolulu County had income levels below the poverty line (US Census Bureau 2001). There are no military or civilian personnel permanently stationed at KTA. However, increased military traffic on public roads between KTA and SBMR would accompany the Proposed Action. Military vehicles could travel through predominantly minority residential neighborhoods. When military actions are conducted in areas accessible to the public, such as public roadways, the risk associated with the operations could extend to civilians. Noise from vehicle maneuvers could also disturb nearby residents. Risks to the public and military personnel inherent in training and day-to-day operations would be minimized or avoided through adherence to existing Army-wide, unit and installation, and other applicable safety regulations and procedures.

### Reduced Land Acquisition Alternative

The impacts associated with Reduced Land Acquisition are identical to those described for the Proposed Action.

***No Action Alternative***

*No Impacts*

No Action would not alter the existing health and safety, housing, or economic conditions of minority or low-income populations in Koʻolauloa CCD or Honolulu County, so no effects on environmental justice are expected.

### 10.2.6 Impacts at Pohakuloa Training Area

***Proposed Action (Preferred Alternative)***

*Significant Impacts Mitigable*

*Impact 1: Environmental justice impacts on Areas of Traditional Importance.* SRP is conducting a TCP survey at PTA to identify ATIs (SRP 2002). As noted previously, evidence indicates the possible presence of ATIs, including burials in the ROI of PTA, although the survey did not identify any ATIs within the project areas.

There would be no noise impacts on ATIs at Mauna Kea because the noise analysis shown in Section 8.6 indicates that noise contours relating to ordnance use and construction under SBCT would not extend much beyond the PTA boundaries.

One FTI antenna will be placed on Mauna Loa, nine others will be located around PTA and the WPAA, and one more will be erected at Kawaihae. While the precise locations of the FTI sites will avoid archaeological resources, Mauna Loa has been identified as a particularly sacred element of the Native Hawaiian cultural landscape. While the antennas would be erected on top of existing support structures, the construction may be considered to have an adverse effect on the nature of the cultural landscape. ATIs and burials, if located within the area of construction activities or new training areas, would be at risk of damage or destruction as a result of the Proposed Action. Impacts could be caused by human presence in the area, physical disturbance from human or vehicle passage, or actual damage from excavation or erosion. The mitigation measures described below will reduce the severity of these impacts on ATIs.

*Regulatory and Administrative Mitigation 1.* Facility construction or training area uses will be designed to avoid identified traditional places and limit visual impacts on TCPs by site location, design, and orientation, where feasible.

If avoiding identified TCPs or ATIs is not feasible because of interference with the military mission or risk to public safety, the Army will consult with the SHPO and Native Hawaiians in accordance with the PA to identify impacts and to develop appropriate mitigation measures. Mitigation for impacts on the cultural landscape could include consulting with Native Hawaiians and having a cultural monitor oversee construction.

The Army will continue to provide Native Hawaiians with access to traditional religious and cultural properties, in accordance with AIRFA and Executive Order 13007, on a case-by-case basis. This access program will be expanded to include new land acquisitions.

The Army previously identified Native Hawaiian burial sites in the SBCT ROI. The Army completed notification and consultation for these burial sites, in accordance with NAGPRA, and left these human remains in place. To address any impacts on any burial sites, or an inadvertent discovery of Native Hawaiian human remains or funerary objects, the Army will abide by all notification and consultation requirements outlined in Section 3 of NAGPRA.

*Less than Significant*

*Environmental justice impacts from air quality.* PTA and WPAA are likely to experience significant impacts from fugitive dust on air quality. As discussed in Section 8.5, the Army will implement mitigation measures to reduce the impacts from fugitive dust to less than significant levels. The activities at PTA and WPAA are remote. Waiki'i Ranch and the Kilohana Girl Scout Camp may experience some impacts from air quality. There are no low-income or minority communities that would be disproportionately affected, so the impacts on environmental justice communities from air quality on the island of Hawai'i would be less than significant.

*No Impacts*

*Economic impacts on environmental justice.* No disproportionate effects on environmental justice populations would occur. PTA is relatively isolated, and there are no military or civilian personnel permanently stationed at DMR. There are no residential neighborhoods or schools nearby that would be affected by noise or traffic from training or construction activities.

There would be no environmental justice noise impacts on ATIs at Mauna Kea (adjacent to PTA) because the noise analysis shown in Section 8.6 indicates that noise contours relating to ordnance use and construction under SBCT would not extend much beyond the PTA boundaries.

### *Reduced Land Acquisition Alternative*

*No Impacts*

The RLA Alternative would have the same impacts on environmental justice as the Proposed Action.

### *No Action Alternative*

*No Impacts*

No effects on environmental justice are expected.

## 10.3 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

An EIS must describe any significant unavoidable impacts for which either no mitigation or only partial mitigation is feasible. Significant and unavoidable impacts from the Proposed Action occur in the following areas:

- Unauthorized recreational access at KTA may be adversely affected by additional fencing and signs restricting access, which is necessary due to the proposed live-fire use of the area (Section 7.2, Land Use/Recreation);
- Air quality impacts from wind erosion of areas previously disturbed by off-road vehicle maneuver activity (where vegetation has been decreased resulting in increased wind erosion) at PTA (Section 8.5, Air Quality);
- Noise impacts from ordnance use at SBMR (Section 5.6, Noise);
- Soil loss from training activities at SBMR, DMR, KTA, and PTA (Section 5.9, Section 7.9, and Section 8.9, Geology, Soils, and Seismicity);
- Biological impacts from fire on sensitive species and habitat at SBMR, KTA and PTA (Section 5.10, Section 7.10, and Section 8.10 Biological Resources);
- Biological impacts from off-road training activities on sensitive species and habitat at PTA (Section 8.10 Biological Resources);
- Cultural resource impacts on historic buildings at KTA (the Nike Missile Site) and PTA (the Ke'āmuku Village) (Section 7.11 and Section 8.11 Cultural Resources);
- Cultural resource impacts on archaeological resources from range and facility construction at PTA (Section 8.11 Cultural Resources);
- Cultural resource impacts on archaeological resources from training activities at DMR and PTA (Section 6.11 and Section 8.11 Cultural Resources);
- Cultural resource impacts on Areas of Traditional Importance at SBMR, DMR, and PTA (Section 5.11, Section 6.11 and Section 8.11 Cultural Resources);
- Cumulative impacts on land use (Section 9.5 Cumulative Impacts);
- Cumulative impacts on biological resources (Section 9.5 Cumulative Impacts);
- Cumulative impacts on cultural resources (Section 9.5 Cumulative Impacts);
- Cumulative impacts on human health and safety hazards (Section 9.5 Cumulative Impacts); and,
- Environmental Justice impacts on Areas of Traditional Importance at SBMR, DMR, and PTA (Section 10.2.3, Section 10.2.4 and Section 10.2.6 Environmental Justice).

## 10.4 Relationship Between Local Short-Term Uses of the Environment and Long-Term Productivity

NEPA requires that an EIS consider the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity.

Construction activities associated with the proposed projects are short-term and temporary. All significant construction impacts would be mitigated, where practicable, under the constraints of public safety and the military mission. Short-term damage to the environment relating to construction includes direct and indirect loss of habitat and damage to sensitive species, loss of nonrenewable cultural resources, emissions impacts on air quality, and surface water quality impacts. Long-term environmental damage includes loss of important farmland, impacts on soil and water quality, impacts on habitat and wildlife from training activities, erosion, and wildfires, air quality impacts from wind erosion due to training activities, and potential damage to cultural resources in the future.

The conversion of important farmland to military use at PTA and SBMR could affect long-term agricultural productivity in Hawaiʻi, but under current law, conversion of important farmlands is exempt from mitigation requirements if the conversion is necessary for national defense.

Long-term productivity would be served by replacing inadequate and inefficient facilities at SBMR and KTA with modern fuel-efficient buildings designed to reduce long-term reliance on nonrenewable fuel sources. Such replacement would also remove workplace hazards, such as LBP and ACM. Infrastructure upgrades (such as communications and power systems) associated with the Proposed Action would prolong the life of these facilities, and it would cost less to maintain and repair them. New facilities, such as the vehicle washes, would be designed to reduce the spread of invasive species and to use recycled water, and other facilities, such as the FTI, may be designed to use solar power, thus minimizing the project's long-term energy requirements.

The long-term productivity of the Proposed Action is based on the Army's mission, specifically its duty under transformation. Any measurement of long-term productivity in this context must include the overriding importance of national defense and the Army's obligation to adapt to changing national security needs. While the Army will take whatever actions are reasonable and practicable to preserve and protect the natural environment under its stewardship, the necessity of national defense requires the Army to provide the nation with capabilities that meet current and evolving national defense requirements. The Proposed Action is designed to meet these goals and further the security and welfare of the US, its residents, and its natural environment.

## 10.5 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

NEPA requires that an EIS analyze the extent to which the proposed project's primary and secondary effects would commit nonrenewable resources to uses that would be irretrievable to future generations.

Implementing the Proposed Action or the RLA Alternative would require committing both renewable and nonrenewable energy and material resources for demolishing inadequate facilities at SBMR and PTA; for constructing FTI towers, proposed ranges, and support facilities at SBMR, DMR, KTA, WAAF, and PTA; and for constructing Dillingham Road and Helemanō and PTA Trails. Material resources would include wood, concrete, metals, and asphalt and other petroleum products, and nonrenewable energy would be used in the construction. This energy expenditure would occur over the short term and would be irreversible once construction is completed. Additionally, further review has indicated that maneuver training at the WPAA may result in an irretrievable commitment of soil resources by loss through erosion of soils that support sensitive plant species and habitat.

Other nonrenewable resources would be used during SBCT training, such as the fuel used by Strykers and other vehicles in maneuvers and troop convoys; the water, power, and other resources necessary to maintain and operate the new military vehicle trails and new training facilities at SBMR, KTA, and PTA; and the increase in local resources required to support the additional military personnel and their families.

# CHAPTER 11

# REFERENCES

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- Kahuku Public and School Library, 56-490 Kamehameha Hwy., Kahuku
- Mililani Public Library, 95-450 Makaimoimo Street, Mililani
- Hawaii State Library, 478 South King St., Honolulu
- Wahiawa Public Library, 820 California Avenue, Wahiawa
- Waianae Public Library, 85-625 Farrington Hwy., Waianae
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3rd Senatorial District
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Shan S. Tsutsui
4th Senatorial District
Honolulu, HI

Rosalyn Baker
5th Senatorial District
Honolulu, HI

J. Kalani English
6th Senatorial District
Honolulu, HI

Gary L. Hooser
7th Senatorial District
Honolulu, HI

Sam Slom
8th Senatorial District
Honolulu, HI

Les Ihara, Jr.
9th Senatorial District
Honolulu, HI

Brian K. Blundell
10th Representative District
Honolulu, HI

Chris Halford
11th Representative District
Honolulu, HI

Kika G. Bukoski
12th Representative District
Honolulu, HI

Sol P. Kaho`ohalahala
13th Representative District
Honolulu, HI

Hermina M. Morita
14th Representative District
Honolulu, HI

Ezra R. Kanoho
15th Representative District
Honolulu, HI

Bertha C. Kawakami
16th Representative District
Honolulu, HI

Bud Stonebraker
17th Representative District
Honolulu, HI

Bertha F. K. Leong
18th Representative District
Honolulu, HI

Barbara Marumoto
19th Representative District
Honolulu, HI

Brian T. Taniguchi
10th Senatorial District
Honolulu, HI

Carol Fukunaga
11th Senatorial District
Honolulu, HI

Gordon Trimble
12th Senatorial District
Honolulu, HI

Suzzane Chun Oakland
13th Senatorial District
Honolulu, HI

Donna Mercado Kim
14th Senatorial District
Honolulu, HI

Norman Sakamoto
15th Senatorial District
Honolulu, HI

David Y. Ige
16th Senatorial District
Honolulu, HI

Ron Menor
17th Senatorial District
Honolulu, HI

Cal Kawamoto
18th Senatorial District
Honolulu, HI

Brian Kanno
19th Senatorial District
Honolulu, HI

Calvin K. Y. Say
20th Representative District
Honolulu, HI

Scott Y. Nishimoto
21st Representative District
Honolulu, HI

Scott K. Saiki
22nd Representative District
Honolulu, HI

Melodie Williams Aduja
23rd Senatorial District
Honolulu, HI

Bob Hogue
24th Senatorial District
Honolulu, HI

Fred Hemmings
25th Senatorial District
Honolulu, HI

Corinne W. L. Ching
27th Representative District
Honolulu, HI

Felipe P. Abinsay, Jr.
29th Representative District
Honolulu, HI

Glenn Wakai
31st Representative District
Honolulu, HI

Blake K. Oshiro
33rd Representative District
Honolulu, HI

Willie C. Espero
20th Senate District
Honolulu, HI

Colleen Hanabusa
21st Senatorial District
Honolulu, HI

Robert Bunda
22nd Senatorial District
Honolulu, HI

Kirk Caldwell
24th Representative District
Honolulu, HI

Brian Schatz
25th Representative District
Honolulu, HI

Sylvia J. Luke
26th Representative District
Honolulu, HI

Kenneth T. Hiraki
28th Representive District
Honolulu, HI

Dennis A. Arakaki
30th Representative District
Honolulu, HI

Lynn Finnegan
32nd Representative District
Honolulu, HI

K. Mark Takai
34th Representative District
Honolulu, HI

Alex M. Sonson
35th Representative District
Honolulu, HI

Roy M. Takumi
36th Representative District
Honolulu, HI

Guy P. Ontai
37th Representative District
Honolulu, HI

Marilyn B. Lee
38th Representative District
Honolulu, HI

Marcus R. Oshiro
39th Representative District
Honolulu, HI

Mark S. Mosses
40th Representative District
Honolulu, HI

Jon Riki Karamatsu
41st Representative District
Honolulu, HI

Tulsi Gabbard Tamayo
42nd Representative District
Honolulu, HI

Romy M. Mindo
43rd Representative District
Honolulu, HI

Michael Puamamo Kahikina
44th Representative District
Honolulu, HI

Maile S. L. Shimabukuro
45th Representative District
Honolulu, HI

Michael Y. Magaoay
46th Representative District
Honolulu, HI

Ken Ito
48th Representative District
Honolulu, HI

David A. Pendleton
49th Representative District
Honolulu, HI

Tommy Waters
51st Representative District
Honolulu, HI

Cynthia Henry Thielen
Assistant Minority Floor Leader, 50th Representative District
Honolulu, HI

Colleen R. Meyer
Assistant Minority Leader, 47th Representative District
Honolulu, HI

J. Curtis Tyler
County of Hawaii, Hawaii County Council
Kailua-Kona, HI

Linda Lingle
Governor
Honolulu, HI

Sharon Ackles
State of Hawaii, Governor's Liaison Officer to West Hawaii
Kailua-Kona, HI

Galen Fox
House Republican Leader, 23rd Representative District
Honolulu, HI

Andy Levin
Mayor's Office
Hilo, HI

John Souza
Office of Senator Hanabusa
Honolulu, HI

Alexis Lum
Office of Senator Inouye
Honolulu, HI

Neil Abercrombie
Prince Kuhio Federal Building
Honolulu, HI

James Arakaki
Hilo, HI

Romy Cachola
Honolulu, HI

Charles D'jou
Honolulu, HI

Andy Smith
State of Hawaii, Governor's Liaison Officer to East Hawaii
Hilo, HI

Curtis Tyler, III
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Hilo, HI

Jeremy Harris
Mayor, City and County of Honolulu
Honolulu, HI

Nina Fisher
Office of Senator Hanabusa
Honolulu, HI

Jennifer Goto Sabas, Esq.
Office of Senator Inouye
Honolulu, HI

Harry Kim
Office of the Mayor
Hilo, HI

Daniel K. Akaka
Honolulu, HI

Duke Bainum
Honolulu, HI

Aaron Chung
Hilo, HI

Donovan Dela Cruz
Honolulu, HI

Leningrad Elarionoff
Hilo, HI

John Henry Felix
Honolulu, HI

Mike Gabbard
Honolulu, HI

Nestor Garcia
Honolulu, HI

Daniel K. Inouye
Honolulu, HI

Julie Jacobson
Hilo, HI

Ann Kobayashi
Honolulu, HI

Bobby Jean Leithead-Todd
Hilo, HI

Barbra Marshall
Honolulu, HI

Ed Case
Honolulu, HI

Gary Okino
Honolulu, HI

Joe Reynolds
Kailua-Kona, HI

Gary Safarik
Hilo, HI

Rod Tam
Honolulu, HI

Dominic Yagong
Hilo, HI

## Federal Agencies

John Nau III
Advisory Council on Historic Preservation
Lakewood, CO

Advisory Council on Historic Preservation
Washington, DC

Horst Greczmiel
Council on Environmental Quality
Washington, DC

Moses Akana
Federal Aviation Administration, Honolulu Control Facility
Honolulu, HI

Charles Lieber
Federal Aviation Administration
Lawndale, CA

Christopher Volk
Federal Aviation Administration
Lawndale, CA

Dom Pascual
Federal Highway Administration
Hale`iwa, HI

David Gedeon
Federal Highway Administration - Central Federal Lands Highway Division
Lakewood, CO

R. Michael Laurs
National Marine Fisheries Service
Honolulu, HI

Margaret Akamine
NOAA Fisheries
Honolulu, HI

Lisa Hanf
US Environmental Protection Agency, Office of Federal Activities
San Francisco, CA

Gordon Smith
US Fish and Wildlife Service
Honolulu, HI

Bo Mahoe
US Postal Service
Wahiawa, HI

Michael Molina
US Fish and Wildlife Service
Honolulu, HI

Michael P. Jones
Federal Fire Department
Pearl Harbor, HI

Larry Smith
Federal Highway Administration
Lakewood, CO

Kenneth Kumor
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Burke, VA

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Oakland, CA

US Environmental Protection Agency, Office of Federal Activities
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US Environmental Protection Agency, Region 9
Honolulu, H

Eric Vanderwerf
US Fish and Wildlife Service
Honolulu, HI

Paul Henson
US Fish and Wildlife Service
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Dennis Orbus
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Oakland, CA

Willie Taylor
US Department of the Interior, Office of Environmental Policy and Compliance
Washington, DC

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411th Engineering Battalion
Honolulu, HI

Bob Smith
Bellows Air Force Environmental Division
Waimanalo, HI

Camp Smith
Camp Smith, HI

Jane Beachy
DPW Environmental
Kane`ohe, HI

Kapua Kawelo
DPW Environmental
Kane`ohe, HI

Joby Rohrer
DPW Environmental
Kane`ohe, HI

Nick Cavallaro
Headquarters, US Army Developmental Test Command
Aberdeen Proving Ground, MD

Hickam Air Force Base
Hickam AFB, HI

Marine Corps Base Kaneohe
Kaneohe Bay, HI

Steve Barker
Navy Region Hawaii Attn: N46
Pearl Harbor, HI

Linda Young
PACNAVFACENGCOM Code PLN214
Pearl Harbor, HI

Todd & Melissa Tagami
US Army
Ewa Beach, HI

Manroop Chawla
US Army ERDC
Champaign, IL

David Georgi
US Army Public Affairs Office
Alexandria, VA

US Coast Guard
Honolulu, HI

Susan L. Papuga
US Coast Guard
Honolulu, HI

US Navy
Pearl Harbor, HI

US Navy
Pearl Harbor, HI

Mary Spencer, SBA
US Navy Pacific Division
Pearl Harbor, HI

**State Agencies**

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Hawaii Fire Department
Hale`iwa, HI

Department of Education, Board of Education
Honolulu, HI

Wilfred Nagamine
Department of Helath, Clean Air Branch
Honolulu, HI

Jerry Y. Haruno
Department of Health, Environmental Health Services Division
Honolulu, HI

Mark Ignolia
Department of Health, Hazard Evaluation & Emergency Response
Honolulu, HI

William K.C. Wong
Department of Health, Safe Drinking Water Branch
Honolulu, HI

Harold Yee
Department of Health, Wastewater Branch
Honolulu, HI

Francis Oishi
Division of Aquatic Resources
Honolulu, HI

Raynard C. Soon
Department of Hawaiian Home Lands
Honolulu, HI

Denis R Lau
Department of Health, Clean Water Branch
Honolulu, HI

Thomas E. Arizumi
Departmentof Health, Environmental Management Division
Honolulu, HI

Russell S. Tanaka
Department of Health, Noise, Radiation and Indoor Air Quality Branch
Honolulu, HI

Steven Y.K. Chang
Department of Health, Solid and Hazardous Waste Branch
Honolulu, HI

Robert Nishimoto
Division of Aquatic Resources
Hilo, HI

Hawaii Army National Guard, Attn: Environmental Office
Honolulu, HI

Hawaii Coastal Zone Management Program
Honolulu, HI

Carol Terry, PhD
Hawaii Division of Forestry and Wildlife
Honolulu, HI

Mr. E. Nalei Pate-Kalakalau
Hawaii Island Burial Council, c/o Burials Program, Hawaii Historic Preservation Division
Kapolei, HI

Honolulu Board of Water Supply
Honolulu, HI

Pua Aiu
Office of Hawaiian Affairs
Honolulu, HI

Haunani Apoliona
Office of Hawaiian Affairs
Honolulu, HI

Ruby McDonald
Office of Hawaiian Affairs
Kailua-Kona, HI

Jalna Keala
Office of Hawaiian Affairs
Honolulu, HI

Nani Lee
Office of Hawaiian Affairs
Honolulu, HI

Clyde Namuo
Office of Hawaiian Affairs
Honolulu, HI

Ululani Sherlock
Office of Hawaiian Affairs/EH
Hilo, HI

State Department of Business, Economic Development, and Tourism Office of Planning
Honolulu, HI

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State Historic Preservation Office
Kapolei, HI

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State of Hawaii, Department of Transportation
Honolulu, HI

Linda Scheffler
State of Hawaii, Department of Transportation
Kailua-Kona, HI

Glenn M. Yasui
State of Hawaii, Department of Transportation, Highways Division
Honolulu, HI

State of Hawaii, Department of Transportation, Harbors Division
Honolulu, HI

Antonie Wurster
State of Hawaii, Department of Transportation
Honolulu, HI

Mary Blewitt
State of Hawaii, Department of Business, Economic Development and Tourism
Honolulu, HI

Tom Smyth
State of Hawaii, Department of Business, Economic Development and Tourism
Honolulu, HI

Nick Vaccaro
State of Hawaii, Department of Land and Natural Resources
Honolulu, HI

Richard Ing
State of Hawaii, Department of Land & Natural Resources
Honolulu, HI

Harry Yada
State of Hawaii, Department of Land & Natural Resources
Hilo, HI

Peter Young
State of Hawaii, Department of Land and Natural Resources
Honolulu, HI

State of Hawaii, DLNR Public Information Office
Honolulu, HI

State of Hawaii, Office of Environmental Quality Control
Honolulu, HI

Marcus R. Oshiro
State Capitol
Honolulu, HI

**Local Agencies**

`Ewa Neighborhood Commission Office
Honolulu, HI

Ala Moana/Kaka`ako Neighborhood Commission Office
Honolulu, HI

Aliamanu/Salt Lake/Foster Village Neighborhood Commission Office
Honolulu, HI

Rae Loui
City and County of Honolulu, Department of Design and Construction
Honolulu, HI

Randy Fujiki
City and County of Honolulu, Department of Planning and Permitting
Honolulu, HI

Eric Crispin
City and County of Honolulu, Dept. of Design and Construction
Honolulu, HI

Timothy E. Steinberger, P.E.
City and County of Honolulu, Department of Design and Construction
Honolulu, HI

Heidi Meeker
City and County of Honolulu
Department of Education
Facilities Branch
Honolulu, HI

Loretta Chee
City and County, Department of Planning and Permitting
Honolulu, HI

Larry Brown
County of Hawaii, Planning Department
Hilo, HI

Christopher J. Yuen
County of Hawaii, Planning Department
Hilo, HI

County of Hawaii Department of Public Works
Hilo, HI

County of Hawaii Department of Parks and Recreation

County of Hawaii Civil Defense
Hilo, HI

County of Hawaii Fire Department
Hilo, HI

County of Hawaii Department of Environmental Management
Hilo, HI

County of Hawaii Police Department
Hilo, HI

Milton Pavao
County of Hawaii, Department of Water Supply
Hilo, HI

Jane Testa
Dept. of Research and Development, Co. of Hawaii
Hilo, HI

Lee Donohue
Honolulu Police Department
Honolulu, HI

Attilio K. Leonardi
Honolulu Fire Department
Honolulu, HI

Hawai`i Kai Neighborhood Commission Office
Honolulu, HI

Kaimuki Neighborhood Commission Office
Honolulu, HI

Kalihi Valley Neighborhood Commission Office
Honolulu, HI

Kalihi-Palama Neighborhood Commission Office
Honolulu, HI

Kan`eohe Satellite City Hall
Kaneohe, HI

Ko`olauloa Neighborhood Commission Office
Honolulu, HI

Kuliouou/Kalani Iki Neighborhood Commission Office
Honolulu, HI

Liliha/`Alewa/Pu`unui/Kamehameha Heights Neighborhood Commission Office
Honolulu, HI

McCully/Mo`ili`ili Neighborhood Commission Office
Honolulu, HI

Tim D. Dittrick
Mililani Mauka/Launani Valley Neighborhood Commission Office
Mililani, HI

David L. Ellis
Mililani Mauka/Launani Valley Neighborhood Commission Office
Mililani, HI

Melissa Graffigna
Mililani Mauka/Launani Valley Neighborhood Commission Office
Mililani, HI

Dean Hazama
Mililani Mauka/Launani Valley Neighborhood Commission Office
Mililani, HI

Teresa K. Lau
Mililani Mauka/Launani Valley Neighborhood Commission Office
Mililani, HI

Marty Ortogero
Mililani Mauka/Launani Valley Neighborhood Commission Office
Mililani, HI

Alonzo M. Sandocal
Mililani Mauka/Launani Valley Neighborhood Commission Office
Mililani, HI

Lance Yoshimura
Mililani Mauka/Launani Valley Neighborhood Commission Office
Mililani, HI

Mililani/Waipio/Melemanu Neighborhood Commission Office
Honolulu, HI

Nu`uanu/Punchbowl Neighborhood Commission Office
Honolulu, HI

Palolo Neighborhood Commission Office
Honolulu, HI

Pearl City Neighborhood Commission Office
Honolulu, HI

Chris Yuen
Planning Director, Co. of Hawaii
Hilo, HI

The Bus
Honolulu, HI

Wahiawa Neighborhood Commission Office
Honolulu, HI

Wai`alae-Kahala Neighborhood Commission Office
Honolulu, HI

Wai`anae Coast Neighborhood Commission Office
Honolulu, HI

Waikiki Neighborhood Commission Office
Honolulu, HI

Waimanalo Neighborhood Commission Office
Honolulu, HI

Waipahu Neighborhood Commission Office
Honolulu, HI

Ken Newfield
North Shore Neighborhood Board
Pupukea, HI

Cynthia K.L. Rezentes
Wai`anae Neighborhood Board
Wai`anae, HI

Jyun Yamamoto
Wahiawa Neighborhood Board
Wahiawa, HI

Mary Anne Long
Ko`olauloa Neighborhood Board
Hau`ula, HI

## Schools

Jan Iwase
Hale Kula Elementary School
Wahiawa, HI

Joan Madden
Hoala School
Wahiawa, HI

Jane Serikaku
Iliahi Elementary School
Wahiawa, HI

Gladys Otsuku
Ka'ala Elementary School
Wahiawa, HI

Robert Lindsey
Kamehaha Schools Hawaii Campus
Kea'au, HI

Colleen Wong
Kamehameha Schools
Honolulu, HI

Norman Minehara
Leilehua High School
Wahiawa, HI

Bobby Broyles
Trinity Lutheran School
Wahiawa, HI

Kathy Ferguson
University of Hawaii
Honolulu, HI

University of Hawaii at Hilo Institute for Astronomy
Hilo, HI

Graham Parkes
University of Hawaii, Department of Philosophy
Honolulu, HI

Roland Jenkins
Wahiawa Middle School
Wahiawa, HI

Joe Lee
Wheeler Elementary School
Wahiawa, HI

Chris L. Sheats
Leeward Community College
\`Aiea, HI

Vice Adm Robert Kihune (Ret)
Kamehameha Schools
Honolulu, HI

Kamehameha Schools Trustees
Honolulu, HI

Deborah Bee
Our Lady of Sorrows School
Wahiawa, HI

UH Center for Hawaiian Studies
Honolulu, HI

Phyllis Turnbull
University of Hawaii
Honolulu, HI

University of Hawaii,  Kua\`ana Student Service
Honolulu, HI

Denise Arai
Wahiawa Elementary School
Wahiawa, HI

Wai\`anae High School Hawaiian Studies Program
Wai\`anae, HI

Shirley Kitamura
Wheeler Middle School
Wahiawa, HI

Judy Smith
Colorado State University University
Ft. Collins, CO

## Libraries

Jo Ann Schindler
Hawaii State Public Library
Honolulu, HI

Keith Fujio
Hawaii State Public Library
Honolulu, HI

Hilo Public Library
Hilo, HI

Kailua-Kona Public Library
Kailua-Kona, HI

Thelma Parker Memorial Public and School Library
Kamuela, HI

Kahuku Public and School Library
Kahuku, HI

Mililani Public Library
Mililani, HI

Hawaii State Library
Honolulu, HI

Wahiawa Public Library
Wahiawa, HI

Waianae Public Library
Waianae, HI

Waialua Public Library
Waialua, HI

Waimanalo Public and School Libraries
Waimanalo, HI

UH Environmental Center
Honolulu, HI

## Organizations

\`Anela Gueco
Adopt An Ahupua\`a
Honolulu, HI

Arthur Pascual
Adopt An Ahupua\`a
Ewa, HI

Alec Sou
Aloun Farm, Inc.
Kapolei, HI

Kyle Kajihiro
American Friends Service Committee
Honolulu, HI

John Hunter
American Lung Association of Hawai\`i
Honolulu, HI

Charles Rose
Association of Hawaiian Civic Clubs
Honolulu, HI

Robert Midkiff
Atherton Foundation
Honolulu, HI

Roberta Chu
Bank of Hawaii
Hilo, HI

Steve Hurt
Big Island Bird Hunters
Keaau, HI

Christopher Linn
Booz | Allen | Hamilton
Arlington, VA

Eduardo Gremlich
Castle & Cook Resorts
Lanai City, HI

John Ray
Chamber of Commerce
Kailua-Kona, HI

Jim Tollefson
Chamber of Commerce of Hawaii
Honolulu, HI

Moses G. David
Children of God & Goddess
Kea`au, HI

Kim Beasley
Clean Islands Council
Honolulu, HI

Adrian Silva
Concerned Citizens of Wai`anae
Wai`anae, HI

Cindy Velasco Kimura
Aylward Enterprises, Inc.
Wahiawa, HI

Joanne Hiramatsu
BearingPoint
Honolulu, HI

William Yancey Brown
Bishop Museum
Honolulu, HI

Harry Saunders
Castle & Cook Homes
Mililani, HI

Alan Arakawa
Castle & Cooke Hawai`i
Mililani, HI

Charles Ota
Chamber of Commerce of Hawaii
Honolulu, HI

Gordon Chapman
Chapman Consulting Services
Waikoloa, HI

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Citizen Action Project
Honolulu, HI

Christina Kemmer
Communications-Pacific. Inc.
Honolulu, HI

Bill Prescott
Concerned Citizens of Waianae
Wai‘anae, HI

Marjorie Ziegler
Conservation Council for Hawaii
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Samuel Cooke
Cooke Foundation
Honolulu, HI

Edwardo Littleton
Del Monte Fresh Produce
Kunia, HI

Jim DuPont
DHHL
Kamuela, HI

DMZ Hawaii, Aloha Aina Camp
Honolulu, HI

Barbara Moore
Dragon Fly Ranch

Michael Fitzgerald
Enterprise Honolulu
Honolulu, HI

Bert L. Hatton
Estate of James Campbell
Kapolei, HI

Fred C. Weyand
Estate of Samuel Damon
Honolulu, HI

Karyn Nolan
Geo Insight
Honolulu, HI

Joshua Stanbro
Conserving Land for People
Honolulu, HI

Dickie Nelson
PTA Cultural Advisory Council
Kealakekua, HI

Sanford Higginbotham
Design Five Group
Princeville, HI

David H. Dinner
David H. Dinner, DDS

Brian Orlopp
Dole Foods
Wahiawa, HI

David Henkin
Earthjustice Legal Defense Fund
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Environment Hawai`i
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Timothy Johns
Estate of Samuel Damon
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Molly Maxwell-Stribling
Friends of Malaekahana
La`ie, HI

Goodfellow Brothers
Hilo, HI

Dan Weisgerber
Goodfellow Brothers
Hilo, HI

John McKoff
Goodfellow Brothers, Inc.
Hilo, HI

Georgette Stevens
Grace Pacific
Honolulu, HI

Katherine Aratani
Harris United Methodist Church
Kaneohe, HI

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Hawaiian Electric Company
Honolulu, HI

Hawai`i Environmental Educators Association
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Hilo, HI

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Hawai`i's Thousand Friends
Kailua, HI

Don McKoff
Goodfellow Brothers, Inc.
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Layton Yuen
Goodsill, Anderson, Quinn & Stifel
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Kawika Winter
Halau Hula O Kukunaokala
Honolulu, HI

Hawai`i Audubon Society
Honolulu, HI

Leimomi Khan
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Honolulu, HI

Clyde H. Nagata
Hawaiian Electric Light Company
Hilo, HI

Hawaiian Heritage Program
Honolulu, HI

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Hawai`i Island Planning Advocates
Hilo, HI

Hawai`i Nature Center
Honolulu, HI

Roy Kimura
Hawai`i Island Contractors Association
Hilo, HI

Paula Helfrich
Hawai`i Island Economic Development Board
Hilo, HI

Alan Mefford
Hawai`i Offroad Association

Tom Lenchanko
Hawaiian Civic Club of Wahiawa
Wahiawa, HI

Richard J. Oszustowicz
Hawaii Gold Cacao Tree, Inc.
Kapaau, HI

Hawaii's Thousand Friends
Kailua, HI

Dan Coats
Hilo Council Navy League
Kukuihaele, HI

David Scott
Historic Hawai`i Foundation
Honolulu, HI

Dawn Chang
Ho`akea
Honolulu, HI

Puanani Rogers
Hookipa Network
Kapaa, HI

Dan Gora
Hui Kalo
Hale`iwa, HI

John B. Ray
Hawai`i Leeward Planning Conference
Kamuela, HI

Ole Fulks
Hawai`i Speleological Survey
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Hawaii Conservation Association
Kona, HI

Kaoui Tsukiyama
Hawaiian Cultural Solutions
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Donna Camvel
Heeia Historical Society
Kaneohe, HI

Peter H. Schall
Hilton Hotels
Honolulu, HI

Gigi Cocquio
Ho`a `Aina O Makaha
Waianae, HI

M.A. Kit Glover
Honolulu Religious Society of Friends
Nanakuli, HI

Ted Vurfeld
Hualalai
Holualoa, HI

Gabe Kilakalua, Jr.
Hui Malama I Na Kupuna O Hawai`i Nei
Nanakuli, HI

William and Melva Aila
Hui Malama O Makua
Wai`anae, HI

Pat Patterson
Hui Malama O Makua
Wai`anae, HI

Albert Ledergerber
Huliau O Ka'u, Inc.
Pahala, HI

James A. Haley
Iliahi Foundation
Kailua, HI

Vicky Takamine
Ilio`ulaokalani Coalition
Honolulu, HI

John Romanowski
JW Glover Construction Company
Hilo, HI

G. Lee Loy
Ka Lahui Hawai`i, Royal Order of Kamehameha I
Hilo, HI

Luella King
Ka Ola Mamo - Wai`anae
Wai`anae, HI

Kahalu`u KEY Project
Kane`ohe, HI

Cha Smith
Kahea
Honolulu, HI

Fred Dodge
Hui Malama O Makua
Wai`anae, HI

James Sparky Rodrigues
Hui Malama O Makua
Wai`anae, HI

RK Kanui
HWPL
Waimanalo, HI

Momi Kamahele
Ilio`ulaokalani Coalition
Wai`anae, HI

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Honoka`a, HI

Ka Makani O Kohala Ohana
Kapaau, HI

Solomon Enos
Ka`ala Farm
Wai`anae, HI

Samuel Alapai Taula Kahanamoku III
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Kamuela, HI

Norman Kaleiola¢akea Gonsalves
Kahu O Kahiko, Inc.
Kamuela, HI

Monty Richards
Kahua Ranch
Kamuela, HI

Kailua
Kailua, HI

Kekuni Blaisdell
Kanaka Maoli Tribunal Komike
Honolulu, HI

Sharon Sakai
Kohala Coast Resort Association
Waikoloa, HI

Kona-Kohala Chamber of Commerce
Kailua-Kona, HI

Creighton & Cathleen Mattoon
Ko'olauloa Hawaiian Civic Club & O'ahu Caucus of...
Hau'ula, HI

Kepa Maly
Kumu Pono Associates
Hilo, HI

Katie Moa
Kupuna O Nanakuli
Wai`anae, HI

Bruce Coppa
Land Use Commission, The Pacific Partnership
Honolulu, HI

Warren Soh
Kahuku Community Association
Kahuku, HI

Randy Vitousek
Kamuela Charities of the Parker Ranch Foundation Trust Committee
Kailua-Kona, HI

Roland D. Sagum III
Kikiaola Land Company, Ltd.
Waimea, Kauai, HI

Kona-Kahala Chamber of Commerce
Kailua-Kona, HI

Jason Sumiya
Koolau Mountain Watershed Partnership
Mililani, HI

Kumu Pono Associates
Hilo, HI

Onaona Maly
Kumu Pono Associates
Hilo, HI

Jason Sumiye
KWIWP
Mililani, HI

James Greenwell
Lanihau Partners LP
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Life of the Land
Honolulu, HI

Henry Curtis
Life of the Land
Honolulu, HI

Hiram Diamond
Lions Club
Wahiawa, HI

Liz Huppman
Lyon Arboretum
Honolulu, HI

Libert K. O`Sullivan
Lyon Arboretum
Kailua, HI

Samuel Mitchell
Machinist Union Local 1998 &NB-10
Honolulu, HI

Betty Waller
Makaha Ahupua'a
Waianae, H

Malama O Puna
Pahoa, HI

Jim Albertini
Malu `Aina Center for Nonviolent Education & Action
Kurtistown, HI

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Mark A. Robinson Trusts
Honolulu, HI

Kealoha Pisciotta
Mauna Kea Anuine Hou
Hilo, HI

Daniel Akaka, Jr.
Mauna Lani Resort
Waikoloa, HI

Lloyd O'Sullivan
Mokule`ia Community Association
Waialua, HI

Stewart A. Ring, RADM
Mokule`ia Community Association
Waialua, HI

Keoni Choy
Na Koa
Kurtistown, HI

Harry Fegerstrom
Na Koa Lohe O Ke Akua
Pahoa, HI

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Nanakuli Ahupua`a Council
Wai`anae, HI

Kamaki Kanahele
Nanakuli Hawaiian Homestead Community Association
Nanakuli, HI

Katy Kok
Nani O Wai`anae
Wai`anae, HI

Leland Miyano
Native Hawaiian Wildlife Association
Kane`ohe, HI

Shad S. Kane
O`ahu Council of Hawaiian Civic Clubs
Kapolei, HI

A. Van Horn Diamond
Oahu Island Burial Council
Kapolei, HI

Cindy Goto
Oceanit
Honolulu, HI

Gwen Kim
Ohana Lualualei Ahupua`a Council
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Outrigger Enterprises, Inc.
Honolulu, HI

Keikilani Kainoa
OWB
Waikoloa, HI

Milo G. Clark
Pacific Bamboo Council
Pahoa, HI

W.C. Bergin
Paniolo Preservation Society
Kamuela, HI

Steven Montgomery
National Wildlife Federation
Waipahu, HI

North Shore
Hale`iwa, HI

Keone Thompson
OA-Hilo
Hilo, HI

Ohana Foley
Occupied Nation of Hawaii
Wahiawa, HI

Gwen Kim
Ohana Koa/Nuclear Free and Independent Pacific
Ka`a`awa, HI

Richard "Dickie" Nelson III
Oiwi Lokahi
Kealakekua, HI

Mel Kanishige
Outrigger Enterprises, Inc.
Honolulu, HI

Gil Kahele
Paa Pono Milolii
Hilo, HI

Rex Palmer
Palmer and Associates Consulting
Pahoa, HI

Pat Fitzgerald
Paniolo Preservation Society
Kailua-Kona, HI

Trustees
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Kamuela, HI

Mel Hewitt
Parker Ranch
Kamuela, HI

Nita Isherwood
Pomokai Farm B&B
Captain Cook, HI

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Protect Our Native Ohana
Hale`iwa, HI

Jerry King
Puuwaawaa Ranch
Kailua-Kona, HI

Robert Oshiro
Queen Emma Foundation
Honolulu, Hi

David Peters
Queen Liliuokalani Trust
Honolulu, HI

Stanley H. Roehrig
Roehrig, Wilson & Hara
Hilo, HI

Joe Rodrigues
Royal Order of the Crown of Hawaii
Honolulu, HI

Kalikolehua Kanoele
Royal Order of Kamehameha
Hilo, HI

Carl Carlson Jr.
Parker Ranch
Kamuela, HI

Tom Whittemore
Parker Ranch
Kamuela, HI

Kunani Nihipali
Poo
Haleiwa, HI

Conczicas Farias
Puuwaawaa Ranch
Kona, HI

Les Goya
Queen Emma Foundation
Honolulu, HI

Thomas Kaulukukui
Queen Liliuokalani Trust
Honolulu, HI

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Roegrig, Wilson & Hara
Hilo, HI

Reynolds Kamakawiwoole
Royal Order of Aha Hui Ku Mauna
Honokaa, HI

Mamo Kawika Awana
Royal Order of Kamehameha
Hilo, HI

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Sandwich Isles Communication
Honolulu, HI

Sue Crede
SAIC
Reston, VA

Adm. (Ret) Robert Kihune
Sandwich Isles Communications, Inc.
Honolulu, HI

Save Our Bays and Beaches
Kane`ohe, HI

John & Marion Kelly
Save Our Surf
Honolulu, HI

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Sierra Club
Hilo, HI

Deborah Ward
Sierra Club
Kurtistown, HI

Judy Dalton
Sierra Club, Kauai Group
Lihue, HI

Daniel Grantham
Sierra Club, Maui Group
Paia, HI

Phil Barnes
Sierra Club, Moku Loa Group
Hilo, HI

Cory Harden
Sierra Club, Moku Loa Group
Hilo, HI

Nara Takakawa
Sierra Club, Oahu Group
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Jeffery Mikulina
Sierra Club, Hawaii
Honolulu, HI

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South Kohala Traffic Safety Committee
Kamuela, HI

Trenchard
Sovereign Nation of Hawaii
Haleiwa, HI

SSFM International
Hilo, HI

Neal Herbert
SSFM International
Hilo, HI

Corey Matsuoka
SSFM International
Hilo, HI

Robert S. Tsushima
SSFM International
Kona, HI

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Kapolei, HI

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The Estate of James Campbell
Kapolei, HI

Bert Hatton
The Estate of James Campbell
Kapolei, HI

Admiral Ronald J. Zlatoper (Ret)
The Estate of James Campbell
Kapolei, HI

David McCoy
The Estate of James Campbell
Kapolei, HI

Keahi Balaz
The Nature Conservancy
Wahiawa, HI

Alan Lloyd
The Nature Conservancy
Kailua, HI

Bev O`Sullivan
The Nature Conservancy
Kailua, HI

Suzanne Case
The Nature Conservancy
Honolulu, HI

Pauline Sato
The Nature Conservancy of Hawaii
Waipahu, HI

Mary Steiner
The Outdoor Circle
Honolulu, HI

Nalani Tavares
Ukanipo Heiau Advisory Council
Wai`anae, HI

Dan Madeira
Veterans of Foreign Wars Hawai`i
Wai`anae, HI

H. Mitchell D'Olier
Victoria Ward, Ltd.
Honolulu, HI

Jim Zampathas
Virtual World Developers, Inc.
Kamuela, HI

Renton Nip
Waihee & Nip
Honolulu, HI

Libby Smith
Wahiawa Community and Business Association
Wahiawa, HI

Ivan Laikupu
Wai`anae Ahupua`a Council
Wai`anae, HI

Joseph Lapilio
Wai`anae Coast Coalition
Wai`anae, HI

Puanani Burgess
Wai`anae Coast Community Alternative Development Corporation
Wai`anae, HI

Wai`anae Community Development
Project Association
Wai`anae, HI

Maxine Hee
Wai`anae Hawaiian Civic Club
Wai`anae, HI

Luwella K. Leonardi
Wai`anae Homestead
Wai`anae, HI

Agnes Cope
Wai`anae Military Civilian Advisory Council
Wai`anae, HI

Waialua Community Association
Hale`iwa, HI

Lizika Lam
Waiki`i Ranch
Kamuela, HI

Lynne Troachor
Waiki`i Ranch
Kamuela, HI

John McDermott
Waiki`i Ranch
Kamuela, HI

Roger Harris
Waiki`i Ranch I & II
Kamuela, HI

Arlene O`Brien
Waiki`i Ranch I & II
Waikoloa, HI

Michael O`Brien
Waiki`i Ranch I & II
Waikoloa, HI

Katherine Augustine
Waikii Homeowners Assoc. c/o Augustine Realty
Kailua-Kona, HI

Ron Hochuli
Waikii Homeowners Assoc. c/o Augustine Realty
Kailua-Kona, HI

Waikii Ranch Homeowners Association
Kamuela, HI

Eleanor Mirikitani
Waikoloa Land Company
Waikoloa, HI

Art Wright
Waikoloa Lutheran Church
Waikoloa, HI

John Schick
Waikoloa Village Association
Waikoloa, HI

Waimea Community Association
Kamuela, HI

Pete Hendricks
Waimea Community Association
Kamuela, HI

Mabel Tolentino
Waimea Hawaiian Civic Club
Kamuela, HI

Maxine Kehaulelio
Waimea Hawaiin Civic Club
Kamuela, HI

Waimea Outdoor Circle
Kamuela, HI

Steve Bonces
Waimea Water Services
Kamuela, HI

Steve Bowles
Waimea Water Services
Kamulea, HI

Waipahu Community Association
Waipahu, HI

Robert Spetich
West Hawaii Water Company
Waikoloa, HI

Mick Castillo
West Hawaii Wildfire Management Organization
Kamuela, HI

Mel D. Macy
West Hawai`i Concrete
Kailua-Kona, HI

East Hawaii Girl Scout Service Center
Keaau, HI

West Hawaii Girl Scout Services Center
Kailua-Kona, HI

Bill Moore
WLM Planning
Hilo, HI

Karen Young
Women of Wai`anae
Wai`anae, HI

**Media Organizations**

Clear Channel Hawai`i
Honolulu, HI

Cox Radio, Inc (KCCN & KINE)
Honolulu, HI

Craig TV (Verizon Americast)
Honolulu, HI

East Honolulu Newspaper
Honolulu, HI

Environmental Television
Kula, HI

Hawaii Fishing News
Honolulu, HI

Hawaii Ocean Industry
Honolulu, HI

Hawai`i Public Radio (KHPR, KIPO, KIFO & KKUA)
Honolulu, HI

Honolulu Publishing Company
Honolulu, HI

Island Family Magazine
Ewa Beach, HI

Ka Wai Ola (OHA)
Honolulu, HI

KGMB (CBS)
Honolulu, HI

KGU AM
Honolulu, HI

KHNL (NBC)
Honolulu, HI

KITV (ABC)
Honolulu, HI

KWAI
Honolulu, HI

New Wave Broadcasting
Honolulu, HI

Kahi Winget
Olelo Community Televison
Kahuku, HI

Hawaii Parent
Honolulu, HI

Dave Smith
Hawaii Tribune-Herald
Hilo, HI

HSTA Newsletter
Honolulu, HI

Bob Olsen
Ka Leo Newspaper
La`ie, HI

KFVE - TV 5
Honolulu, HI

KGMZ, KRTR & KXME
Kailua, HI

KHET - Hawaii Public TV
Honolulu, HI

KHON - TV 2
Honolulu, HI

KUMU AM & FM
Honolulu, HI

Midweek
Kane`ohe, HI

Meredith Nichols
Olelo Community Televison
Honolulu, HI

Pacific Business News
Honolulu, HI

PMP Company Ltd. (Ka Nuepa)
Wahiawa, HI

Spotlight Hawaii Publishing
Honolulu, HI

William Cole
The Honolulu Advertiser
Honolulu, HI

Hugh Clark
The Honolulu Advertiser
Honolulu, HI

Gregg Kakesako
The Honolulu Star-Bulletin
Honolulu, HI

Diane Leone
The Honolulu Star-Bulletin
Honolulu, HI

Mary Vorsuro
The Honolulu Star-Bulletin

Shannon Wood
The Ko`olau News
Kailua, HI

This Week Publications
Honolulu, HI

West Coast Chronicle
Waianae, HI

West Hawaii Today
Kailua-Kona, HI

Windward Oahu News
Kailua, HI

**Individuals**

Gwendolyn Abella
HI

Bob Acree
Kailua-Kona, HI

William Ada

Aly Adachi

Leslie M. Agorastos
Kamuela, HI

Thomas Ah Yee
Modesto, CA

Henry Ahl
Waianae, HI

Edwin Aho
Waianae, HI

Mohaka Aiu
Honolulu, HI

Tom Aitken
Pahoa, HI

Melva Aila

Wayne Aiona
Hilo, HI

Eddie Akana
Kamuela, HI

William A. Akau
Kawaihae, HI

William Aila

Moanikeala Akaka
Aloha Aina Education Center
Hilo, HI

Edgar Akena
Honolulu, HI

Harry Aki, Jr.
Waianae, HI

Patricia Aki
Waianae, HI

Dan Aldridge
Wailoloa, HI

Rosemary Alles
Kamuela, HI

Ph.D., Lee Altenberg
Kihei, Maui, HI

Carolos Altieri
San Juan, PR

Melvin Amantiad
Haleiwa, HI

Kaliko Amona
Kailua, HI

Joy Anamizu
Kahuku, HI

Diane Anderson
Hale`iwa, HI

Lei Anguay

Andrea Anixt
Ka`a`awa, HI

Gregory Apo
Los Angelos, CA

Wes Arakaki
Captain Cook, HI

Guy Archer
Honolulu, HI

Darrel Armstrong
Kamuela, HI

Noelani Arasta
Waianae, HI

Kainoa Ariola
Hilo, HI

Ashera Ashera
Ffestinoig, Gwynedd, LL41 4RF

Donna Ashizawa
Volcano, HI

Maggi Aspin
Keaau, HI

Dan Au
Mililani, HI

Nena Auld
Hilo, HI

William Bailey
Honolulu, HI

Neil Bajwa
Pittsburgh, PA

Georgia Bannon
Papiakau, HI

Mandy Rose Baptist
Honolulu, HI

Gay Barfield
Mountain View, HI

Yesenia Barreto
Kamuela, HI

Pomai Bartelmann
Kamuela, HI

Beverly Bartlett
Haiku, HI

Kimberlee Bassford
Seattle, WA

Holit Bat-Edit
Pahoa, HI

Carlyn Battilla
Hilo, HI

Keoni Baxter

Tom Beach
Kamuela, HI

Catherine & Malia Behi
Hilo, HI

Tomas Belsky
Hilo, HI

Cheryl Berg
Pahoa, HI

Tamara Bestman
Lelystad, AL 8226, AS Netherlands

Robert Bethea
Hilo, HI

David Bigelow

Wayne Bigura
Wahiawa,

Daniel Bishop
Kaneohe, HI

Beryl Blaich
Kiluea, HI

Mehana Blaich
Kiluea, HI

Brandon P. K. Blaisdell
Pahoa, HI

Alan Blanchard
Hale`iwa, HI

Sebastian Q. Blanco
Honolulu, HI

Nathan Boddie
LaGrange, GA

Ryan Boggan
Sterrett, AL

Phil and Elsha Bohnert, MD
Mililani, HI

Yoon Bokdong
Honolulu, HI

Bridget Bombard
Haleiwa, HI

Paul Borokhov
Chatham, NJ

Hidi Boteilho
Kea`au, HI

Stacey Bow
Honolulu, HI

Brian Bott

Audrey Bowers
Concord, CA

D. Bowman
Athens, GA

Victoria Brader

David Bramlett
Haleiwa, HI

Jasmine K. Branco
Hilo, HI

Rick Brenke
Phoenix, AZ

Delvin J K Brian
Hilo, HI

George and Dana Brown
Cocoa Beach, FL

Larry Brown
Hilo, HI

Niyati Brown
Pa'auilo, HI

Courtney Bruch
Makeiwa, HI

Dorothy Buck
Kahului, HI

Keoni Bunag
`Aiea, HI

Manuel Bunda
Wai`alua, HI

Jeff Burgett
Honolulu, HI

T.C. Burkhartzmeyer
Medford, MN

Gwen Burrows
Ele'ele, HI

Lara Butler
Kapaa, HI

Bobby Camara
Volcano, HI

Keliiwai Camarillo
Kailua, HI

Pearl Campbell

Wally Campbell
Kamuela, HI

Ramona Cao
Brooklyn, NY

Sydney Cardea
Kamuela, HI

Melissa Cardwell
Pahoa, HI

Jackie Carlisle
Wahiawa, HI

Kamomihoohiki Carralho
Hilo, HI

Eloise Case
Hudson, NH

Tony Castanha
Honolulu, HI

M. Castillo
Hilo, HI

Deanna Cavaco
Honolulu, HI

Phyllis Coochie Cayan
`Aiea, HI

Roy Carvalho
Waikoloa, HI

Joy Chambers
Milford, MA

Rhiannon Chandler
Honolulu, HI

Michele Chavez-Pardini
Kamuela, HI

Gordon Ching
Hilo, HI

Ken Choo
Haleiwa, HI

Hank Choy
Waianae, HI

Greg Chun
Kamuela, HI

C. Francis Chung
Honolulu, HI

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Honolulu, HI

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Honolulu, HI

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Honolulu, HI

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Kawaihae, HI

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Volcano, HI

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Kaneohe, HI

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Kamuela, HI

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Haiku, HI

Jeannine Copp
Kihei, HI

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Keauhou, HI

Aarin Correa
Kane`ohe, HI

Kalewa Correa
Kane`ohe, HI

Skye Correa
Kane`ohe, HI

Kevin Correll
Wernersville, PA

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Honolulu, HI

George Cox
Haleiwa, HI

Kaleihao Crabbe
Hoolehua, HI

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Honolulu, HI

Nancy Crawford
Kea`au, HI

Nancy Crom
Albany, NY

Steve Cullen
Irvine, CA

Kahaulani Curry
Aiea, HI

Judy Dalton
Lihue, HI

Lisa Damon
Kailua-kona, HI

Kaliko Danaele
Kearny, HI

Kimball Daugherty

Thalia Davis
Kailua-Kona, HI

Alison Denning

Crystal Dawn HI

Gerald Demello
Hilo, HI

Jesse Dawn

Janine Denny
Lawai, HI

Dustin DePonte
Pearl City, HI

Mary Krane Derr
Chicago, IL

A DeSoto

Duane DeSoto
Hau`ula, HI

Frenchy DeSoto
Wai'anae, HI

Makamae DeSoto
Hau`ula, HI

John DeSoto
Waianae, HI

Josie Dibibar-Patinio
Waianae, HI

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Beaverton, MI

Gavin Dillard
Haiku, HI

Marilyn Dinger
Kaysville, UT

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Stephen Dinion
Honolulu, HI

Keanui Doane
Mili, HI

Kristin Dobson
Kamuela, HI

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Waianae, HI

Pete Doktor
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Kima Douglas
Princeville, HI

Michael Douglas
Princeville, HI

DS
Mt. View, HI

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Sunset Beach, HI

Arline Eaton
Waipahu, HI

Anne Ebel
Makaha, HI

Bud Ebel
Makaha, HI

T Edwards
Hilo, HI

Thomas Ehlke
Honolulu, HI

Toni Ehrlich-Feldman
El Cerrito, CA

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Waianae, HI

Duane & Marjorie Erway
Kailua-Kona, HI

Julia Estrella
Honolulu, HI

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Cindy Evans
Waikoloa, HI

Jon Evans
Volcano, HI

Suki Ewers
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James Facette
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Constance Fay
Honokaa, HI

Hanalei Fergerstrom
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Kurtistown, HI

Brian Fink
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Kailua Kona, HI

Katherine Fisher
Haleiwa, HI

Richard Fisher
San Pedro, CA

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Kamuela, HI

Judith Flank
Kapolei, HI

David Fleischer
Maineville, OH

RaVani Flood
Keaau, HI

Kalani Flores
Kamuela, HI

Felicity Artemis Flowers
Paia, HI

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Honolulu, HI

David Ford
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Wai`anae, HI

Tyler Forman
Phoenix, AZ

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Landrum, SC

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Kona, HI

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Springer Fyrberg
Honomu, HI

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Haleiwa, HI

Kekama Galioto
Honolulu, HI

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Rincon, PR

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Kamuela, HI

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Liaikoloa, HI

Linda Gemignani
Kapaau, HI

Virginia Gibson
Key Largo, FL

Adah Glasser
Hilo, HI

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Mary A. Glover
Waianae, HI

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Pearl City, HI

Corrine Goldstick
Honolulu, HI

William Golove
Berkeley, CA

L. Gonschor
Honolulu, HI

Jen Graf
Honolulu, HI

Bill Graham
Hawi, HI

Ivan Granger
Pukalani, HI

John Grant
Seattle, WA

Sande Greene
Kihei, HI

Alice Greenwood
Waianae, HI

Regina Gregory
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Ted Grudin
Kihei, HI

Heidi Guth
Honolulu, HI

Carolyn Hadfield
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Waikoloa, HI

Warren Hahlbeck
Waikoloa, HI

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Nashville, TN

John Hall
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Maile K. Hallums
Waianae, HI

Gary Hana
Mililami, HI

Hanaloa

Hiko'ula Hanapi
Kamuela, HI

Cory Harden
Hilo, HI

James Hardin
Wai`alua, HI

Isaac Harp
Lahaina, HI

Berton Harrah
Marysville, OH

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Glorieta, NM

Eli Harris
Carrboro, NC

Stan Harris
Hale`iwa, HI

Christopher Harrison
Waikoloa, HI

Alison Hartle
Honolulu, HI

Theresa Hartney
Las Vegas, NV

alana Haught
Hilo, HI

Brenda Haverkamp
Topeka, KS

Elizabeth Haynes
Kahuku, HI

Larry Hawthorne

David Heaukulani
Hilo, HI

Moses Heanu
Pahala, HI

Mary Lou Henry
Hale`iwa, HI

Emily Herb
Kamuela, HI

Claudia Herfurt
Hanlei, HI

Deldrene N. Herron
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Great Britain, (UK)

Mel Hewett
Kamuela, HI

David Higgins
Kamuela, HI

Adam Hilligoss

Kylia Hilligoss
Melbourne - Vic, Australia

Ruth S. Hirokawa
Wahiawa, HI

Gar S. Hunter
Makaha, HI

Mrs. Hochuli

Odessa Kawai

Lawrence Hirai
Mililani, HI

Nelson Ho
Hilo, HI

Kawaiolimaikamapuna Hoe
Kane`ohe, HI

Pete Hoffmann
Waikaloa, HI

Dale Hoffmann
Honolulu, HI

C. Campbell Holtey
Kailua, HI

J. Honke
Waiawa, HI

Dale Hoopai
Kamuela, HI

Reagan Hooton
Kapa'a, HI

Kristina Hopkinson
Hilo, HI

Jane Horike
Hilo, HI

Elaine & Doug Hornal
Waialua, HI

Tina Horowitz
Philadelphia, PA

Dave Hovle
Kamuela, HI

Elinore Huna
Hilo, HI

Ann Hunter
Makaha, HI

Forrest Hurst
Westfield, IN

Jeff Hunter

Ikaika Hussey

Mary Lou Hyslop
Keaau, HI

Ellen B. Hyer
Wahiawa, HI

Joey Ibarra

Barbara Ikeda
Honolulu, HI

David M.K. Inciong
Pearl City, HI

David P. Ingham
San Francisco, CA

Wally Inglis
Honolulu, HI

Skippy Ioane
Hilo, HI

Bianca Isaki
Honolulu, HI

Michael Iven
Santa Barbara, Ca

Joycelyn Iyo
Hilo, HI

Tom Jackson
Denver, CO

Bob Jacobson
Kurtistown, HI

Jerard Jardin
Honolulul, HI

Grace Jarvis
Wah, HI

Scott Jarvis
Hanalei, HI

Katie Johnson
Reston, VA

Patricia Johnson
Honolulu, HI

Timothy Johnston
Marina, CA

Larry Jones
Honolulu, HI

Russell Jones
Honolulu, HI

Mahealani Jones
Hilo, HI

Malia Ka`aihue
Hau`ula, HI

Kahanamoku
Kamuela, HI

Nahe Kahokualohi
Hilo, HI

Aurora Kaipo
Pahoa, HI

Tanya Kaiser
Clinton, OH

Noe Kaiwi

Kyle Kajihiro
Honolulu, HI

Alvin Kakina
Kailua-Kona, HI

Anjanette Kalb
Denver, CO

Calvin Kaleiwahea
Volcano, HI

Raphael Kaliko
Honolulu, HI

Hope Kallai
Kilauea, HI

Herring K. & Sherry Kalua
Hilo, HI

Larry & Kapna Kamai
Waianae, H

George Kamaka
Kaleiwa, HI

Reynolds Kamakawiwoole

Lilikala Kame'eleihiwa
Honolulu, HI

Jack Kampfer
Wahiawa, HI

Dennis Kanahele

Shad Kane
Kapolei, HI

John Kanui
Hilo, HI

P Kaopuiki
Honolulu, HI

Kamana Kapele
Kealakekua Kona, HI

Clifford Kapono
Hilo, HI

Kris Kato
Hilo, HI

M.T. Kato
Honolulu, HI

J.J. Kaufmann
Honolulu, HI

Sharon Kaufman-Diamond M.D.
Waikoloa, HI

Jamie Moana Kawauchi
Hilo, HI

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# CHAPTER 14

# GLOSSARY AND INDEX

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## 14.1 GLOSSARY

**`A`a (lava)—**(Pronounced "ah-ah") is a Hawaiian term for basalt lava flows that have a rough rubbly surface composed of broken lava blocks called clinkers. See http://volcanoes.usgs.gov/Products/Pglossary/aa.html for a photograph and more detailed description.

**Affected environment—**The physical features, land, and area or areas to be influenced, affected by, or created by an alternative under consideration; also includes various social and environmental factors and conditions pertinent to an area.

**Air assault—**The movement of friendly assault forces (combat, combat support, and combat service support) by rotary-wing aircraft to engage and destroy enemy forces or to seize and hold key terrain.

**Ambient air quality—**The atmospheric concentration of a specific compound (amount of pollutants in a specified volume of air) actually experienced at a particular geographic location that may be some distance from the source of the relevant pollutant emissions.

**Average daily traffic volumes—**The total traffic volume during a given time in 24-hour periods, greater than one day and less than one year, divided by the number of days in that period.

**Ballistic—**Guided in the ascent of a high-arch trajectory and freely falling in the descent.

**Ballistic effect—**Relating to the trajectory and fall of a ballistic projectile.

**Battalion—**Military unit generally composed of multiple companies with a headquarters section (approximately 300 to 1,000 Soldiers).

**Billet—**Shelter for troops.

**Bivouac/bivouacking—**Temporary settlement or shelter; to watch at night or be on guard as a whole Army.

**Brigade—**A military unit smaller than a division, usually composed of multiple battalions with a headquarters section, to which are attached smaller units tailored to meet anticipated requirements (approximately 3,000 to 5,000 Soldiers).

**Bradley Fighting Vehicle—**A 21-ton armored personnel carrier which can carry Seven infantry men. It is a tracked vehicle with a 25mm cannon, 7.62mm machine gun, and TOW anti-tank missiles.

**Call-for-fire—**A request for fire containing data necessary for obtaining the required fire on a target.

**Cannon—**A large bore, direct fire, gun often mounted on a tank or similar vehicle.

**Cantonment area—**Permanent military station, usually containing administration buildings, barracks, and support facilities.

**Ceded lands—**Lands that were either Crown or government lands until 1893, when the Hawaiian Kingdom was overthrown.

**Chemistry—**Any chemical reactions that transform pollutant emissions into other chemical substances.

**Company—**A military unit usually composed of multiple platoons with a headquarters section (about 150 Soldiers).

**Concentration units—**The ratio of the quantity of a substance in a mixture to the quantity of the mixture is its concentration in the mixture. Concentrations are often expressed in units of mass (weight) or volume of a substance per unit of mass or volume of the mixture. If the concentration is very high, then the concentration might be given in terms of a percentage. Percentage concentrations are equivalent to "parts per hundred." In many environmental applications, the concentrations of interest are very dilute, and it is convenient to express concentrations in parts per thousand (ppt), parts per million (ppm), or parts per billion (ppb). Concentrations in water are typically given either in units of mass per mass or in mass per volume. For example, there are approximately 35 grams of salt in 1,000 grams of seawater. The concentration of salt in seawater, in units of mass per mass, is therefore approximately 35 parts of salt per 1,000 parts of seawater, or 35 ppt. If there were only 35 milligrams (mg) of salt in the same mass of water, then the concentration would be 35 parts per million (ppm); and if there were 35 micrograms (μg) of salt in the same mass of water, then there would be 35 parts per billion (ppb). Because 35 milligrams of salt takes up only a very small volume, adding 35 milligrams of salt to one liter of pure water doesn't change the volume of the solution much. One liter of pure water has a mass of 1,000 grams, or one kilogram. Therefore, at dilute concentrations, 35 ppm can be expressed as 35 milligrams per liter (mg/L). Similarly, 35 ppb is nearly the same as 35 μg/L. Concentrations in soils are nearly always given in units of mass per mass. Concentrations in air are typically given in units of volume per volume, or, because volume of air depends on the temperature and pressure, in units of mass per volume at a specified pressure and temperature.

**Contingency force—**A force reserved in order to be deployed as needed.

**Convoy—**An organized and controlled group of vehicles that moves over the same route at the same time and under one commander.

**Corps—**A tactical unit usually consisting of two or more divisions and auxiliary arms and services.

**Criteria Pollutants**—The 1970 amendments to the Clean Air Act required EPA to set National Ambient Air Quality Standards for certain pollutants known to be hazardous to human health. EPA has identified and set standards to protect human health and welfare for six pollutants: ozone, carbon monoxide, total suspended particulates, sulfur dioxide, lead, and nitrogen oxide. The term, "criteria pollutants" derives from the requirement that EPA must describe the characteristics and potential health and welfare effects of these pollutants. It is on the basis of these criteria that standards are set or revised.

**Critical habitat—**A description of the specific areas with physical or biological features essential to the conservation of a listed species and that may require special management considerations or protection. These areas have been legally designated via Federal Register notices.

**Cumulative effects—**Effects that are the result of incremental impacts of an action, when added to other past, present, and reasonably foreseeable future actions, regardless of which agency (federal or nonfederal) or person undertakes such actions.

**Deployment—**The movement of forces within operational areas.

**Detachment—**A temporary military or naval unit formed from other units or parts of units.

**Direct fire—**Gunfire delivered on a target, using the target itself as a point of aim for either the gun or the director.

**Division—**A major administrative and tactical unit/formation that combines the necessary arms and services required for sustained combat; larger than a regiment/brigade and smaller than a corps (approximately 12,500 to 20,000 Soldiers).

**Dry fire—**Simulated fire; used only for training.

**Dud rounds—**Explosive munitions that have not been armed as intended or that have failed to explode after being armed.

**Easement—**An interest in land owned by another that entitles its holder to a specific limited use. A right-of-way is usually an easement.

**Ecosystem—**A community of interacting organisms (including people) and their environment that functions together to sustain life.

**Emission—**The release of air contaminants into the ambient air; the amount (usually stated as a weight) of one or more specific compounds introduced into the atmosphere by a source or group of sources

**Emission range—**The amount of pollutant emitted during a specified increment of time or during a specified increment of activity.

**Emission standard—**A requirement established under the federal Clear Air Act that limits the quantity, rate, or concentration of emissions of air contaminants on a continuous basis.

**Endangered species—**Any species or subspecies of bird, mammal, fish, amphibian, reptile, or plant that is in serious danger of becoming extinct throughout all, or a significant portion, of its range. Federal endangered species are officially designated by the US Fish and Wildlife Service or the National Marine Fisheries Service, and the designation is published in the Federal Register.

**Environmental—**1) In a scientific context, a combination of natural conditions. 2) In a planning context, a category of analytical studies of aesthetic values, ecological resources, cultural (historical) resources, sociological and economic conditions, etc.

**Environmental consequences—**The impacts on the affected environment that are expected from implementing a given alternative.

**Environmental impact statement—**As defined in the Council on Environmental Quality regulations, a detailed written report that provides a "full and fair discussion of significant environmental impacts and (informs) decision-makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment." The draft EIS evaluates a range of reasonable alternatives and their associated impacts and presents a preferred alternative if one option is clearly favored above the others. After departmental review, the draft EIS is circulated among agencies and the public for comment. Following the public hearing held to formally record comments on the draft, a final EIS is prepared incorporating public and agency input and recommending a selected alternative.

**Executive order—**Order issued by the President by virtue of his authority vested by the Constitution or by an act of Congress. An executive order has the force of law.

**Facilities—**Buildings and the associated infrastructure, such as roads, trails, and utilities.

**Farmland Protection Policy Act—**Soil phases/areas protected by the FPPA and 7 CFR 658. FPPA soils include prime farmland, unique farmland, farmland of statewide importance, and farmland of local importance.

**Federal Register—**A daily publication of the US Government Printing Office that contains notices, announcements, regulations, and other official pronouncements of US Government administrative agencies. Various printed announcements and findings related to specified environmental matters and transportation projects and activities appear in this publication.

**Fee simple—**Fee simple ownership means possession of a piece of real estate in totality, generally not subject to any other person's ownership interests. Also referred to as "fee simple absolute" or "owned in fee."

**Field artillery—**1) A basic branch of the Army. The branch name identifies personnel and units that use cannons, rockets, and missile systems to assist in land combat operations. 2) Artillery weapons that are sufficiently mobile to accompany and support infantry, mechanized, armored, airborne, and air mobile units in the field.

**Fire power—**The capacity of an individual or unit to deliver accurate and effective fires on a target or area to kill or suppress the enemy in its position, to deceive the enemy, and to support tactical maneuvers.

**Fires—**Effects of lethal and nonlethal weapons.

**Force-on-force—**A force engaging another force, usually from within the same Army, in nonlive fire, for the purpose of training and practice.

**Forced entry—**To enter a property by use of force, usually without permission.

**Fugitive emissions**—Emissions not caught by a capture system; releases not confined to a stack, duct, or vent, such as equipment leaks, emissions from the bulk handling or processing of raw materials, windblown dust and a number of other specific industrial processes

**Future force—**The future forces of the Army, which will undergo transformation in training, equipment, and weapons over an estimated 20 years to become the future force.

**Hazardous material—**A substance or material that the Secretary of Transportation has determined is capable of posing an unreasonable risk to health, safety, and property when transported in commerce and that has been designated as hazardous under section 5103 of federal hazardous materials transportation law (49 U.S.C. 5103). The term includes hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table (see 49 CFR 172.101), and materials that meet the defining criteria for hazard classes and divisions in part 173 of subchapter C of CFR chapter I (USDOT 2003).

**Hazardous substance—**Any substance that, due to its quantity, concentration, or physical and chemical characteristics, poses a potential hazard to human health and safety or to the environment.

**Hazardous waste—**A solid waste (or combination of wastes) that, due to its quantity, concentration, or physical, chemical, or infectious characteristics, can cause or significantly contribute to an increase in mortality. RCRA further defines a hazardous waste as one that can increase serious, irreversible, or incapacitating reversible illness or pose a hazard to human health or the environment when improperly treated, stored, disposed of, or otherwise managed.

**Heavy brigade—**A brigade that is composed of heavy artillery and armored vehicles and designed to contain, repel, or defeat a heavily armed enemy force.

**Heavy forces—**A large force designed for sustained battlefield combat, usually composed largely of armored vehicles.

**Howitzer—**A large bore, indirect fire, gun that operates much like a mortar.

**Impacts—**Positive or negative effects on the natural or social environment resulting from transportation projects.

**Improved conventional munitions (ICMs)—**Cluster bombs, artillery munitions that contain multiple submunitions.

**Incendiaries—**A weapon, such as a bomb, designed to ignite fires.

**Indirect fire—**Fire delivered on a target that is not itself used as a point of aim for the weapons or the director. Indirect fire can cause casualties to troops, inhibit mobility, suppress or neutralize weapon systems, damage equipment and installations, and demoralize the enemy.

**Infantry—**Soldiers trained, armed, and equipped to fight on foot.

**Inhalable particles**—All dust capable of entering the human respiratory tract.

**Inter-theater support operations—**Operations designed to convey supplies, personnel, and equipment between the originating theater and points outside the theater, to include the continental United States and other theaters.

**Interim Brigade Combat Team—**The original name for the Stryker Brigade Combat Team. Change in name only.

**Interim force—**The force between the current forces and the future force.

**Intra-theater—**Within a theater (see theater, below).

**Jurisdictional determination—**A site survey performed by the US Army Corps of Engineers to officially determine whether a given parcel of land is subject to wetlands regulations, and if so, the extent of the area.

**Land navigation training—**Maneuvers designed to train troops in techniques for navigating to a given destination.

**Level of service—**Combinations of operating conditions that can occur in a given lane or roadway when it is accommodating various traffic volumes.

**Light brigade—**A force composed primarily of foot-mobile fighters employing artillery, mortars, tactical air, Army aviation, naval gunfire, and reconnaissance assets to support the tactical operations plan.

**Light forces—**Small agile forces designed for quick deployment and redeployment, usually not involving armored vehicles.

**Light infantry—**Composed of light arms and hand-held weapons.

**Live-fire exercise—**Training activities using real or lethal ammunition.

**Maneuver—**A movement to place ships, aircraft, or land forces in a position of advantage over the enemy.

**Materiel—**All items necessary to equip, operate, maintain, and support military activities without distinction as to its application for administrative or combat purposes. Examples of materiel are ships, tanks, self-propelled weapons, and aircraft and related spares, repair parts, and support equipment, but excluding real property, installations, and utilities.

**Meteorology—**The physical processes, generally occurring in the atmosphere, affecting the distribution, dilution, and removal of pollutants.

**Mine-clearing line charge—**The MICLIC is a rocket-propelled, explosive line charge. It is used to reduce minefields that contain single-impulse, pressure-activated anti-tank, mines and mechanically activated anti-personnel mines.

**Mission essential—**That materiel, equipment, personnel, projects, etc. that are critical to a military unit in order to accomplish their assigned missions.

**Mitigation measure—**A specific design commitment made with the resource agencies and other agencies during the environmental evaluation and study process that serve to moderate or lessen impacts derived from the proposed action. This might include planning and development commitments, environmental measures, and right-of-way improvements. A mitigation measure is implemented during construction or post-construction.

**Nap of the earth flight (also called terrain flight)—**Flight close to the Earth's surface during which airspeed, height, and altitude are adapted to the contours and cover of the ground in order to avoid enemy detection and fire.

**National Environmental Policy Act—**The National Environmental Policy Act of 1969 (NEPA) is our nation's basic charter for protecting the environment. It establishes policy, sets goals, and provides means for carrying out the policy. In accordance with NEPA, all federal agencies must prepare a written statement on the environmental impact of a proposed action. The provisions to ensure that federal agencies act according to the letter and spirit of NEPA are the Council on Environmental Quality regulations for implementing NEPA (43 CFR 1500-1508).

**Nonlive-fire exercise—**Training exercise using training rounds or nonlethal ammunition or blanks.

**Notice of intent—**Announcement in the Federal Register advising interested parties that an EIS will be prepared and circulated for a given project.

**Ordnance impact area—**An area having designated boundaries, within the limits of which all ordnance will detonate on impact.

**Pahoehoe (lava)—**Basaltic lava that has a smooth, hummocky, or ropy surface. See http://volcanoes.usgs.gov/Products/Pglossary/pahoehoe.html for a photograph and more detailed description.

**Particulates—**Fine liquid or solid particles, such as dust, smoke, mist, fumes, or smog, found in air or emissions.

**Parts per ***—**See concentration units.

**Pesticide—**Any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest; the term pesticide also applies to herbicides, fungicides, avicides (bird agents), rodenticides, and various other substances used to control pests.

**Platoon—**A subdivision of a company-size military unit, normally consisting of two or more squads or sections (approximately 30 Soldiers).

**Programmatic EIS—**The first tier of a sequence of environmental statements or analyses that is broad in scope and conducted in accordance with NEPA.

**Proposed action—**Plan that a federal agency intends to implement and that is the subject of an environmental analysis. Usually the proposed action is the agency's preferred alternative for a project. The proposed action and all reasonable alternatives are evaluated against the no action alternative.

**Pyrotechnics—**A mixture of chemicals that, when ignited, is capable of producing light, heat, smoke, sound, or gas.

**Regiment—**A military unit usually consisting of a number of battalions or squadrons.

**Scoping—**A process conducted early in the project that is open to agencies and the public to identify the range, or scope, of issues and alternatives to be addressed during the environmental studies and in the EIS. Even though scoping is the initial step in the EIS process, public involvement is a critical component that continues throughout the EIS process.

S**hort-Range Training Ammunition (SRTA)—** also known as blue-tip ammunition, uses a plastic ball projectile. Although SRTA is classified as live-fire training, in accordance with AR 385-63, the maximum range of this ammunition is only 300 to 700 yards (274 to 640 meters), depending on the caliber used.

**Special Operation Forces—**Forces designed and equipped to deal with unusual or specific tasks, often involving foreign language capabilities, specialized equipment, training, and tactics.

**Special status species—**Those plants or animals that have a protected status designated by a state or federal agency because of general or localized population decline.

**Squad—**A small military unit, usually consisting of approximately 10 Soldiers.

**Squadron—**A battalion-sized ground unit in US Army cavalry regiments and in the SBCT, which consists of troops instead of companies.

**Strike force—**A force prepared to carry out an attack that is intended to inflict damage on, seize, or destroy an objective.

**Stryker Brigade Combat Team—**The interim force between the current force and the future force. Uses the Stryker vehicle.

**Tactical—**Using tactics in the use of weapons or forces deployed at the battlefront in such a way as to achieve a given objective.

**Tactical force—**A combat force, together with any service force required for its direct support, organized under one commander to operate as a unit and to engage the enemy in combat.

**Tactical maneuver—**A maneuver designed to perform a specific task or a task with a specific goal.

**Tax map key—**The description of a physical land unit of the state, using the division, zone, section, plat, and parcel. It is prepared especially for taxation purposes and in accordance with the requirements of the City and County of Honolulu Real Property Assessment Division and the County of Hawai'i Real Property Tax Division.

**Theater of operations—**A subarea within a theater of war defined by the geographic combatant commander required to conduct or support specific combat operations.

**Theater of operational readiness—**A theater of operations in which forces are prepared to fight a prolonged battle or war.

**Tracers—**Ammunition containing a chemical composition to mark the flight of projectiles by a trail of smoke or fire.

**Troop—**The company-sized elements in the RSTA Squadron.

**Unexploded ordnance—**Explosive ordnance that has been primed, fuzed, armed, or otherwise prepared for action and that has been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material and remains unexploded either by malfunction or design or for any other cause.

**Unique agricultural land—**Land other than prime agricultural land that is used for producing specific high-value food and fiber crops, as determined by the Secretary of Agriculture. Unique agricultural land possesses a special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of specific crops when treated and managed according to acceptable farm methods. Examples of such crops include citrus, tree nuts, olives, cranberries, fruits, and vegetables.

**Viewshed—**The landscape that can be directly seen under favorable atmospheric conditions, from a viewpoint or along a transportation corridor.

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