US Army Corps
of Engineers
Louisville District

Environmental Assessment

for the

2024 Rough River Lake Water Control Manual Revision

January 2024

Draft Finding of No Significant Impact

2024 Rough River Lake Water Control Manual Revision

Breckinridge, Grayson, and Hardin Counties, Kentucky

The U.S. Army Corps of Engineers, Louisville District (USACE) has conducted an Environmental Assessment (EA) in accordance with the National Environmental Policy Act of 1969, as amended (NEPA), and Engineering Regulation (ER) 200-2-2, *Policy and Procedures for Implementing the NEPA*. The Draft EA dated December 2023, for the 2024 Rough River Lake Water Control Manual Revision evaluated alternatives and environmental impacts from revising and updating the 2022 Rough River Lake Water Control Manual.

The EA evaluated alternatives to revise and/or continue to utilize the 2022 Rough River Lake Water Control Manual and considered potential impacts to natural, cultural, and socioeconomic resources. The Recommended Plan is to revise the existing Water Control Manual and implement the proposed changes to operational levels at the reservoir which are designed to alleviate stress on the Rough River Dam structure and reduce potential threats to downstream communities that could result from degradation or failure of the dam.

In addition to a "No Action" plan, a single alternative (the Recommended Plan) was evaluated. The No Action Plan would entail the continued use of the 2022 Water Control Manual (WCM) and would result in no change from current authorized operations at Rough River Lake. This would also fail to reduce the current risks associated with the ongoing structural stresses on the dam facility.

Revisions to the WCM under the Recommended Plan include delaying the initiation of the spring fill by two weeks from 15 March to 1 April and targeting a summer pool elevation that is five feet lower (490 feet National Geodetic Vertical Datum of 1929 [NGVD29]) than the currently approved elevation of 495 feet. It is anticipated these actions will be repeated until the dam remediation is complete.

For both the No Action Alternative and the Recommended Plan, the potential effects were evaluated, as appropriate. A summary assessment of the potential effects of the Recommended Plan are listed in Table i.

Table i: Summary of Potential Effects of the Recommended Plan.

Resource/Area of Concern	Insignificant Adverse Effects	Insignificant Effects as a Result of Mitigation	No or Negligible Effects	Beneficial Effect
Reservoir, Pool, and Lake Operation	☒	☐	☐	☐
Climate	☐	☐	☒	☐
Air Quality	☐	☐	☒	☐
Topography, Geology, and Soils	☐	☐	☒	☐
Surface Water Hydrology and Groundwater	☐	☐	☒	☐
Water Quality	☐	☐	☒	☐
Habitats	☐	☐	☒	☐
Fish and Wildlife Resources	☐	☐	☒	☐
Listed Species	☐	☐	☒	☐
Demographics, Environmental Justice, and Socioeconomics	☐	☐	☒	☐
Recreation, Visitation, and Economy	☒	☐	☐	☐
Cultural Resources	☐	☐	☒	☐
HTRW Materials	☐	☐	☒	☐
Aesthetics and Visual Qualities	☒	☐	☐	☐
Noise	☐	☐	☒	☐

All practical means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan. The recommended plan does not include major development of new facilities or other construction activities that could negatively impact the environment.

No compensatory mitigation is required as part of the recommended plan.

A 30-day public review of the draft EA and FONSI was completed on [pending]. All comments submitted during the public review will be responded to in the Final EA and FONSI.

Pursuant to Section 7 of the Endangered Species Act of 1973, as amended, the USACE determined that the recommended plan will have no effect on Federally listed species or their designated critical habitat.

Pursuant to Section 106 of the original National Historic Preservation Act of 1966, as amended, and in accordance with 36 C.F.R. § 800.3(a)(1), the USACE determined that the recommended plan has no potential to cause effects on historic properties.

There is no discharge of dredged or fill material or any other discharge into waters of the U.S. associated with the recommended plan. Therefore, a Section 404(b)(1) evaluation and Section 401 water quality certification, pursuant to the Clean Water Act of 1972, are not applicable.

All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives. Based on this report, the reviews by other Federal, State and local agencies, Tribes, input of the public, and the review by my staff, it is my determination that the recommended plan would not significantly affect the human environment; therefore, preparation of an Environmental Impact Statement is not required.

_____ _____

Date

L. Reyn Mann
Colonel, U.S. Army
District Commander

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Executive Summary

The U.S. Army Corps of Engineers' (USACE) Rough River Lake Project is situated in Breckinridge, Grayson, and Hardin counties in south central Kentucky. The dam is located on the Rough River near the community of Falls of Rough, about 20 miles from Leitchfield and 78 miles southwest of Louisville. The USACE office is located in Falls of Rough, Kentucky, at 14957 Falls of Rough River Road (Highway 79).

In early January 2023, a semi-quantitative risk assessment (SQRA) conducted on Rough River Dam concluded that compelling evidence exists that the dam experiences distress at historic elevated reservoir levels. The risk assessment recommended that the dam be reclassified from a Dam Safety Action Classification (DSAC) rating of 3 (High Priority) to a DSAC rating of 2 (High Urgency). The risk assessment also determined that the implementation of a five-foot summer pool restriction (change from 495 feet to 490 feet per the National Geodetic Vertical Datum of 1929 [NGVD29]) combined with delaying the spring fill by two weeks (15 March to 1 April) could reduce the risk of dam failure by approximately ½-order of magnitude compared to the existing condition. On 25 January 2023, USACE Louisville District (LRL) presented the recommendations from the risk assessment to the Dam Senior Oversight Group (DSOG). Given the DSAC reclassification and potential risk to the public, DSOG ultimately endorsed the change in the DSAC and concurred with the immediate implementation of the summer pool restriction combined with a two-week delay in spring fill. It was anticipated that this pool restriction will be repeated until the dam remediation is complete.

The purpose of this Environmental Assessment (EA) is to document the analysis of potential environmental impacts of the proposed action and its alternatives and to support a determination of whether the proposed action would significantly affect the quality of the human environment (which would require an Environmental Impact Statement). The EA also provides an opportunity for public involvement in the agency decision-making process.

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Table of Contents

List of Figures

List of Tables

List of Acronyms

CEJST–Climate and economic justice screening tool

CEQ–Council of Environmental Quality

CFS–cubic feet per second

CFR-Code of Federal Regulations

CWA-Clean Water Act of 1977

DSOG–Dam Senior Oversight Group

EAB–Emerald Ash Borer

EA–Environmental Assessment

EABIN-Emerald Ash Borer Information Network

EIS–Environmental Impact Statement

EM–Engineering Manual

EP–Engineering Pamphlet

ER–Engineering Regulation

ESA–Endangered Species Act

FGDC-Federal Geographic Data Committee

FONSI–Finding of No Significant Impact

FPWCA–Federal Water Pollution Control Act Amendments of 1961, Pub. L. No. 87–88, 75 Stat. 204, as amended

FWCA–Fish and Wildlife Coordination Act

HAB–Harmful Algal Blooms

IRRM–Interim Risk Reduction Measure

KDFWR-Kentucky Division of Fish and Wildlife Resources

KDOW–Kentucky Division of Water

LRL–USACE Louisville District

MBTA–Migratory Bird Treaty Act

MGD–million gallons per day

MRLC-Multiresolution Land Characteristics Consortium

MSL–mean sea level

NAA–No Action Alternative

NAAQS–National Ambient Air Quality Standards

NCEI-National Center for Environmental Information

NEPA–National Environmental Policy Act of 1969

NHPA–National Historic Preservation Act

NHRP–National Register of Historic Places

NLCD–National Land Cover Database

NOAA–National Oceanic and Atmospheric Administration

NRCS–National Resources Conservation Service

NWI–National Wetland Inventory

O&M–Operations and Maintenance

ORB–Ohio River Basin

SQRA-Semi-quantitative risk assessment

TNC–The Nature Conservancy

USACE–United States Army Corps of Engineers

USEPA–United States Environmental Protection Agency

USGS–United States Geological Survey

VOC–Volatile Organic Compounds

WCM–Water Control Manual

1 INTRODUCTION

In March 2004, the United States Army Corps of Engineers (USACE), Louisville District (LRL) completed and circulated an Environmental Assessment (EA) which evaluated alternatives to address issues with Rough River Lake Dam identified through the Dam Safety Assurance Program. The issues involved the hydraulically inadequate spillway and stilling basin, and the need for the remediation of the rock toe, and foundation artesian pressures. These repairs were completed in following years. Additional risk assessment and engineering analysis developed during repair activities led to the determination that additional adverse conditions exist at the project, making the dam subject to unacceptable performance metrics and subject to possible uncontrolled release of pool. It was determined that additional rehabilitation measures would be needed.

A comprehensive risk assessment concluded that the dam and related structures did not meet the current USACE Public Protection Guidelines (ER 1110-2-1156). For this reason, it was determined that expedited action was justified to remediate the potential risks associated with the dam. The primary and key risk contributor was determined to be erosion into or at the bedrock foundation. The existing bedrock foundation of the dam was not treated across the historic river valley during original construction. Karstic bedrock with solution features exists in the dam foundation below the dam embankment. The bedrock foundation is subject to constant hydrologic loading that could lead to piping of embankment material into the foundation and a subsequent breach of the dam.

These issues, and the proposed actions to remediate them, were addressed in a second EA circulated to the public and agencies in June 2009. Following receipt of comments from an Independent External Review Panel, LRL again reviewed alternatives for the purpose of resolving the ongoing dam safety issues at Rough River Lake. Based on current design criteria, LRL concluded that seepage pathways remained a concern. In addition to this review of alternatives, the resulting recommended plan required a greater area for construction activities than previously evaluated in the EA's of 2004 or 2009, and an additional EA was completed and circulated for review in 2012. The 2012 EA evaluated the proposed action as a cutoff wall with foundation grouting, conduit grouting, and a conduit filter. The Rough River Remediation Project was subsequently put on hold, pending Congressional approval and funding.

In 2017, LRL discovered issues with the design of the proposed remediation project related to ability of the existing conduit to withstand pressures applied by the cutoff wall. In 2020, another EA was completed that developed additional alternatives to ensure a safely operating reservoir project for the public and the environment. Efforts to fund and implement the remediation plan at Rough River Dam are ongoing.

In 2023, the LRL implemented a temporary deviation from the authorized operation of Rough River Lake which was intended to be an interim measure designed to reduce stressors on the dam facility. This deviation included delaying the initiation of the spring fill by two weeks from March 15 to April 1, and targeting a summer pool elevation of 490 feet National Geodetic Vertical Datum of 1929 (NGVD29), which is five feet lower than the approved elevation of 495 feet, NGVD29. These measures were endorsed as needed for safety by the DSOG in January 2023. The course of action endorsed by the DSOG was to maintain these changes in operation annually until the dam remediation is complete. LRL is therefore proposing (detailed herein as the recommended plan) to revise its Water Control Manual for Rough River Lake to integrate these changes into authorized operations.

The purpose of this EA is to identify the potential impacts to the natural and human environment from revising the current Rough River Lake Water Control Manual (WCM) and operating the lake in accordance with the revision, and to determine whether the environmental effects of the action have the potential to be significant. The changes in authorized operations to be reflected in the revised WCM are designed to reduce stressors on the dam structure until a full remediation plan can be implemented.

It is important to note that the proposed remediation project is a stand-alone and as yet future Action that will be implemented when funding becomes available. The environmental impacts of the remediation project will be assessed in a separate NEPA effort, as needed.

2 Project Location

Rough River Lake (Project) is located on the Rough River in west-central Kentucky and the reservoir impounds areas of Breckinridge, Grayson, and Hardin counties (Figure 1). The dam site is 89.3 miles above the mouth of Rough River, which flows into the Green River at Livermore. Green River Lock 2 at Calhoun is 8.1 miles downstream of Livermore. The dam is located near the community of Falls of Rough, about 20 miles from Leitchfield and 95 miles southwest of Louisville.

Figure 1. Rough River Lake Project vicinity map.

3 Project Description and Authorization

Rough River Lake is a Y-shaped reservoir located in Breckinridge, Hardin, and Grayson counties in Kentucky. The lake was created by the dam, which began construction in 1955 and was complete by 1960. During the summer months the lake is about 5,100 acres, has 260 miles of shoreline, is 45 miles long, and is 65 feet deep in the deepest portion of the lake which includes the area around the dam. In contrast to the summer months, during the winter, the lake decreases to 2,180 acres at an elevation of 470.

The Rough River Lake Project (Project) was authorized by the Congress of the United States as part of the Flood Control Act of 1938, Pub. L. No. 75-761, 52 Stat. 1215. Post authorization changes include water supply and water quality control as Project purposes within the purview of the Water Supply Act of 1958, Pub. L. No. 85-800, 72 Stat. 319 (codified as amended at 43 U.S.C. § 390b) and the Federal Water Pollution Control Act Amendments of 1961, Pub. L. No. 87-88, 75 Stat. 204 (FWPCA).

The reservoir serves as a unit in the system of reservoirs in the Green River basin and part of the comprehensive plan for the Ohio River Basin (ORB) authorized by the Flood Control Act of 1938 and was completed in September 1959. The dam controls runoff from 454 square miles of the Rough River basin, contributing to the reduction of water surface elevations on the lower Green and Ohio Rivers during flood events. The authorized purposes of the Project are flood control, and the dam shall be operated to encourage and develop collateral uses such as recreation, fish and wildlife propagation, conservation (Section 4 of the Flood Control Act approved 22 December 1944 – Public Law 534, 78th Congress, Chapter 665, 2d Session), and other purposes in the public interests. Development of the plan for public use of Rough River Reservoir has been conducted in general accordance with the basic policies defined in the applicable legislation supplemented by pertinent directives of USACE. The annual drawdown from summer pool to winter pool also provides incidental benefit to low flow augmentation and navigation, despite these not being authorized purposes.

In accordance with ER 1110-2-240, the lake provides water supply storage and supplies drinking water to nearby Leitchfield and the Grayson County Water District. The Project operates to increase natural low-flow conditions downstream of the dam in the interest of water quality control. The USACE also conducts an active natural resource management program to preserve natural areas and to provide suitable habitat for native fish and wildlife and provides regional recreational opportunities to the surrounding area.

Regulations governing the preparation and/or modification of WCM's include Engineer Regulation (ER) 1110-2-240, *Water Control Management*, dated 30 May 2016; Engineer Manual (EM) 1110-2-3600, *Management of Water Control Systems*, dated 30 November 1987; ER 1110-2-8156, *Preparation of Water Control Manuals*, dated 30 September 2018; and ER 1110-2-8160, *Policies for Referencing of Project Elevation Grades to Nationwide Vertical Datums,* dated 1 March 2009.

4 National Environmental Policy Act Overview

This EA has been prepared in accordance with the National Environmental Policy Act of 1969, Pub. L. No. 91-190, 83 Stat. 852 (codified as amended at 42 U.S.C. §§ 4321, et seq.) (NEPA) and the Council on Environmental Quality's (CEQ) Regulations (codified at 40 C.F.R. Parts 1500-1508), as reflected in the USACE ER 200-2-2. ER 200-2-2 supplements, and applies in conjunction with, the CEQ regulations. Because ER 200-2-2 is in the process of being revised to conform to the CEQ regulations (as revised effective September 14, 2020), the CEQ regulations will control in the event of a conflict between ER 200-2-2 and the CEQ regulations.

The regulations above set forth a process whereby the USACE assesses the environmental effects of proposed major Federal actions and considers reasonable alternatives to these proposed actions. In general, Federal agencies prepare an EA to evaluate whether a Federal action has the potential to cause significant environmental effects. If the agency determines that the action would significantly affect the quality of the human environment, the agency prepares an Environmental Impact Statement (EIS) to evaluate the proposed action and alternatives in greater detail. If the EA concludes that the action will not have significant environmental impacts, the agency will issue a Finding of No Significant Impact (FONSI) to document the basis for that conclusion.

The CEQ regulations do not contain a detailed discussion regarding the format and content of an EA, but an EA must briefly discuss the:

- Need for the proposed action;
- Proposed action and alternatives (when there is an unresolved conflict concerning alternative uses of available resources);
- Environmental effects of the proposed action and alternatives; and
- Agencies and persons consulted in the preparation of the EA.

4.1 Scope of the EA

NEPA requires Federal agencies to review potential environmental effects of Federal actions which include the adoption of formal plans approved by Federal agencies upon which future agency actions will be based. Pursuant to ER 1130-2-550, this EA has been prepared to fulfill USACE's regulatory requirements under NEPA and provide USACE with the information needed to make an informed decision about the potential effects to the natural and human environment from the proposed revision of the current Rough River Lake WCM and implementation of the changes in operations to be reflected in the revision.

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4.2 PURPOSE AND NEED FOR USACE ACTION

To manage and operate each water resources project, USACE district offices develop WCMs to guide project operations. These manuals describe the project's dams, reservoirs, and any affected rivers; historic floods and storms in the project area; and data from other agencies, such as the Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) and the Department of the Interior's U.S. Geological Survey (USGS), that USACE uses in operating the projects. The manuals also describe methods for forecasting the amount of runoff flowing to the dams' reservoirs, document policies and procedures for deciding how much water to release from the reservoirs, and generally have an associated drought contingency plan that provides guidance for district actions in response to periods of water shortages.

In early January 2023, a semi-quantitative risk assessment (SQRA) conducted on Rough River Dam concluded that compelling evidence exists that the dam experiences distress at elevated reservoir levels. The risk assessment recommended that the dam be reclassified from a Dam Safety Action Classification (DSAC) rating of 3 (High Priority) to a DSAC rating of 2 (High Urgency). The risk assessment also determined that the implementation of a five-foot summer pool restriction (change from 495 feet to 490 feet per the National Geodetic Vertical Datum of 1929 [NGVD29]) combined with delaying the spring fill by two weeks (15 March to 1 April) could reduce the risk of dam failure by approximately ½-order of magnitude compared to the existing condition.

On 25 January 2023, USACE Louisville District (LRL) presented the recommendations from the risk assessment to the Dam Senior Oversight Group (DSOG). Given the DSAC reclassification and potential risk to the public, DSOG ultimately endorsed the change in the DSAC and concurred that an immediate implementation of an annual summer pool restriction and annual two-week delay in spring fill was a prudent and an appropriate action to take to reduce project risk. LRL first implemented these changes in 2023 as an approved one-year deviation from authorized operations reflected in the 2022 Water Control Manual. The proposed Action discussed and analyzed herein represents a revision of the existing WCM which will authorize and codify the 2023 pool restriction and delayed fill prescription which will be implemented on an annual basis. This change in operations is meant to be an interim solution designed to reduce stress to the Rough River Dam structure until remediation efforts can be completed.

4.3 ALTERNATIVES

When preparing an EA, Federal agencies must consider a range of alternatives that could reasonably achieve the purpose and need that the proposed action is intended to address. The alternatives to be evaluated in this EA are a No Action Alternative of continuing to operate the Project under the 2022 WCM, and the Proposed Action Alternative of updating the WCM to include the pool restriction and delayed fill prescription that would reduce stress on the Rough River Dam structure while minimizing potential impacts on the other authorized purposes of the Rough River Lake Project.

USACE initially considered other alternatives to the Proposed Action as part of the scoping process for the Rough River Lake Dam remediation project. While evaluating potential pool restriction scenarios, 23 guide curve alterations were evaluated. Four of these were chosen for elicitation by the team performing the risk assessment. The three scenarios forwarded for further consideration, but eventually eliminated, include:

(1) Targeting elevation 465 feet NGVD29 year-around and maintaining the current release criteria.
(2) Targeting elevation 465 feet NGVD29 year-around and eliminating the crop season release criteria (i.e., release at non-crop season (higher rates) year around).
(3) Targeting a summer pool elevation 15 feet below the current target level (480 feet NGVD29 instead of 495 feet NGVD29).

It was ultimately determined that all scenarios would lead to risk reductions approaching ½-order of magnitude, with the exception of targeting NGVD29 465 feet year-around and eliminating the crop-season release criteria. Due to the faster rate of flood storage evacuation, this scenario was closer to or slightly above ½-order of magnitude of risk reduction. However, it was also qualitatively determined that adverse impacts to other authorized purposes of the Rough River Lake Project for this scenario would be significant.

While none of these scenarios lower the overall project risk to below tolerable risk guidelines, the pool restriction (preferred alternative) serves to provide some risk reduction until the permanent solution (i.e., proposed Rough River Lake Dam Remediation Project) is implemented.

4.3.1 No Action

Inclusion of the No Action Alternative (NAA) is required by CEQ regulations and serves as a basis for comparison against which the effects of the Proposed Action can be evaluated. Under the NAA, USACE would take no action and would not revise the existing WCM. In this scenario, the 2022 WCM would remain in effect, and the NAA would result in "no change" from current operational parameters. Under the NAA, operation and management of the Project would follow guidelines outlined in the existing WCM and, therefore, would not alleviate ongoing stressors occurring to the Rough River Dam facility.

4.3.2 Proposed Action Alternative (Preferred Alternative)

Under this alternative, USACE would revise and adopt a new WCM that moves the spring fill by two weeks from 15 March to 1 April and targets a summer pool elevation of 490 feet NGVD29. A formal risk assessment conducted by USACE determined that implementing the pool restriction and delayed fill prescription reduces the risk of further degradation and/or failure of the Rough River Lake Dam and serves as an interim measure to provide some risk reduction until a permanent solution (i.e., the proposed dam remediation project) can be implemented. Analysis conducted by USACE suggests that the Preferred Alternative offers the best solution that both reduces the risks associated with the ongoing structural issues while minimizing the potential impacts to the natural and human environment.

4.4 AFFECTED ENVIRONMENT/ENVIRONMENTAL CONSEQUENCES

The NEPA and the CEQ's NEPA Implementing Regulations require that an EA identify the likely environmental effects of a proposed project and that the agency determine whether those impacts may be significant. Effects (or impacts) are changes to the natural and human environment from the Proposed Action or alternatives that are reasonably foreseeable and have a reasonably close causal relationship to the proposed alternatives (40 C.F.R. § 1508.1(g)). Effects may include ecological, aesthetic, historic, cultural, economic, social, or health effects, and can be either beneficial or adverse.

The determination of whether an impact significantly affects the quality of the natural and human environment must consider the action's potential to affect the environment and the degree of the impacts of an action (40 C.F.R. § 1501.3(b)). Significance varies with the setting of the proposed action, and agencies should consider the specific affected area and its resources where the proposed action is to occur. This includes a consideration of the short-term effects, long-term effects, effects on public health and safety, and effects that would violate Federal, state, tribal, or local law protecting the environment.

The potentially affected environment refers to the area in which the Proposed Action (or other alternatives) would take place and the potentially affected resources of the area (40 C.F.R. § 1502.3(b)). The affected environment includes reasonably foreseeable environmental trends and planned actions in the area, if applicable (40 C.F.R. § 1502.15). The degree of the effects of the Proposed Action generally refers to the magnitude of change that would result if the Proposed Action or alternatives were implemented.

All potentially relevant resource areas were initially considered for analysis in this EA. Some resource topics are not discussed, or the discussion is limited in scope, due to the lack of anticipated effect from the Proposed Action on the resource or because that resource is not located withing the Project.

This Section presents the adverse and beneficial environmental effects of the Proposed Action and the NAA. The section is organized by resource topic, with the effects of alternatives discussed under each resource topic. Impacts are quantified whenever possible. Qualitative descriptions of impacts are explained by accompanying text where used.

Qualitative definitions/descriptions of impacts as used in this section of the EA include:

Degree:

- No Effect, or Negligible – a resource would not be affected, or the effects would be at or below the level of detection, and changes would not be of any measurable or perceptible consequence.
- Minor – effects on a resource would be detectable, although the effects would be localized, small, and of little consequence to the sustainability of the resource. Mitigation measures, if needed to offset adverse effects, would be simple and achievable.
- Moderate – effects on a resource would be readily detectable, localized, and measurable. Mitigation measures, if needed to offset adverse effects, would be extensive and likely achievable, and
- Significant – effects on a resource would be obvious and would have substantial consequences. The resource would be severely impaired so that it is no longer functional in the project area. Mitigation measures to offset the adverse effects would be extensive, and success of the mitigation measures would not be guaranteed.

Duration:

• Short term – temporary effects caused by the construction and/or implementation of a selected alternative; and

• Long term – caused by an alternative and remain after the action has been completed and/or after it is in full and complete operation.

5 Existing Conditions and Environmental Effects of the Proposed Action and Alternatives

5.1 Reservoir, Pool, and Lake Operation

5.1.1 Existing Condition

The primary function of Rough River Reservoir is flood risk management, and it is operated as a unit in the Green River Basin and is part of the comprehensive plan for the Ohio River Basin authorized by the Flood Control Act of 1938. In addition to flood control regulations, in accordance with ER 1110-2-240, the lake also supplies drinking water to the surrounding area, as well as providing fish and wildlife habitat. There are currently two water supply users with active water storage agreements with Rough River Lake (USACE 2023). The City of Leitchfield entered into a water storage agreement with the United States government on 3 August 1966. Upon execution of the agreement, approximately 120 acre-feet of water storage space was reallocated to accommodate a water supply yield of 1 million gallons per day (MGD) between 464.9 and elevation 464.0 mean sea level (MSL). The City of Leitchfield's joint-use Operations and Maintenance (O&M) obligation is billed annually. Grayson County Water District entered into a water storage agreement on 20 November 2017, to utilize 260 acre-feet between 470.0 and elevation 465.0 NGVD29 (USACE 2023). Figure 2 shows the operating tower and outlet works and Tables 1 and 2 provide characteristics of the Project including physical data, hydrology, and operating levels.

Figure 2- Operating tower and outlet works at Rough River Lake Dam.

In February of 2022 Rough River Lake's WCM was updated to meet format compliance with ER 1110-2-8156. A record of changes to pool levels are as follows:

(1) October 1969, ORLED-H: *Report on Feasibility of Increasing Minimum Pool Levels, Barren, Nolin and Rough River Reservoirs*; January 1970 – minimum Rough River pool raised from 465.0 to 470.0
(2) December 2002 – minimum Rough River pool raised from 470.0 to elevation 475.0
(3) December 2012 – minimum Rough River pool lowered from 475.0 to elevation 470.0

Table 1: Summary data of Rough River Lake Dam and Reservoir.

Physical Data		
Main Dam:		
Dam Type	Rolled Earth Fill	
Maximum Height	130 feet	
Length	1,590 feet	
Top Elevation	556 feet NGVD29 + 3-foot parapet wall	
Spillway Type	Uncontrolled open cut	
Spillway Crest Elevation	524 feet NGVD29	
Spillway Base Width	65 feet	
Outlet Works	Three 4.75 x 9.5 feet slide gates in an 12 x 12 feet semi-elliptical concrete conduit. Two 24-inch bypass pass pipes	
Conduit Inlet Invert Elevation	430 feet NGVD29	
Bypass Inlet Invert Elevation	449.8 feet NGVD29	
Hydrology		
Drainage Area	454 mi^2	
Basin Average Rainfall from PMP	27.83 inches	
Probable Maximum Flood (PMF) Peak Inflow	344,000 cfs	
Max. PMF Pool Elevation	556.7 feet NGVD29	
Maximum 6-Hour Inflow	54,400 cfs; 14 Feb 1989*	
Maximum Period-of-Record Release	6,400 cfs; 4 May 2011*	
Maximum Period-of-Record Pool Elevation	527.4 feet NGVD29; 4 May 2011*	
Maximum release and Minimum release during normal operation	3,000 cfs/50 cfs	
Mean Annual Discharge	680 cfs	
Maximum Design Discharge Capacity of the conduit and outlet works	5,600 cfs	
Discharge Capacity of the Bypass system with the Reservoir at seasonal pool	200 cfs	
Average Discharge from Dam site	670 cfs	
Operating Levels		
Pool	*Elevation (feet NGVD29)*	*Storage (acre-ft)*
Top of Dam	559	869,100
Top of Flood Control Pool (spillway crest elevation)	524	334,380
Seasonal Pool (April 14 – October 15)	495	120,010
Water Quality and Water Supply Pool	N/A	N/A
Minimum Pool	470	29,800
Upstream projects, River Mile, and Drainage Area	Not applicable	
**Values from district provided database.*		
***Storage above seasonal pool calculated as part of the hydrologic model development using the elevation storage curve developed using the Rough River Lake water control manual.*		
****From most recent Inspection Report*		

Source: (USACE 2023)

Table 2- Spillway Flood Control Regulation Schedule

Pool Elevation (ft- NGVD29)	Pool Conditions	Regulation
514-524		When precipitation forecasts indicate need to retain storage especially for local Rough River control, pass inflow only, up to the Maximum Release rate. However, unless a regulation based on such
524 and above		Release inflow up to capacity of conduit. If pool exceeds elevation 524 keep conduit open until pool returns to elevation 524. Maintain pool at elevation 524 by passing inflow until donwstream conditions permit return to Schedule B. (At such a time, the Reservoir Regulation Section will evaluate weather and river conditions to determine feasibility of releasing on recessino of downstream stages to regain storage capacity for possible storm recurrence.)

Source: (USACE 2023)

5.1.2 Environmental Consequences

5.1.2.1 No Action

Under the NAA, a revision to the existing WCM and implementation of the pool restriction and delay in fill prescription would not be approved and the Project would continue to operate under current authorized levels. As this alternative would result in the operation and management of the Project continuing as outlined in the current WCM, no short- or long-term effects to the reservoir, pool, and lake operations are anticipated. However, failure to revise the existing WCM would not address ongoing issues with the dam structure. While the continued degradation, loss of function, or failure of the Rough River Dam is not a certainty, failure to codify the change in operations authorized by the proposed WCM revision has the potential to have a significant negative impact on the authorized purposes of the Project, including the reservoir, pool, and operations of the Rough River Lake Project.

5.1.2.2 Proposed Action

Revising the WCM to include the pool restriction and delayed fill prescription would be expected to have a minor impact on the reservoir, pool, and operations of Rough River Lake. The water level reduction authorized by the proposed 2024 WCM revision would be within normal annual operating limits and the proposed restriction would result in delaying spring fill and in a modest reduction to lake levels primarily occurring during summer pool. This change in operations would amount to a relatively minor impact on total lake volume and surface area and would not be expected to have adverse impacts to three of the four authorized purposes of the Rough River Lake Project, i.e., flood risk management, water quality, and water supply. Analysis on the potential impacts of the Proposed Action to recreation and visitation is provided in Section 5.11.

5.2 Climate

5.2.1 Existing Condition

The Green River Basin has a temperate climate with relatively cold winters and hot, humid summers. The National Oceanic and Atmospheric Administration weather station at Leitchfield, Kentucky (Network ID GHCND: USC00154703) is considered representative of the Rough River Basin. The monthly temperature and precipitation data presented below are taken from the summary of monthly means from 1981-2010 (NCEI 2022).

Temperatures are generally moderate with few days greater than 100 degrees Fahrenheit and a few days less than zero degrees Fahrenheit. The maximum recorded temperature to date is 108 degrees Fahrenheit and the minimum recorded temperature is -27 degrees Fahrenheit. Mean annual temperature is approximately 57 degrees Fahrenheit, with monthly means varying from 37 degrees Fahrenheit in January to 76 degrees Fahrenheit in July. Approximate mean monthly temperatures for the Rough River Project are provided in Table 3.

Table 3- Approximate mean monthly temperatures (degrees Fahrenheit) for the Rough River Lake Project.

Month	Mean Temperature	Month	Mean Temperature
January	32.1	**July**	74.3
February	36.0	**August**	73.2
March	44.3	**September**	66.3
May	62.7	**October**	55.1
June	70.8	**December**	34.6

Source: (USACE 2022)

The average growing season (the last killing frost in spring until the first killing frost in fall) extends from late-April to mid-October with a median length of approximately 177 days (USACE 2022).

In general, precipitation in the Project area is evenly distributed throughout the year, with smaller amounts of rainfall occurring in late summer and fall. Average annual rainfall at the Rough River Reservoir weather station is approximately 49 inches. In addition, there are seven weather observation stations in close proximity to the Rough River watershed that measure precipitation (USACE 2022**)**. The average annual rainfall of the four stations considered to be the most representative of the watershed is 49.3 inches (Table 4).

Table 4- Mean monthly and annual precipitation at select weather stations within the Rough River Lake Project Area.

	Leitchfield	Beaver Dam	Glendale	Rough River Lake	Average
	(inches)	(inches)	(inches)	(inches)	(inches)
Station ID	*USC00154703*	*USC00150490*	*USC00153252*	*USC00156988*	
POR	*1895-2019*	*1903-2010*	*1951-2012*	*1940-2019*	
Jan	3.31	3.46	3.71	3.35	3.46
Feb	4.03	4.24	4.17	3.75	4.05
Mar	4.30	4.34	4.65	3.99	4.32
Apr	4.15	4.50	4.29	4.42	4.34
May	5.68	5.42	5.63	6.31	5.76
Jun	3.73	3.74	3.90	3.92	3.82
Jul	4.58	4.31	4.71	4.14	4.44
Aug	3.53	3.32	3.27	3.31	3.36
Sep	3.28	3.57	3.39	3.40	3.41
Oct	3.73	3.76	3.64	3.77	3.73
Nov	3.87	4.19	4.29	4.13	4.12
Dec	4.42	4.69	4.71	4.28	4.53
Annual	48.61	49.54	50.36	48.77	49.32

Source: (USACE 2023)

From 2002 - 2019, annual snowfall at the dam has averaged approximately 12 inches (USACE 2022). In general, periods of extended snow and ice cover are unusual and snowmelt runoff does not significantly contribute to flooding of the Project area.

Climate Change

In 2017, the USACE Huntington District in collaboration with the Ohio River Basin Alliance, the USACE Institute for Water Resources, the USACE Great Lakes and Ohio River Division, and numerous other Federal agencies, non-government organizations, and research and academic institutions completed the Ohio River Basin Climate Change Pilot Report. This pilot study investigated potential climate change impacts to ORB infrastructure, including Federal facilities operated for reduction of flood damages, navigation, local protection, water supply, and hydroelectric power production, as well as the potential impacts on terrestrial and aquatic ecosystems that are influenced by operation of these infrastructure components (Drum et al. 2017). The primary purpose of the study was to identify those components of the ORB infrastructure and ecosystem resources that may be at risk from future changes in precipitation and temperature, and to formulate mitigation and adaptation strategies that may be implemented to reduce those effects.

The primary concern to water management agencies is the threat of extreme weather episodes becoming more prevalent, longer, and more potent. The potential for climate and weather elements including temperature, precipitation, winds, humidity, evaporation to become less predictable and more susceptible to extreme changes suggests a need for review studies of the existing operating schemes for water management and whether the current infrastructure design can accommodate potential future operational changes.

The pilot study addresses the formulation of potential adaptation themes or strategies that could decrease the impacts associated with changes in precipitation, streamflow discharge, and temperatures across the basin. Although not prescriptive in nature, these strategies suggest potential paths forward that can be integrated into both near- and long-term infrastructure planning, structure rehabilitation, water policy analysis, and operational changes and can be useful as a management tool for lake projects throughout the ORB, including Rough River Lake.

The USACE Climate Hydrology Assessment Tool was also used to investigate potential future changes to flood flows in the region, using observed and projected data from the Green River Basin (HUC 0511). Looking closer at the trend of mean projected annual maximum monthly stream flows, a statistically significant, positive trend is observed for the Green River watershed as a whole. This increase is statistically significant (p-value <0.001), which suggest that there may be potential for flood risk to increase in the future in the study area relative to the current time. However, the modeling used in these studies suggest that the more rapid changes in temperature, precipitation, and stream flows resulting from changes in regional climate may not begin within the ORB until 2040 (Drum et al. 2017). The modeling results also suggest a gradual increase in annual mean temperatures between 2011 and 2040 amounting to one-half degree per decade, with greater increases between 2041 and 2099 of one full degree per decade. The results of the Drum et al. pilot study further suggests that the Rough River Lake region is not expected to experience marked hydrologic regime changes that may negatively affect the operation of the Project until 2071 (Drum et al. 2017).

5.2.2 Environmental Consequences

5.2.2.1 No Action

Under the NAA, a revision to the existing WCM to include the pool restriction and delayed fill prescription would not be approved and the Project would continue to operate under current authorized levels. As this alternative would result in the operation and management of the Project continuing as outlined in the current WCM, no short- or long-term effects to the local and regional climate are anticipated. Under this alternative, the local and regional impacts potentially incurred as a result of climate change would be expected to continue following current trends with their concomitant environmental outcomes. However, failure to revise the existing WCM would not address ongoing issues with the dam structure.

The Rough River Lake Project is operated to reduce the risks and associated damages of flooding in the basin. Based on the literature review of observed trends as well as an analysis of locally observed data, statistically significant and increasing trends in precipitation have been documented. While the continued degradation, loss of function, or failure of the Rough River Dam is not a certainty, failure to codify the change in operations authorized by the proposed WCM revision has the potential to reduce the project's ability to withstand the potential effects of climate change, including an increase in the prevalence and intensity of flood events in the region.

5.2.2.2 Proposed Action

Adopting the WCM revision and implementing the pool restriction and delayed fill prescription would be expected to have no impact on local or regional climate at Rough River Lake. Because the proposed water level reduction authorized by the proposed revision would be within normal annual operating limits and the proposed restriction targets a seasonal reduction that would result in a modest reduction to lake levels, surface area, and volume, the Action would be expected to have a negligible impact on climate.

5.3 Air Quality

5.3.1 Existing Condition

The United States Environmental Protection Agency (USEPA) Office of Air Quality Planning and Standards has set National Ambient Air Quality Standards (NAAQS) for six principal pollutants, called "criteria" pollutants. They are carbon monoxide, nitrogen dioxide, ozone, lead, particulates of microns or less in size (PM-10 and PM-2.5), and sulfur dioxide. Ozone is the only parameter not directly emitted into the air, but that forms in the atmosphere when three atoms of oxygen (O_3) are combined by a chemical reaction between oxides of nitrogen (NOx) and volatile organic compounds (VOC) in the presence of sunlight. Motor vehicle exhaust and industrial emissions, gasoline vapors, and chemical solvents are some of the major sources of NOx and VOC, also known as ozone precursors. Strong sunlight and hot weather can cause ground-level ozone to form in harmful concentrations in the air. As of November 2023, Breckinridge, Grayson, and Hardin counties were all in attainment for all NAAQS (USEPA 2023a). Attainment is a designation given to areas of the United States that have met all air standards for human health by established deadlines using criteria set forth in the Clean Air Act (CAA).

5.3.2 Environmental Consequences

5.3.2.1 No Action

Under the NAA, a revision to the existing WCM to include the pool restriction and delayed fill prescription would not be approved and the Project would continue to operate under current authorized levels. As this alternative would result in the operation and management of the Project continuing as outlined in the current WCM, no short- or long-term effects to the local or regional air quality are anticipated.

5.3.2.2 Proposed Action

Revising the WCM to include the pool restriction and delayed fill prescription would be expected to have no impact on local or regional air quality at Rough River Lake. Because the water level reduction authorized by the proposed WCM revision would not involve activities that generate emissions above those existing at current baseline levels, the Proposed Action would be expected to have no impact on air quality.

5.4 Topography, Geology, and Soils

5.4.1 Existing Condition

Rough River Lake is located within Mississippian Plateaus region of south-central Kentucky near the eastern-most boundary of the Western Kentucky Coal Field physiographic region (Figure 3). The Mississippian Plateaus region is subdivided into the western Mammoth Cave Plateau and the eastern Pennyroyal Plateau, which are separated by the Dripping Springs Escarpment. The Green River marks the approximate southern boundary between the Western Kentucky Coal Field region and the Mammoth Cave Plateau (USACE 2022).

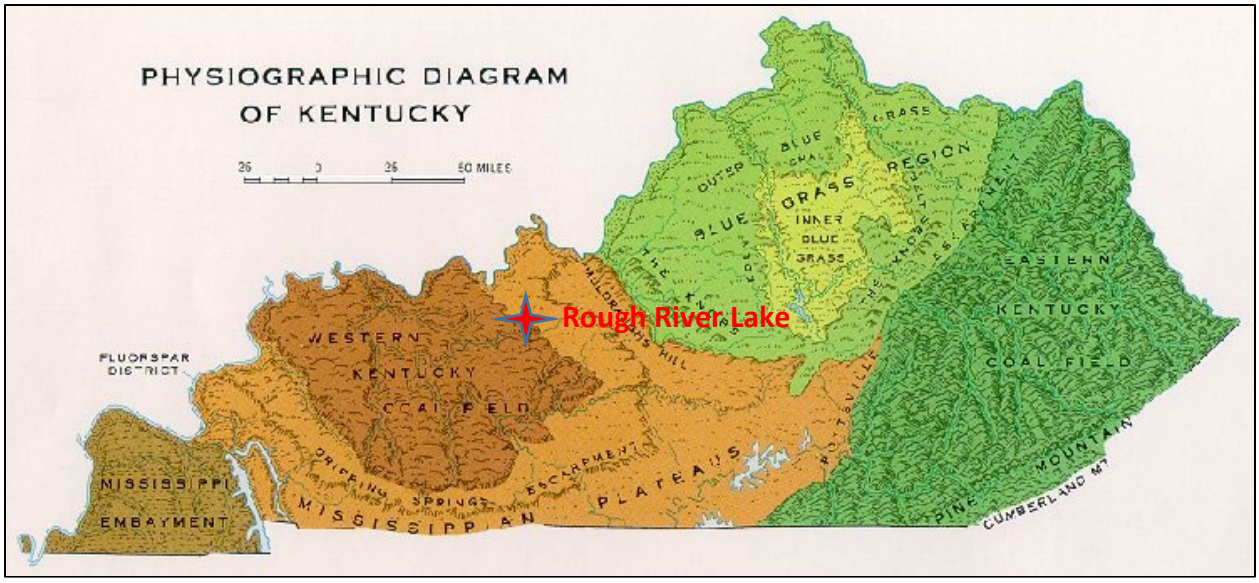

Figure 3. Physiographic Regions of Kentucky (Source: KGS 2012)

The Mississippian Plateaus region of Kentucky is one of the most well-developed karst landscapes in the world. The development of the Mammoth Cave System has occurred within limestone of Mississippian age, divided stratigraphically (in ascending order) into the St. Louis, St. Genevieve, and Girkin formations. Overlying the Girkin is the Big Clifty Sandstone, also of Mississippian age, which acts as the protective cap rock for the Mammoth Cave Plateau. Geologic formations that are common to the Mammoth Cave Plateau are also present at the Rough River Dam site. Geologic formations exposed in the Project area range from the Girkin Limestone of the Lower Chester Series upward into the Caseyville Formation of the Lower and Middle Pennsylvanian Series. (USACE 2022). See Figure 4 for the geological regions of Kentucky.

Common rock strata found on the Rough River Lake Project are part of the Chester series, and the stratigraphy from top to bottom is as follows (Campbell 1996, USACE 2022):

- Hardinsburg Sandstone
- Golconda Formation (contains Haney Limestone, Big Clifty Sandstone Member, and Beech Creek Limestone)
- Elwren Shale, equivalent to Elwren Sandstone of Marlott
- Reelsville Limestone
- Sample Sandstone
- Beaver Bend Limestone

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey, several soil series/types are found within project area. The very rocky, Rosine-Gilpin-Lenberg and Wellston silty clay loam comprise the largest percentages of soils of the fee lands. Many of the silt loam soil types present on the Project are classified as prime farmland or farmland of statewide importance. These soil types are present scattered in and around the Project; the vast majority are situated above the lake rim and in the outlying areas surrounding the lake. Actions by Federal agencies such as construction activities and Federal land management decisions have the potential to directly or indirectly contribute to the loss of prime and unique farmlands. A soil report detailing the location

of prime and unique farmlands within the Project fee lands is provided in Appendix A (NRCS 2022).

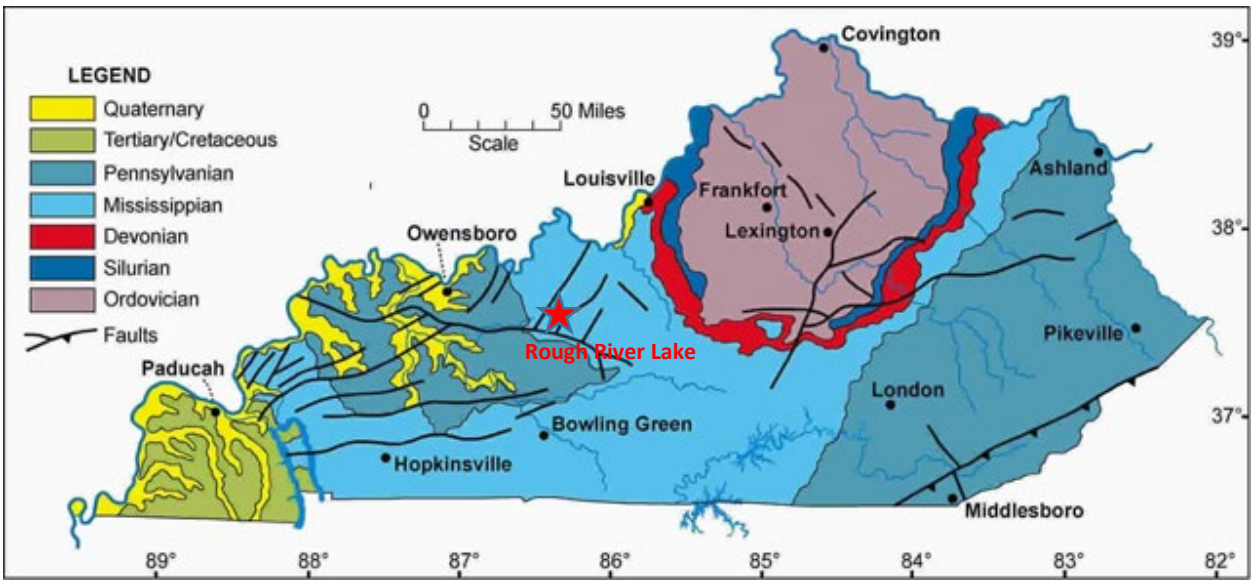

Figure 4. Geology of Kentucky (Source: KGS 2019).

5.4.2 Environmental Consequences

5.4.2.1 No Action

Under the NAA, a revision to the existing WCM to include the pool restriction and delayed fill prescription would not be approved and the Project would continue to operate under current authorized levels. As this alternative would result in the operation and management of the Project continuing as outlined in the current WCM, no direct short- or long-term effects to topography, geology, and/or soils are anticipated.

5.4.2.2 Proposed Action

Revising the WCM to include the pool restriction and delayed fill prescription would be expected to have no impact on topography, geology, and soils at the Project. Because the water level reduction authorized by the proposed WCM revision would be within normal annual operating limits and the proposed restriction targets a seasonal reduction that would result in a modest change to lake levels, surface area, and volume, the Action would be expected to have no impact on prime and unique farmlands. Soils of the project will not be impacted by the Proposed Action because the project will involve no soil disturbance and sedimentation rates will not increase beyond normal baseline levels as a result of the WCM revision.

5.5 Surface Water Hydrology and Groundwater

5.5.1 Existing Condition

Surface Water

Rough River is the major tributary of the lower Green River in west-central Kentucky. Rough River is 136 miles long and its drainage basin lies wholly within the state. Rising in northwestern Hardin County and flowing west to southwest through Grayson, Breckinridge, Ohio and McLean Counties, it joins the Green River at the town of Livermore. Rough River Lake Dam is on the boundary of Breckinridge and Grayson Counties about 89 miles above the confluence of the two rivers. The lake also collects the 29.5-mile-long North Fork Rough River, which flows for its entire length in Breckinridge County.

The Rough River Basin lies entirely within Kentucky, with the headwaters originating in west central Hardin County. The Rough River meanders 141 miles in a west-by-southwesterly direction, draining portions of six counties, to its confluence with the Green River at River Mile (RM) 71.3. The watershed is roughly rectangular in shape, about 63 miles in length with an average width of 17 miles wide. The drainage area at the Rough River Dam is 454 square miles, and total drainage area of the Rough River Basin at the Green River confluence is 1,081 square miles. See Figure 5 regarding the Project area watershed.

The Rough River valley lies in a relatively flat plain with an average slope of about 1.5 feet per mile. The channel below the dam has an average slope of 0.8 feet per mile, increasing over the next 38 miles to 1.9 feet per mile (USACE 2022). The upper 13 miles of the Rough River above the reservoir rises sharply with an average slope of 5.5 feet per mile. The elevation of the stream bed ranges from approximately 350 NGVD29 at the confluence with Green River to approximately 568 NGVD29 near the source. In the vicinity of the dam, the stream channel is about 30 to 40 feet wide at the bottom, about 100 feet wide at the top, and the banks are about 14 feet high.

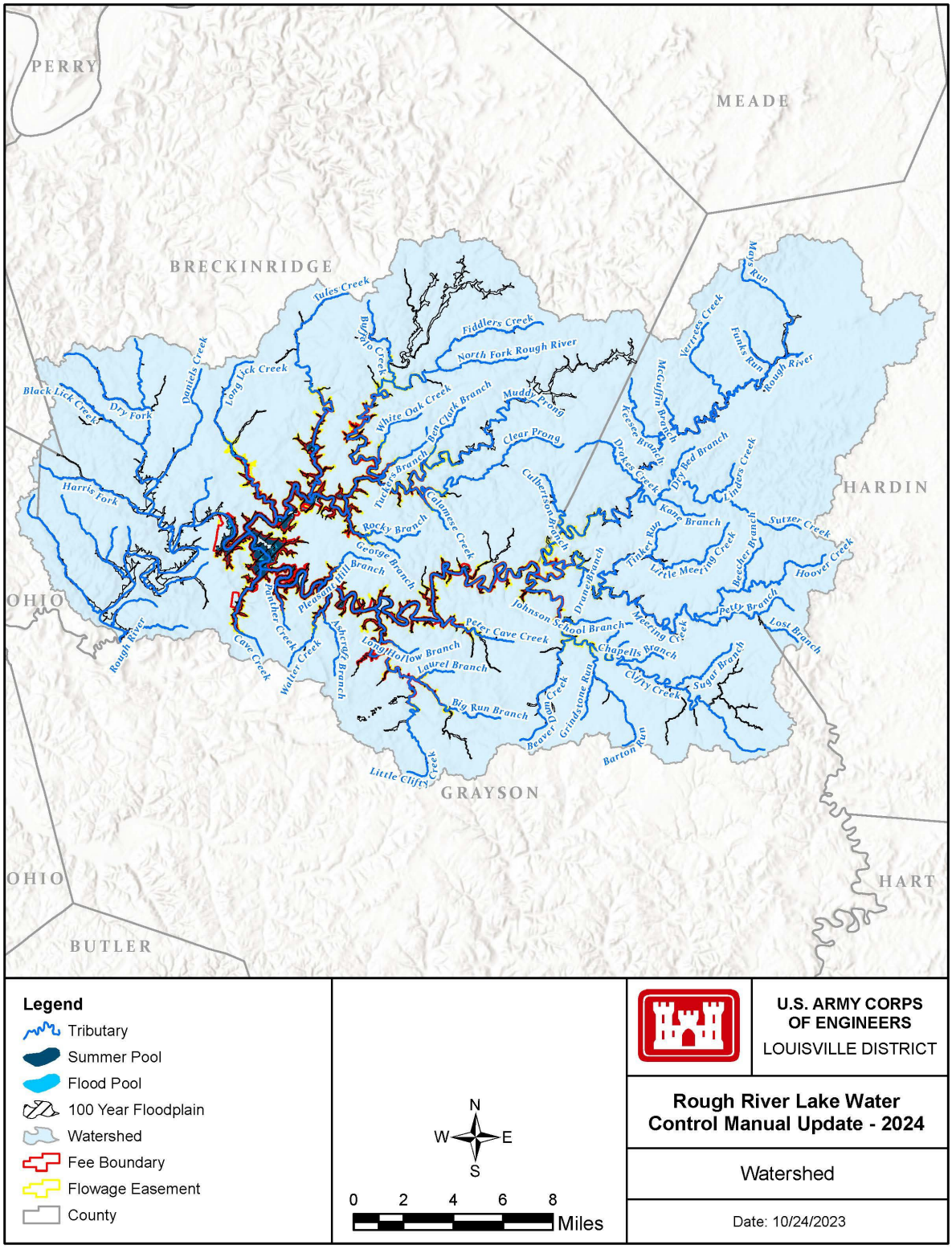

Figure 5. Rough River Lake Watershed (NLCD 2019).

Groundwater

Groundwater occurs throughout the Rough River basin and is influenced by the type and geometry of bedrock in the area. Surface and groundwater flows are controlled by the nature of these rocks and the associated surface features. The headwaters of the basin are in the Eastern Pennyroyal region, which is characterized by flat lying limestones, sandstones, and shales that underlie flat to gently rolling terrain. The limestone areas have well-developed karst topography, characterized by vast sinkhole plains that take virtually all surface water that comes to them and channel it through caves and smaller underground passages below the ground surface. Several springs in this region, discharging from major underground passages, are large enough to support municipal water systems. In soluble limestone terrain or karst regions, the underground drainage may differ from the boundary of its surface watershed and flow through caves and cracks in the rocks beneath the surface ridges (KGS 2019).

Groundwater resources of the Project Area vary greatly and are highly dependent on local geomorphology. Throughout much of the Project Area, drilled wells are adequate for a domestic supply with the depths of adequate wells ranging from 100 to 300 feet. Nearly all drilled wells in the Ohio River alluvium are adequate for domestic use and many wells have the potential to yield several hundred gallons per minute (Carey 2001, KGS 2019). Compound horizontal wells set in the alluvium may yield 5,000 gallons per minute, which is enough for a community or industrial supply. Yields as high as 100 gallons per minute have been reported from wells penetrating fault zones (KGS 2019).

5.5.2 Environmental Consequences

5.5.2.1 No Action

Under the NAA, revising the current WCM to include the pool restriction and delayed fill prescription would not be approved and the Project would continue to operate under current authorized levels. As this alternative would result in the operation and management of the Project continuing as outlined in the current WCM, no short- or long-term effects to surface water hydrology and groundwater are anticipated. However, failure to revise the existing WCM would not address ongoing issues with the dam structure. While the continued degradation, loss of function, or failure of the Rough River Dam is not a certainty, failure to codify the change in operations authorized by the proposed WCM revision would have the potential to have a significant negative impact on the authorized uses of Rough River Lake Project and the surrounding environment, including surface water hydrology.

5.5.2.2 Proposed Action

Revising the WCM to include the pool restriction and delayed fill prescription would be expected to have a negligible impact on surface water hydrology and groundwater resources at the Rough River Lake Project. Because the proposed reduction in water levels authorized by the proposed WCM revision would be within normal annual operating limits and the restriction targets a seasonal reduction that would result in a modest change in lake levels, surface area, and volume, the Action would be expected to have a negligible impact on the surrounding hydrology of the Project. Due to the scope and timing of the delay in fill and pool restriction, the Proposed Action would be expected to also have a negligible impact to local aquifers beyond normal baseline levels and fluctuations caused by changes in annual precipitation of the area.

5.6 Water Quality

5.6.1 Existing Condition

The water quality management authority of USACE is founded on the FWPCA, as well as the Clean Water Act (CWA) of 1977 and the Water Quality Act of 1987. In addition, Executive Order 12088, Federal Compliance with Pollution Control Standards (1978), requires Federal facilities to comply with applicable pollution control standards in the same manner as any non-Federal entity. ER 1110-2-8154 stipulates that it is USACE policy to develop and implement a holistic, environmentally sound water quality management strategy for all projects. Furthermore, it is USACE's goal to responsibly manage our projects to maximize environmental compliance. USACE also must comply with applicable State regulations and standards.

Water quality in Rough River Reservoir and its associated watershed is monitored by USACE, Kentucky Division of Water (KDOW), and water supply utilities. USACE Project personnel conduct water quality monitoring in which biweekly measurements are collected from spring to fall during lake stratification to monitor temperature and dissolved oxygen levels. Dissolved oxygen is used as an important indicator of potential water quality problems that can be detrimental to aquatic ecosystems. Reduced oxygen levels at depths can lead to dead zones that can produce fish kills. reduced biodiversity, reduce aesthetic values, impact the quality drinking water, and create conditions that promote harmful algal blooms (HABs). Water quality in the tailwater is also assessed by analyzing data for exceedances of water quality standards and criteria. Data collected via the Louisville District Water Quality Program is assessed annually. Data is compared and if any exceedances of established water quality criteria occur, the Louisville District Water Quality Team reports this to the Kentucky Division of Water (KDOW).

During summer 2020, water quality in the dam's tailwater of Rough River Lake was also assessed by USACE personnel by analyzing collected data for exceedances of water quality criteria established by the KDOW. Rough River Lake had one exceedance for temperature at the tailwater. Trophic state index scores (TSI) for the three indices collected at the Project (i.e., total chlorophyll-a, total phosphorus, and secchi depth) classified the lake as moderately eutrophic or eutrophic, indicating moderate to high levels of biological activity potential. Total phosphorus and total nitrogen levels at all (n = 8) sample locations exceeded the United States Environmental Protection Administration (USEPA) nutrient criteria. Finally, the sampling showed there were three samples with cyanobacteria cell counts over 100,000 cells/mL at the time of sampling.

Watershed geology, morphology, and land use are primary factors in determining the quality of water within a watershed. Agricultural uses (hay/pasture and cultivated crops) make up approximately 45% of the surrounding watershed. Watersheds with heavy agricultural use commonly experience eutrophication, or the overloading of nutrients into water bodies due to the runoff of fertilizers and animal waste. The results documented during this study indicate that Rough River Reservoir accumulates high loads of nutrients which can have a significant effect on the aquatic ecosystem and have the potential to contribute to the production of Harmful Algal Blooms (HABs).

As a requirement of the CWA, KDOW is responsible for monitoring water quality of the state's waters. The most recent water quality assessment of Rough River Lake conducted by KDOW was in 2020. According to KDOW (2022), the lake was classified as fully supporting warm water aquatic habitat, primary contact recreation (swimming), secondary contact recreation (fishing/wading/boating), and domestic water supply (drinking water). The lake was classified as

partially supporting fish consumption due to the presence of low levels of mercury and polychlorinated biphenyls in fish tissue samples (KDOW 2022).

Impacts to the surrounding watershed also have the potential to impact the water quality of the Project. Bioassessments of the Project's major inflows are conducted by KDOW as part of state-wide water quality monitoring program. Many of the surrounding streams contributing to the inflow of the lake have been classified as impaired and contribute to water quality of Rough River Lake Project. The National Water Quality Inventory Report to Congress (305(b) report) is the primary means of informing Congress and the public about general water quality conditions in the United States. These reports consist of water quality assessments submitted by states, tribes and others and summarized by the USEPA for Congress. In addition to designated uses, the 305(b) report calls for a listing of impaired waters (Section 303(d)). States are required to develop and implement Total Maximum Daily Loads (TMDLs) for water resources listed on their respective 303(d) lists. A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can accept and still meet the state's Water Quality Standards for public health and healthy ecosystems.

According to the KDOW's 2016 Section 303(d) list, Rough River is impaired from RM 55.1 to 64.35 (Adams Fork to Caney Creek), for exceeding approved concentrations of iron, fecal coliform, and *Escherichia coli*, impacting warm water aquatic habitat, secondary contact recreation (i.e., boating, wading, fishing), and primary contact recreation (swimming), respectively. Rough River (RM 125.0 to 137.9) is characterized as *non-supporting* primary contact recreation (swimming) as a result of contamination by the fecal coliform *Escherichia coli*. This section of the stream is also currently 303(d) listed and was approved for a TMDL restoration plan in 2019. Potential sources of fecal coliforms to Rough River, and the basin as a whole, include publicly owned water treatment facilities, diffused pollution from agriculture, livestock near streams, failing or improperly maintained residential septic systems, and human waste from straight pipes (KDOW 2018).

Among the streams that form the headwaters of the Rough River Lake Project, Meeting Creek (RM 5.25 – 14.0) is classified as an Outstanding State Resource Water. However, the results of a 2007 bioassessment documented evidence of impairment due to excess nutrients and/or sedimentation in the stream. Long Lick Creek (RM 4.55 – 7.3) and Pleasant Hill Branch (RM 0.9 - 2.95) are both classified as *non-supporting* for warm water habitat based on poor benthic macroinvertebrate and habitat assessment scores. Potential causes of impairment of streams within the Rough River Lake watershed include human-caused perturbations that have altered the chemical, physical, and biological integrity of streams including runoff or the alteration of the hydrological regime from agriculture and the loss or modification of riparian habitat.

5.6.2 Environmental Consequences

5.6.2.1 No Action

Under the NAA, a revision to the existing WCM to include the pool restriction and delayed fill prescription would not be approved and the Project would continue to operate under current authorized levels. As this alternative would result in the operation and management of the Project continuing as outlined in the current WCM, no immediate effects to water quality are anticipated. However, failure to revise the existing WCM would not address ongoing issues with the dam structure. While the continued degradation, loss of function, or failure of the Rough River Dam is not a certainty, failure to codify the change in operations authorized by the proposed WCM

revision has the potential to have a significant negative impact on the authorized uses of the Rough River Lake Project, including water quality.

5.6.2.2 Proposed Action

Revising the WCM to include pool restriction and delayed fill prescription would be expected to have no impact on water quality at the Rough River Lake and tailwaters of the project. Because the water level reduction authorized by the proposed WCM revision would be within normal annual operating limits and the restriction targets a seasonal reduction that would result in a modest change in lake levels, surface area, and volume, the Action would be expected to have no impact on water quality of the Project. Water Supply and Water quality impacts are low because there is sufficient volume of water above the intake elevations. Thermal stratification is not expected to change significantly with a summer pool target elevation five feet lower than the current authorized level. In addition, the development of harmful algal blooms (HABs) is not expected to significantly increase given the available depth and volume of the reservoir when targeting a summer pool elevation of 490 feet NGVD29.

5.7 Habitats

5.7.1 Existing Condition

Habitats of the Project area are delineated and categorized using the National Land Cover Database (NLCD). The NLCD provides nationwide data on land cover and land cover change at a 30-meter resolution with a 16-class legend based on a modified Anderson Level II classification system (MRLC 2023).

NLCD analysis indicates that the dominant land cover category for the project is "deciduous forest" forested habitat, comprising 66.2% of terrestrial land cover on fee lands (Table 5). Project-wide, 28% percent (n = 2,996.6 acres) of total fee lands are classified as modified for human use or otherwise developed in some way, i.e., developed land, cultivated crops, hay fields, pasture, etc. Table 5 contains a detailed list of terrestrial habitat types and their relative acreages. Figure 6 includes NLCD land cover types present on the Project fee lands.

Table 5. Estimated land cover types present on the Rough River Lake Project (NLCD 2019).

Land Cover Type	Acres
Developed, Open Space	146.3
Developed, Low Intensity	56.7
Developed, Medium Intensity	29.2
Developed, High Intensity	5.6
Barren Land	46.0
Deciduous Forest	3669.9
Evergreen Forest	59.4
Mixed Forest	224.0
Shrub/Scrub	0.7
Grassland/Herbaceous	75.7
Hay/Pasture	204.1
Cultivated Crops	9.2
Woody Wetlands	3.3
Emergent Herbaceous Wetlands	19.1

Forested habitats are classified using the NLCD system and include mixed, evergreen, and deciduous forest habitat types. These habitat classification types are broad categories that can be further refined into known forest community associations that result from local or regional geological character as well as local geology and topology, aspect. In general, the older, larger tracts of the forest habitat are located on steeper slopes that are often associated with water courses and are found in areas that were generally harder to access when the surrounding region was cutover.

Forested habitats on the Project are a mosaic of mixed community types occurring at different successional stages. The undulating terrain of the Rough River Lake and greater Project area is dominated by the mixed mesophytic forest with oak-hickory forest association communities present on the slopes and uplands surrounding the lake (Figure 6). The specific forest community composition of the Project is dependent on slope, aspect, soil type and moisture content. Red maple (*Acer rubrum*) and sugar maple (*A. saccharum*) associations predominate on the forested areas with alkaline soils formed from the limestone and shale rock of the park and in old fields. Also present are numerous oak (typically *Quercus montana*, *Q. alba*, *Q. coccinea*, or *Q. velutina*) and hickory (typically *Carya glabra* and *C. ovata*) species, particularly along the steeper, more xeric slopes and along ridges of the project. Evergreens include Virginia pine (*Pinus virginiana*) and eastern white pine (*Pinus strobus*) and are patchily distributed in certain sections of the project (NatureServe 2023).

Bottomlands are less prevalent on the project but are characterized by seasonal wetness. The dominant species in these areas in pin oak (*Quercus palustris*), maples, ash, elm, and swamp oak (*Q. bicolor*), with beech (*Fagus grandifolia*) and sweetgum (*Liquidambar styraciflua*) also present. In the less hydric areas, white and red oaks, beech, sugar maple, and hickory can be dominant, with elm, ash, black walnut (*Juglans nigra*), honey locust (*Gleditsia triacanthos*), and blackgum (*Nyssa sylvatica*) also present. Sycamore (*Plantanus occidentalis*), boxelder (*Acer negundo*), hackberry (*Celtis occidentalis*), black willow (*Salix nigra*), and cottonwood (*Populus deltoides*) are also common.

Old fields are successional habitats characterized by grasses, shrubs, and trees. These habitats are typically maintained for hay productions, left as fallow fields, or transitioning from grasslands to early successional scrub/shrub/forest communities. In general, early successional habitats of the project area are characterized by the following plant species: blackberry (*Rubus sp.*), raspberry (*Rubus sp.*), switchgrass (*Panicum sp.*), big bluestem (*Andropogon gerardi*), and little bluestem (*Schizachyrium scoparium*) among other grasses, forbs and shrubs.

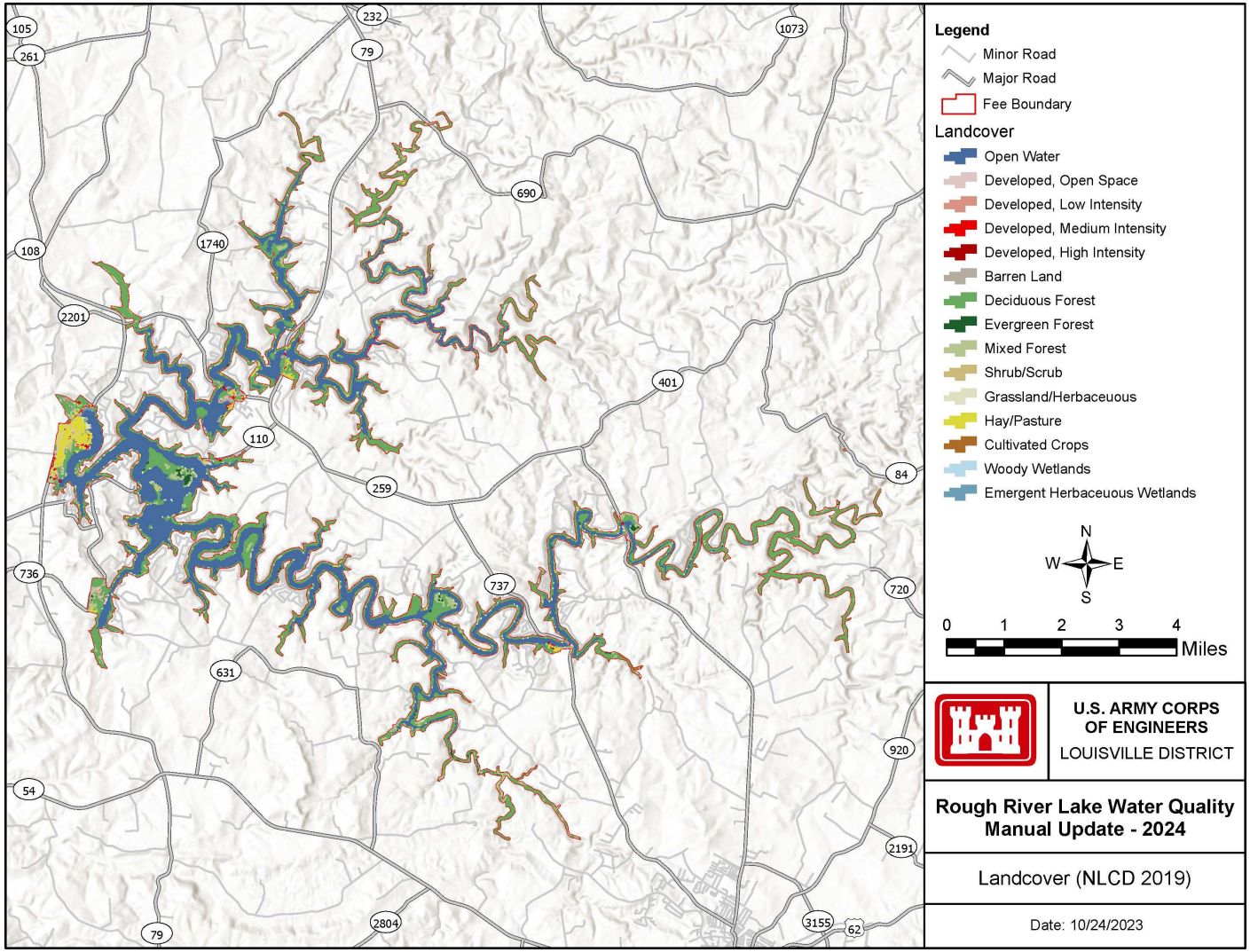

Figure 6. Land cover types present on fee lands at the Rough River Lake Project.

Wetlands

Wetlands need to be considered for federal projects under CWA Section 404 and Executive Order 11990. Wetlands are defined as: Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support and that under normal circumstances, do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps marshes, bogs, and similar areas (USACE 1987).

Analysis conducted via the United States Fish and Wildlife Services (USFWS) National Wetland Inventory (NWI) desktop application indicate that approximately 48.2 acres of freshwater wetlands exist within the Rough River Lake fee boundaries (USFWS 2022). Wetland habitat types found on the Project include freshwater forested/shrub (40.4 acres), riverine (3.9 acres), freshwater emergent (3.4 acres), and pond (0.5 acres) habitat types. Additionally, lacustrine habitat, which is generally modified deep water habitats that occur as a result of impoundment or otherwise exist as a result of habitat manipulation, also occurs within the Project (USFWS 2022).

Most wetland habitats are found within the floodplain and riparian zones of the backwater sloughs of the lake. Freshwater emergent wetlands are characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichen, which are “present for most of the growing season in most years (USFWS 2022). Herbaceous wetlands have less than 30% aerial coverage of tree and shrub species (FGDC 2013). Some of these wetlands are seasonally flooded and some may be temporarily flooded, meaning surface water is present for brief periods (from a few days to a few weeks) during the growing season, but the water table usually lies well below the ground surface for most of the season. At least one potential freshwater forested/shrub wetland adjacent to the lake is considered forested with an aerial coverage of 30% or more of broad-leaved deciduous trees greater than 20 feet tall and is seasonally flooded (FGDC 2013). Figure 7 shows existing wetlands within the project boundary according to the USFWS NWI database (USFWS 2022).

Typical wetland flora of this area includes various sedges (*Carex* spp.), cattail (*Typha* sp.), spikerush (*Eleocharis palustris*), smartweed (*Persicaria sp.*), knotweed (*Reynoutria japonica*), pickerelweed (*Pontedaria cordata*), pondweed (*Potamogeton sp.*), and scouring rush (*Equisetum hyemale*). Trees such as willow (*Salix sp*.), cottonwood (*Populus deltoides*), sycamore (*Platanus occidentalis*), box elders and maples (*Acer spp.*), ash (*Fraxinus spp.*), and oak (*Quercus spp.*) may also be found in bottomlands containing wetland habitats on the project. Wetlands provide habitat for many animals, including red-winged blackbird (*Agelaius phoenicus*), muskrats (*Ondatra zibethicus*), mink (*Neovison vison*), beaver (*Castor canadensis*), reptiles and amphibians, as well as a wide range of waterfowl.

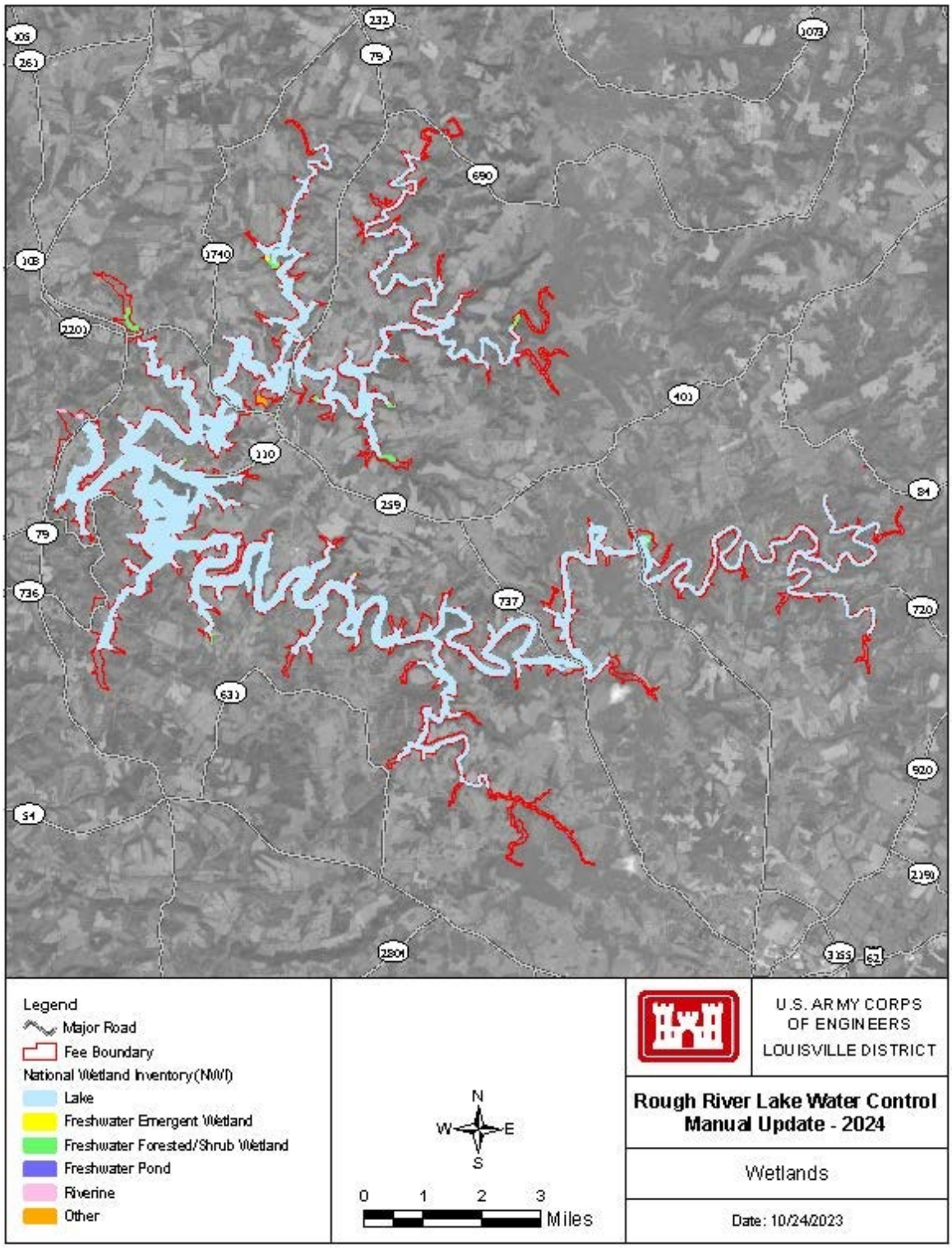

Figure 7. Wetlands within the Rough River Lake Project boundary (Source: USFWS National Wetland Inventory).

5.7.1.1 No Action

Under the NAA, a revision to the current WCM to include the pool restriction and delayed fill prescription would not be approved and the Project would continue to operate under current authorized levels. As this alternative would result in the operation and management of the Project continuing as outlined in the current WCM, no immediate effects to wetland habitats are anticipated. However, failure to revise the current WCM would not address ongoing issues with the dam structure. While the continued degradation, loss of function, or failure of the Rough River Dam is not a certainty, failure to codify the change in operations authorized by the proposed WCM revision has the potential to have a significant negative impact on the surrounding resources of Rough River Lake Project, including wetland habitats.

5.7.1.2 Proposed Action

Revising the WCM to include the pool restriction and delayed fill prescription would be expected to have no impact on terrestrial habitats at the Rough River Lake Project. Because the proposed water level reduction authorized by proposed WCM revision would be within normal annual operating limits and the proposed restriction targets a seasonal reduction that would result in a modest change to lake levels, surface area, and volume, the Action would be expected to have a negligible impact on local hydrology and wetland resources of the Project.

5.8 Fish and Wildlife Resources

Aquatic Wildlife

Fishing is available on Rough River Lake with management of the lake fish stocks conducted by Kentucky Department of Fish and Wildlife Resources (KDFWR). Rough River Lake supports healthy populations of several game fish species including largemouth bass (*Micropterus salmoides*), smallmouth bass (*M. dolomieu*). hybrid striped bass (*Morone* sp.), channel catfish (*Ictalurus punctatus*), flathead catfish (*Pylodictis olivaris*), white crappie (*Pomoxis annularis*), black crappie (*P. nigromaculatus*), and bluegill (*Lepomis macrochirus*). The main forage fish is gizzard shad (*Dorosoma cepedianum*).

The fishery resource of Rough River Lake is typical of most large Kentucky impoundments. The fishes most sought by lake anglers include bass, catfish, hybrid striped bass, crappie, and panfish. The lake suffers from lack of suitable cover for some fish species, a condition fairly typical of multi-purpose lakes. However, according to the KDFWR (2021), the largemouth bass population assessment at Rough River Lake has averaged a “Good” rating since 1996 but has been in the “Excellent” range since 2012.

Terrestrial Wildlife

Terrestrial wildlife is defined as animals that are found on land and in the air and includes amphibians, birds, mammals, and reptiles. Habitat diversity around the lake provides for a relatively diverse composition of wildlife species. The area provides many habitats, ranging from sandstone cliffs to karst topography to bottomland woods, which allow for a large diversity of reptiles and amphibians. Habitat around the lake, ranging from upland forests to grasslands and marshes, also supports many varieties of birds. The Project area provides the opportunity to observe 230 bird species. These include 51 permanent residents, 25 winter residents, 65 summer residents and 89 migratory species. Thirty-three of these species are considered game birds (USACE 2023). Dove, quail, and mallards are the most widely hunted. Sandhill cranes migrate through and over the basin in the spring and fall.

The Rough River basin is on the eastern most edge of the Mississippi Flyway. While wood ducks commonly nest in the area, most waterfowl are associated with wintering or migrating flocks. Hunting is limited, with mallards comprising the majority of the take on the lake and both mallards and wood ducks comprising the majority of take from the river. Forty-nine mammal species are known to inhabit the upper basin. Four game species- cottontail rabbit, fox and gray squirrels, and whitetail deer are the most sought after by hunters. The river otter (*Lontra canadensis*) has been re-introduced and other furbearers, such as muskrat (*Ondatra zibethicus*), woodchuck (*Marmota monax*), skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), gray fox (*Urocyon cinereoargenteus*), red fox (*Vulpes vulpes*) and coyote (*Canis latrans*) are also common. Smaller mammals (bats, rodents, voles, etc.) comprise the remaining species.

In total, 119 state listed species have been documented or are known from Breckinridge, Grayson, and Hart counties, including the Project fee lands (KDFWR 2023). A list of these species is provided in Appendix A.

Invasive Species

The USACE promotes an ecosystem approach to environmental stewardship. This management philosophy includes conservation, preservation and restoration of the lands and waters entrusted to the Corps, as well as those under its regulatory authority. As a result of centuries of habitat manipulation and plant and animal introductions (both intentional and accidental), numerous species have been allowed to reach invasive and/or nuisance status which often threaten the integrity of ecosystems. These species present a management challenge to USACE. Invasive species are organisms that are not native (exotic) to a geographical region and displace native species, causing the form and function of the natural ecosystem to be altered. They threaten our nation's resources, preventing or seriously hindering the operation of navigation, adversely affecting flood control, hydropower generation, and water supply, or otherwise limit recreational use by the public. The economic costs can be high, and introductions of new invasive species are ongoing.

Invasive species present at the Project include autumn olive (*Elaeagnus umbellate*), bush honeysuckle (*Lonicera maackii*), Japanese honeysuckle (*Lonicera japonica*), microstegia (*Salvia microstegia*) tree of heaven (*Ailanthus altissima*), mimosa (*Albizia julibrissin*), multiflora rose (*Rosa multiflora*), and privet (*Ligustrum* spp.). These species are culled by USACE as part of timber stand improvement activities occurring on the Project. Each of these species has the potential to negatively impact native vegetation and/or animals on the project. Honeysuckle species can out-compete and displace native plants, alter natural habitats by decreasing light availability, and deplete soil moisture and nutrients. Multiflora rose forms dense thickets, excluding most native shrubs and herbs from establishing.

Emerald ash borer (*Agrilus planipennis*) infestations have the potential to negatively impact the forest communities of the Project area. The emerald ash borer (EAB) is a destructive wood-boring pest of ash trees (*Fraxinus* spp.). Native to Asia and the Russian Far East, the EAB was unknown in North America until its discovery in southeast Michigan in 2002. Today, EAB infestations have been detected in 35 states, including the state of Kentucky (first document in 2009). The EAB has been documented in Breckinridge, Grayson, and Hart counties of the Rough River Project area (EABIN 2023). While white ash (*Fraxinus americana*) is predominantly found on upland sites, it does not make up a large percentage (<5%) of the tree species in most forest stands (EABIN 2023). However, green ash (*Franxinus pennsylvanica*) is an important component of the bottomland forest communities at the Project. As large ash trees die, forest composition will change, and

canopy gaps will be created which will result in light reaching the forest floor and may promote some understory vegetation on a small scale.

Invasive species have the potential to negatively impact natural areas of the Rough River Lake Project and can result in significant impacts to ecosystem function. For example, the creation of canopy gaps caused by the loss of host trees can alter soil moisture, increase incidental light striking the forest floor, and change the temperature profiles. Infestations can also alter forest stand composition and age structure, understory plant diversity, and may facilitate growth of invasive plants. These impacts to forested habitats have the potential to impact the fauna that use these areas (e.g., birds and mammals). For example, some neotropical bird species that require larger tracts of mature, interior forests may be negatively impacted by forest fragmentation and other species that occupy edge habitat may be favored. Loss of trees in riparian areas can adversely impact cold-loving aquatic fish and invertebrate species by increasing solar exposure to streams and increasing water temperature.

5.8.1 Environmental Consequences

5.8.1.1 No Action

Under the NAA, a revision to the existing WCM to include the pool restriction and delayed fill prescription would not be approved for the Project and the Project would continue to operate under current authorized levels. As this alternative would result in the operation and management of the Project continuing as outlined in the current WCM, no effects to fish and wildlife resources are anticipated. However, failure to revise the existing WCM would not address ongoing issues with the dam structure. While the continued degradation, loss of function, or failure of the Rough River Dam is not a certainty, failure to codify the change in operations authorized by the WCM revision has the potential to have a significant negative impact on the natural resources of the lake Project, including fish and wildlife populations.

5.8.1.2 Proposed Action

Revising the WCM to include the pool restriction and delayed fill prescription would be expected to have a negligible impact on fish and wildlife resources at the Rough River Lake and tailwaters of the project. Because the proposed water level reduction authorized by the proposed WCM revision would be within normal annual operating limits and the proposed restriction targets a seasonal reduction that would result in a modest change to lake levels, surface area, and volume, the Action would be expected to have negligible impact on fish populations of the Project. Water supply and quality impacts are low because there will be sufficient volume of water above the intake elevations. Because thermal stratification is not expected to change significantly with a summer pool target elevation five feet lower than the current authorized level, the reproductive cycles of fishes occurring within the lake will not be impacted. In addition, the Proposed Action is not expected to alter the thermal profile of water releases that may impact fish and wildlife occurring downstream of the Project.

5.9 Listed Species

5.9.1 Existing Condition

Lists of threatened, endangered, and species of special concern are maintained by USFWS and the State of Kentucky. Under the Endangered Species Act of 1973 (ESA), Pub. L. No. 93-205, 87 Stat. 884 (codified as amended at 16 U.S.C. §§ 1531, et seq.), endangered species generally are defined as any species in danger of extinction throughout all or a significant portion of its range. A threatened species is any species likely to become endangered in the foreseeable future. The ESA defines critical habitat of the above species as a geographic area that contains the physical or biological features that are essential to the conservation of a particular species and that may need special management or protection.

Based on data obtained from the USFWS Information for Planning and Consultation (IPaC) resource (USFWS 2023), 13 Federally listed species have been or are known to occur in the vicinity of the Project and are described in further detail below. Endangered freshwater mussel species listed include the fanshell (*Cyprogenia stegaria*), northern riffleshell (*Epioblasma torulosa rangiana*), pink mucket, (*Lampsilis abrupta*), ring pink (*Obovaria retusa*), clubshell (*Pleurobema clava*), rough pigtoe (*Pleurobema plenum*), and the proposed endangered salamander mussel (*Simpsonaias ambigua*). The threatened mussel species potentially affected by activities in this location is rabbitsfoot (*Quadrula cylindrica cylindrica*). All the mussel species listed above have been experiencing decades of decline due to habitat modification or loss, over harvesting, and pollution. Several may be extirpated from large parts of their formal ranges and others may be functionally extinct. While many of these species may have been historically present in the greater Green River watershed (which includes the Rough River), none are currently found within the Project fee boundary.

Endangered mammals potentially located on or near the Project include the Federally endangered northern long-eared bat (*Myotis septentrionalis*), Indiana bat (*M. sodalis*), and gray bat (*M. grisescens*). Because these bat species have very large ranges, their presence in the Project area is assumed (USFWS 2023). Because all three of the listed bat species have very large ranges that include the entire state of Kentucky, all are considered potentially present throughout the state, even in areas in which they have not been previously documented. However, there are no known hibernacula or maternity caves used by the northern long-eared bat, Indiana bat, or gray bat occurring on fee lands of the Project.

The monarch butterfly (*Danaus plexippus;* candidate for listing) and the whooping crane (*Grus americana*) are also within range of the project.

No Critical Habitat for Federally listed species has been designated on the Rough River Lake Project (USFWS 2023).

Additional Listed or Protected Wildlife

Bald eagles (*Haliaeetus leucocephalus*) have a very large range in the continental U.S. and have a history of nesting within and near the project boundaries. While this species was formally removed from the Federal list of endangered and threatened species in 2007, bald eagles are state listed and are also protected under the Migratory Bird Treaty Act (MBTA) of 1918, Pub. L. No. 65-186, 40 Stat. 755 (codified as amended at 16 U.S.C. §§ 703, et seq.) and the Bald and Golden Eagle Protection Act, Pub. L. No. 86-70, 54 Stat. 250 (codified as amended at 16 U.S.C. §§668-668c).

Bald eagles are known to nest on fee lands and transient individuals also visit the Project seasonally.

The Osprey (*Pandion haliaetus*) is also protected by the MBTA and is a frequent resident of the Project.

The Commonwealth of Kentucky designates certain species as endangered, threatened, or special concern species based on their conservation status within the state (KDFWR 2023). The KDFWR maintains a list of documented observations for Kentucky state listed species, which can be organized by county. Appendix A lists the state listed species which have been observed in Breckenridge, Hart, and Grayson counties, and may therefore be present on the Project fee lands. This list represents a diverse array of wildlife that includes 112 taxa, including 37 species classified by the Commonwealth as endangered (KDFWR 2023).

5.9.2 Environmental Consequences

5.9.2.1 No Action

Under the NAA, a revision to the existing WCM to include the pool restriction and delayed fill prescription would not be approved for the Project and the Project would continue to operate under current authorized levels. As this alternative would result in the operation and management of the Project continuing as outlined in the current WCM, no effects to listed species are anticipated. However, failure to revise the existing WCM would not address ongoing issues with the dam structure. While the continued degradation, loss of function, or failure of the Rough River Dam is not a certainty, failure to codify the change in operations via the revision of the current WCM has the potential to cause significant negative impacts to nearby wildlife, including Federally listed mussels residing downstream of the Project.

5.9.2.2 Proposed Action

There are no changes to the operations or management of the Project as part of the proposed WCM revision that would impact listed species. As such, there would be no effects to listed species or their critical habitats. Because the minimum release of 50 cubic feet second (cfs) will be maintained during lake operations, the Proposed Action would be expected to have no effect on the fanshell, northern riffleshell, pink mucket, ring pink, clubshell, rough pigtoe, rabbitsfoot, and salamander mussels occurring downstream of the Project. Because no terrestrial habitats will be impacted by the Proposed Action, there will be no effect on the northern long-eared bat, Indiana bat, gray bat, monarch butterfly, and whooping crane. No ESA Section 7 consultation with the USFWS is required for a “no effect” determination. No effects are anticipated to bald eagles or osprey as a result of implementing the Proposed Action.

5.10 Demographics, Environmental Justice, and Socioeconomics

5.10.1 Existing Condition

Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (Exec. Order No. 12,898, 1994) requires that, to the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review, 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 in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands.

Executive Order 13985 Advancing Racial Equity and Support for Underserved Communities Through the Federal Government (Exec. Order No. 13985, 2021) promotes racial equity and support for underserved communities and allocation of resources to address the historic failure to invest sufficiently, justly, and equally in underserved communities, as well as individuals from those communities.

Executive Order 14008 Tackling the Climate Crisis at Home and Abroad (Exec. Order No. 14,008, 2021) established the Justice40 Initiative with the goal that 40 percent of the overall benefits of certain investments, including climate change and clean water infrastructure flow to disadvantaged communities.

The CEQ created the Climate and Economic Justice Screening Tool (CEJST) to help Federal agencies identify disadvantaged communities that have been historically marginalized, underserved, and/or overburdened by pollution. The tool identifies these communities through publicly available nationally consistent datasets. Under the current formula, a census tract will be identified as "disadvantaged" in one or more categories of criteria if the census tract is above the threshold for one or more environmental or climate indicators and the census tract is above the threshold for the socioeconomic indicators. A search of the Climate and Economic Justice Screening Tool for an area encompassing the Project Area (Census Tracts 21085950700 and 21085950300) indicates that this area is identified as a "disadvantaged" community because it meets more than one burden threshold and the associated socioeconomic threshold. Identified factors that indicate this community is disadvantaged include a relatively high proportion of households living in poverty, high rates of heart disease and diabetes, low life expectancy, barriers to transportation, and high energy costs (CEQ 2023).

The USEPA EJScreen tool was utilized to evaluate the demographics and environmental justice variables for a 15-mile area encompassing Project. Table 6 shows environmental and demographic indicators ("Value" column) present within this buffer zone, and how those indicators compare to the state, regional, and national averages (USEPA 2023).

Table 6. Comparison of value and percentile ranks for environmental and demographic indicators within 15-mile radius of Rough River Lake.

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter ($\mu g/m^3$)	8.35	8.54	47	8.08	54
Ozone (ppb)	58	59.3	43	61.6	24
Diesel Particulate Matter ($\mu g/m^3$)	0.105	0.203	21	0.261	18
Air Toxics Cancer Risk* (lifetime risk per million)	20	26	0	25	5
Air Toxics Respiratory HI*	0.3	0.32	2	0.31	31
Toxic Releases to Air	890	7,500	44	4,600	57
Traffic Proximity (daily traffic count/distance to road)	19	78	42	210	23
Lead Paint (% Pre-1960 Housing)	0.13	0.24	40	0.3	39
Superfund Proximity (site count/km distance)	0.036	0.039	64	0.13	33
RMP Facility Proximity (facility count/km distance)	0.044	0.33	15	0.43	8
Hazardous Waste Proximity (facility count/km distance)	0.03	0.78	13	1.9	4
Underground Storage Tanks (count/km^2)	0.42	1.1	52	3.9	37
Wastewater Discharge (toxicity-weighted concentration/m distance)	1.6	0.48	97	22	92
SOCIOECONOMIC INDICATORS					
Demographic Index	23%	26%	49	35%	39
Supplemental Demographic Index	17%	16%	60	14%	70
People of Color	5%	16%	37	39%	13
Low Income	42%	37%	59	31%	71
Unemployment Rate	5%	6%	61	6%	61
Limited English Speaking Households	0%	1%	0	5%	0
Less Than High School Education	16%	13%	65	12%	73
Under Age 5	7%	6%	66	6%	67
Over Age 64	19%	17%	64	17%	64
Low Life Expectancy	24%	22%	66	20%	85

Source: USEPA 2023.

When compared to the national average, these data indicate the assessed area compares favorably with all listed environmental indicators (Table 6). When compared to the national, regional, and state demographic indicators, these data indicate that the assessed area contains a smaller proportion of people of color, a higher proportion of the population is classified as low income, and more people with less than a high school education.

5.10.2 Environmental Consequences

5.10.2.1 No Action

Under the NAA, a revision to the existing WCM to include pool restriction and delayed fill prescription would not be approved and the Project would continue to operate under current authorized levels. As this alternative would result in the operation and management of the Project continuing as outlined in the current WCM, no effects to minority or low-income populations are anticipated. However, failure to revise the existing WCM would not address ongoing issues with the dam structure. While the continued degradation, loss of function, or failure of the Rough River Dam is not a certainty, failure to codify the change in operations authorized by the proposed WCM revision would pose an unacceptable risk to the public and property and to the local and regional economies that surrounding minority and/or low-income residents rely upon.

5.10.2.2 Proposed Action

The Proposed Action is anticipated to have a negligible effect on the local or regional socioeconomic environment. While there may be a minor effect on recreation and visitation as a result of implementing the Proposed Action, the Action would not be expected to have a current or future impact on environmental or demographic variables that may negatively affect surrounding communities, nor would it have a disproportionate adverse effect on minority or low-income communities that may rely or utilize the Project for income or recreation.

5.11 Recreation, Visitation, and Economy

5.11.1 Existing Condition

Rough River Lake provides a wide array of recreational opportunities utilized by both the local population and traveled visitors. The USACE collects visitation data specific to the various activities on a fiscal year cycle. Table 7 shows a comparison of economic benefits within the Project's zone of influence between FY 2016 and FY 2019 (USACE 2023).

Table 7- Activity participation by visitor at Rough River Lake (2016 and 2019).

Visits (person-trips) in FY 2016	Visits (person-trips) in FY 2019
· 1,661,544 in total	· 1,858,164 in total
· 52,339 picnickers	· 199,484 picnickers
· 34,137 campers	· 183,977 campers
· 324,466 swimmers	· 336,104 swimmers
· 201,459 water skiers	· 101,868 walkers/hikers/joggers
· 1,131,359 boaters	· 1,159,503 boaters
· 265,813 sightseers	· 179,954 sightseers
· 504,971 anglers	· 102,637 anglers
· 3,130 hunters	· 39,303 special event attendees
· 216,728 others	· 37,302 others

Rough River Lake is the primary location for water-related recreation for the region, providing the public with a location for boating, sailing, canoeing/kayaking, paddle boarding, and swimming in the area. With almost two million visitors each year, project visitors are a diverse group of people with a wide variety of interests including campers (who utilize the campgrounds around the reservoir); adjacent residents; anglers (who utilize hunting grounds and participate in fishing tournaments); marina customers; and day users who picnic, hike, bird watch, bicycle, and ride horses.

The USACE maintains trails, picnic sites, fishing platforms, playgrounds, shelter houses, restrooms and a Visitor Center for the public. The USACE also offers interpretive programming for the public and educational opportunities for local schools. The Project offers a wide variety of recreational facilities including campgrounds, day use and picnic areas, boat ramps, information center, hunting and multi-use trails provided by USACE and partners. The lake provides facilities for water-based recreation, such as boating and kayaking, and multi-use trail users, such as cyclists and hikers. The project had 1,858,164 visitors in 2019, contributing an estimated $94,764,234 in visitor spending at local economies within 30 miles of the project (USACE 2023). Table 8 contains

a detailed list of the various recreational facilities and activities available at Rough River Lake through governmental agencies as well as commercial concessions.

Table 8. Recreation areas and available activities at Rough River Lake.

Recreation Area	Camping	Lodging	Showers	Boat Ramps	Marina	Fishing facilities	Picinic	Playground	Swimming Area	Trails	Golf	Amphitheater	Grocery/Snack Bar	Operating Agency
Axtel	■		■	■				■	■	■				USACE
Axtel Marina					■		■						■	Business/Concessionaire
Cave Creek	■		■	■		■	■	■		■				USACE
Eveleigh				■										USACE
Forrl Visitor Center							■			■				USACE
Laurel Branch	■		■	■		■	■	■	■	■				USACE
North Fork	■		■	■		■	■	■	■					USACE
Peter Cave	■		■	■	■								■	Business/Concessionaire
Rough River State Park		■	■	■	■		■	■	■	■			■	KY Dept. of Parks
Tailwater						■	■	■						USACE

■ Available

Source: USACE 2023

USACE recognizes the importance of Rough River Lake and the activities on USACE lands and waters as being an important part of the local economy. Aside from savings through flood risk management and development advantages through water supply, businesses can see investment opportunities and people are drawn to the natural areas surrounding USACE lakes, as evidenced by the growing number of residents adjacent to USACE properties. Table 9 provides information on the economic benefits for fiscal years 2016 and 2019 in areas within 30 miles of Rough River Lake.

Table 9- Estimated economic benefits realized within a 30-mile Zone of Influence of the in the Rough River Lake Project.

Economic Benefits	Economic Benefits
Economic Data in FY 16	**Economic Data in FY 19**
Visitation per year resulted in: --$82,511,295 in visitor spending within 30 miles of the Corps lake. --$40,676,998 in sales within 30 miles of the Corps lake. --665 jobs within 30 miles of the Corps lake. --$16,340,630 in labor income within 30 miles of the Corps lake. --$21,101,028 in value added within 30 miles of the Corps lake. --$14,786,410 in National Economic Development Benefits. With multiplier effects, visitor trip spending resulted in: --$59,375,526 in total sales. --810 jobs. --$22,031,633 in labor income. --$31,097,339 in value added (wages & salaries, payroll benefits, profits, rents, and indirect business taxes).	Visitation per year resulted in: --$111,875,195 in visitor spending within 30 miles of the Corps lake. --$50,955,553 in sales within 30 miles of the Corps lake. --963 jobs within 30 miles of the Corps lake. --$19,817,615 in labor income within 30 miles of the Corps lake. --$26,110,756 in value added within 30 miles of the Corps lake. --$15,648,539 in National Economic Development Benefits. With multiplier effects, visitor trip spending resulted in: --$75,006,395 in total sales. --1,149 jobs. --$27,187,897 in labor income. --$38,802,059 in value added (wages & salaries, payroll benefits, profits, rents, and indirect business taxes).
Benefits in Perspective	
Recreation experiences increase motivation to learn more about the environment; understanding and awareness of environmental issues' and sensitivity to the environment. (USACE Recreation 2016 & 2019 Lake Report, https://www.iwr.usace.army.mil/Missions/Value-to-the-Nation)	

Source: (USACE 2023)

5.11.1.1 No Action

Under the NAA, a revision to the existing WCM to include the pool restriction and delayed fill prescription would not be approved and the Project would continue to operate under current authorized levels. As this alternative would result in the operation and management of the Project continuing as outlined in the current WCM, no short- or long-term effects to the local and regional economies are anticipated and visitation and opportunities for recreation at the Project would be expected to continue following current trends. However, failure to revise the existing WCM would not address ongoing issues with the dam structure. While the continued degradation, loss of function, or failure of the Rough River Dam is not a certainty, failure to codify the change in operations authorized by the proposed WCM revision has the potential to have a significant negative impact on visitation to and recreational use of Rough River Lake and the local and regional economies that rely upon it.

5.11.1.2 Proposed Action

Revising the WCM to include pool restriction and delayed fill prescription would be expected to have minor, temporary impacts on visitation and/or recreational opportunities at Rough River Lake. While the majority of the recreational activities occurring on the Project would not be impacted by Proposed Action, it is possible that the lower water levels may result in reduced accessibility and/or usability of private boat docks and a slightly reduced navigable channel in

certain sections of the lake. The proposed water level reduction authorized by the revision of the WCM would be within normal annual operating limits and the restriction targets a seasonal reduction that would result in a temporary effect to the summer pool. This may have a minor impact on a subset of private boat dock and/or ramp owners on the lake, at least initially. However, it should be noted that efforts are currently underway to mitigate these minor issues as a number of the private landowners have applied for necessary permits to modify their boat ramps. Potential impacts to USACE facilities would be limited. For example, the Axtel boat ramp is a USACE-owned and operated facility on the lake which is slated (Winter 2024) to be extended to make it more usable during lower lake levels.

5.12 Cultural Resources

5.12.1 Existing Condition

The Commonwealth of Kentucky's geographic distribution of cultural resources has been divided into seven management areas primarily according to landform divisions and major drainage systems. Six of these management areas were further subdivided into sections specific to prehistoric cultural developments in different areas of the state (Pollack 2008). Table 10 identifies these divisions and subdivisions relative to the counties in which they reside.

Table 10- Management Areas and Sections of Kentucky.

Management Area	Section	Counties (Figure 1.4)
1) Purchase	A) Mississippi River	Carlisle, Fulton, Graves, Hickman
	B) Ohio River I	Ballard, Livingston, McCracken
	C) Lower Tennessee\ Cumberland	Calloway, Lyon, Marshall, Trigg
2) Green River	D) Ohio River II	Breckinridge, Crittenden, Daviess, Hancock, Henderson, Union
	E) Western Coalfield	Butler, Hopkins, McLean, Muhlenberg, Ohio, Webster
	F) Pennyroyal	Allen, Caldwell, Christian, Logan, Simpson, Todd, Warren
	G) Upper Green River	Adair, Barren, Casey, Edmonson, Grayson, Green, Hart, Metcalfe, Taylor
3) Salt River	H) Salt River	Anderson, Boyle, Bullitt, Hardin, Jefferson, Larue, Marion, Meade, Mercer, Nelson, Oldham, Shelby, Spencer, Washington
4) Upper Cumberland	I) Lake Cumberland	Clinton, Cumberland, McCreary, Monroe, Pulaski, Russell, Wayne
	J) Southeastern Mountains	Bell, Harlan, Knox, Laurel, Whitley
5) Bluegrass	K) Central Bluegrass	Bourbon, Clark, Fayette, Franklin, Garrard, Harrison, Jessamine, Lincoln, Madison, Montgomery, Scott, Woodford
	L) Northern Bluegrass	Boone, Campbell, Carroll, Gallatin, Grant, Henry, Kenton, Owen, Pendleton, Trimble
	M) Eastern Bluegrass	Bath, Bracken, Fleming, Lewis, Mason, Nicholas, Robertson
6) Upper Kentucky/ Licking	N) Gorge	Estill, Lee, Magoffin, Menifee, Morgan, Powell, Rowan, Wolfe
	O) Interior Mountains	Breathitt, Clay, Jackson, Knott, Leslie, Letcher, Owsley, Perry, Rockcastle
7) Big Sandy	P) Lower Big Sandy	Boyd, Carter, Elliott, Greenup, Johnson, Lawrence, Martin
	Q) Upper Big Sandy	Floyd, Pike

Note: Reprinted from Pollack (2008). *The Archaeology of Kentucky: An update*. Volume One: State Historic Preservation Comprehensive Plan Report No. 3.

Rough River Lake falls within Management Area 2: Green River Management Area, Ohio River II/Upper Green River. The Green River Management area has the largest number of recorded sites (n=5,834) in the state (Pollack 2008). The most abundant sites within this management area are open habitation without mounds (n=3,983), which account for over 68.3 percent of the sites. Historic farms account for only 11 percent of identified sites.

Rough River Lake has a spatiotemporal occupation of Native Americans spanning from the Paleoindians around 9,500 BC into the early 19th century with the Shawnee Indians; and to a lesser extent with the Delaware, Mingo, Miami, and Wyandotte. The Cherokee and Iroquois Confederacy were primarily located in parts of eastern Kentucky where the Cherokee claimed Kentucky as part of their traditional hunting grounds and the Iroquois raided across the state and into Illinois country. Even though Euro-American contact with Native Americans occurred in this region sometime before 1750 when Europeans were exploring the region (Pollack 2008), it wasn't until the late 18th century to early 19th century when Euro-American settlement dominated the region after Native American's were forcefully displaced.

Prehistoric history is typically divided into a sequence of periods and sub-periods. The change from one sub-period to another is frequently marked by a shift in the morphology / typology of hafted bifaces or, in later periods, pottery. These changes in material culture often correlate with major climatic shifts in the past, as new environments require new adaptations. Against this backdrop of periodic shifts, several trends seem to have persisted over time. These trends include: a rise in population and population density; greater site permanence and complexity; and an increase in localization and settling into specific landscapes. As such, the cultural history of the Rough River Lake region has been divided into the following periods: Paleoindian (9,500 – 8,000 BC) with three subperiods; Archaic (8000-1000 BC) with three subperiods; Woodland (1000 BC to AD 1000) with three subperiods; Mississippian (AD 900 to 1,000); Fort Ancient (AD 1700-1750) and Historic (European contact and settlement, AD 1770-Present; Pollack 2008).

5.12.2 Environmental Consequences

5.12.2.1 No Action

Under the NAA, a revision to the current WCM to include the pool restriction and delayed fill prescription would not be approved. Because the Project would continue to operate under current authorized levels, there will be no potential to cause effects to historic properties (See 36 C.F.R. § 800.3(a)(1)).

5.12.2.2 Proposed Action

Because the normal operation range spans between 495 to 475 feet asl (summer pool to winter pool, respectively), this alternative would not change operations outside the normal range of Rough River Lake water management levels. As such, there are no potential effects to historic properties associated with the Proposed Action (see 36 C.F.R. § 800.3(a)(1)).

5.13 Hazardous, Toxic, and Radioactive Waste Materials (HTRW)

5.13.1 Existing Condition

The USEPA Envirofacts database was queried to identify HTRW sources within a five-mile radius of the Project boundaries. A total of 31 USEPA regulated facilities were identified within five miles of the Project. A total of six sites were identified within USACE property boundaries (USEPA 2023b). A list of these facilities is provided in Appendix A.

5.13.2 Environmental Consequences

5.13.2.1 No Action

Under the NAA, a revision to the existing WCM to include the pool restriction and delayed fill prescription would not be approved and the Project would continue to operate under current authorized levels. As this alternative would result in the operation and management of the Project continuing as outlined in the current WCM, no short- or long-term effects to HTRW sources are anticipated. However, failure to revise the existing WCM would not address ongoing issues with the dam structure. While the continued degradation, loss of function, or failure of the Rough River Dam is not a certainty, failure to codify the change in operations authorized by the proposed WCM revision would pose an unacceptable risk to the environment and communities downstream of the project. Threats posed by dam failure include potential impacts to existing HTRWs that occur near or downstream of the Rough River Lake Project and the release of lake sediments that contain mercury and other accumulated toxins.

5.13.2.2 Proposed Action

Revising the WCM to include the pool restriction and delayed fill prescription would be expected to have no effect on HTRWs at Rough River Lake. Because the proposed water level reduction authorized by the proposed WCM revision would be within normal annual operating limits and the proposed restriction targets a seasonal reduction that would result in a temporary effect to the lake volume and surface area, the implementation of the Proposed Action is expected to have no potential to disturb existing or introduce new HTRW materials to the environment.

5.14 Aesthetics/Visual Qualities

5.14.1 Existing Condition

Shaped by erosion activity of the Rough River, the Project area boasts a great variety of terrain ranging from gradual slopes to steep ravines which supports diverse plant and animal communities. There are numerous streams that make up the surrounding watershed which, when taken with the Rough River, the lake, surrounding grasslands, large contiguous stands of deciduous and evergreen forest, farmlands and agricultural areas, karst topography, and intensively managed areas provide significant natural biological and topographical diversity.

The Rough River basin is unique in comparison to other similarly sized basins in that it encompasses four Level IV ecoregions. Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources. Ecoregions are hierarchical, with Level 1 providing the broadest classification and Level IV being the most detailed. The four ecoregions that make up the Rough River basin include the Caseyville Hills, the Crawford-Mammoth Cave Uplands, the Mitchel Plain, and the Knobs-Norman Uplands. The immediate Project area is located in the Crawford Mammoth Cave Uplands (NRCS 2006).

While the areas surrounding the reservoir area are predominantly a mix of rural-residential and agricultural land use types, the valleys in the countryside making up the Rough River Lake area

are generally well entrenched with steep wooded side slopes which have great scenic value. Woodlands can also be a dominant component of the surrounding landscape in some areas, and the forests of the project are a mosaic floral communities of different age cohorts. The dominant forest type of the region is the central oak/hickory forest ecosystem which can contain as many as seven oak species in addition to numerous hickory, maple, ash, and magnolia species. The surrounding topographical diversity allows for the development of distinct forest communities in upland and lowland areas. Tree species such as sycamore, red maple, birch, black walnut, hemlock, hackberry, and sweet gum may be found in bottomlands near watercourses of the area.

5.14.2 Environmental Consequences

5.14.2.1 No Action

Under the NAA, a revision to the existing WCM to include the pool restriction and delayed fill prescription would not be approved and the Project would continue to operate under current authorized levels. As this alternative would result in the operation and management of the Project continuing as outlined in the current WCM, no short- or long-term effects to the aesthetics or visual properties of the Rough River Lake Project are anticipated. However, failure to revise the existing WCM would not address ongoing issues with the dam structure. While the continued degradation, loss of function, or failure of the Rough River Dam is not a certainty, failure to codify the change in operations authorized by a WCM revision has the potential to have a significant negative impact on current aesthetic values of the lake and areas downstream of the Project.

5.14.2.2 Proposed Action

Revising the WCM to include the pool restriction and delayed fill prescription would be expected to have a minor impact on visual or aesthetic qualities of Rough River Lake. The proposed restriction targets a seasonal pool reduction that would result in a temporary effect to the lake volume and surface area that would remain within normal annual operating limits throughout the remainder of the year. While the proposed water level reduction authorized by the Proposed Action would result in an increase in the amount of shoreline dewatered during the summer season, the visual effect of this would be minimal and temporary.

5.15 Noise

5.15.1 Existing Condition

Changes in noise are typically measured and reported in units of A-weighted decibels (dBA), a weighted measure of sound level. The primary sources of noise within the Project area include everyday vehicular traffic along the adjacent highways (typically between 50 and 60 dBA at 100 feet) and human-generated recreational activities at the Project. Noise ranging from about 10 dBA for the rustling of leaves to as much as 115 dBA (the upper limit for unprotected hearing exposure established by the Occupational Safety and Health Administration) is common in areas where there are sources of recreational activities, construction activities, and vehicular traffic (USACE 2014).

5.15.2 Environmental Consequences

5.15.2.1 No Action

Under the NAA, a revision to the existing WCM to include the pool restriction and delayed fill prescription would not be approved and the Project would continue to operate under current authorized levels. As this alternative would result in the operation and management of the Project continuing as outlined in the current WCM, no short- or long-term effects to ambient noise levels of the Rough River Lake Project are anticipated.

5.15.2.2 Proposed Action

Revising the WCM to include the pool restriction and delayed fill prescription would be expected to have no effect on ambient noise levels of the Rough River Lake Project. Noise levels would not be impacted by a revision of the current WCM or change in operations.

5.16 Cumulative and Indirect Effects

NEPA requires a Federal agency to consider not only the direct and indirect impacts of a proposed action, but also the cumulative impact of the action. A cumulative impact is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time" (40 C.F.R. § 1508.7). These actions include on- or off-site projects conducted by government agencies, businesses, or individuals that are within the spatial and temporal boundaries of the actions considered.

The cumulative effects analysis is based on the potential effects of the proposed project when added to similar impacts from other projects in the region. An inherent part of the cumulative effects analysis is the uncertainty surrounding actions that have not yet been fully developed. The CEQ regulations provide for the inclusion of uncertainties in the analysis and states that "when an agency is evaluating reasonably foreseeable significant adverse effects on the human environment and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking" (40 CFR 1502.21).

Within the proposed WCM revision, there are no future actions that are recommended to meet goals outlined for the Rough River Lake Project. However, there is the potential for cumulative effects of the Proposed Action on these resources when added to the impacts of other past, present, and reasonably foreseeable future actions in the region. For example, any future development and/or construction associated with the greater dam remediation project has the potential to produce temporary construction-related effects (e.g., noise, fugitive dust, vehicle emissions, etc.). While future actions have the potential to cause negative effects to all environmental resources analyzed, analysis of future unplanned actions is not feasible and is outside of the scope of this EA. All future actions taken by USACE in the support of any remediation efforts that may be conducted at the Rough River Lake Project, would require appropriate environmental review and NEPA compliance.

SUMMARY OF ENVIRONMENTAL EFFECTS

To manage and operate each water resources project, USACE district offices develop Water WCMs to guide project operations. These manuals describe the project's dams, reservoirs, any affected rivers, and historic floods and storms in the project area. The manuals also describe methods for forecasting the amount of runoff flowing to the dams' reservoirs, document policies and procedures for deciding how much water to release from the reservoirs, and generally have an associated drought contingency plan that provides guidance for district actions in response to periods of water shortages.

As previously discussed herein, it is anticipated that the Proposed Action will have at most minor or negligible effects on the following resource types: reservoir operation, climate, air quality, topography, geology, soils, surface water hydrology and groundwater, listed species, demographics and environmental justice, recreation and visitation, cultural resources, HTRW materials, aesthetics and visual resources, and noise. While the continued degradation, loss of function, or failure of the Rough River Dam is not a certainty, failure to codify the change in operations authorized via a revision of the current WCM would pose an unacceptable risk to the public and property and has the potential to have a significant negative impact on the use of Rough River Lake and the local and regional economies that rely upon it. In this way, the Proposed Action is expected to have beneficial effects on the natural and human environment by providing an interim solution that is designed to reduce the structural stressors currently occurring at the Rough River Dam facility. Table 11 provides a summary of anticipated effects from the adoption and implementation the revised WCM that will authorize the proposed annual pool restriction and delayed spring fill schedule.

Table 11. Summary of environmental effects from the Proposed Action.

Resource Evaluated	**Effect**
Reservoir, Pool, and Lake Operation	Minor effect
Climate	No effect
Air Quality	No effect
Topography, Geology, and Soils	No effect
Surface Water Hydrology and Groundwater	Minor effect
Water Quality	No effect
Habitats	No effect
Listed Species	No effect
Demographics, Environmental Justice, and Socioeconomics	No effect
Recreation, Visitation, and Economy	Minor effect
Cultural Resources	No effect
HTRW Materials	No effect
Aesthetics and Visual Qualities	Minor effect
Noise	No effect

6 COMPLIANCE WITH ENVIRONMENTAL LAWS

Adoption of the proposed 2024 Rough River Lake Water Control Manual Revision would not commence until the proposed actions achieve environmental compliance with the applicable laws and regulations, as described below.

Bald and Golden Eagle Protection Act (codified as amended at 16 U.S.C §§ 668-668c). *In compliance.* The Bald and Golden Eagle Protection Act imposes requirements on USACE projects concerning bald eagles. Adoption of the revised 2024 WCM would not adversely affect bald eagles or their habitat.

Clean Air Act (codified as amended at 42 U.S.C. §§ 7401-7671q). *In compliance.* The purpose of the Clean Air Act is to protect public health and welfare by the control of air pollution at its source, and to set forth primary and secondary National Ambient Air Quality Standards to establish criteria for States to attain or maintain. The proposed 2024 WCM revision does not include major development of new facilities or other construction activities that could impact air quality from increased emissions. Negligible and temporary emissions would be expected to occur during continued maintenance activities of facilities at the Project but these activities would not rise above normal baseline levels and would not result from changes to the existing WCM. Any such emissions would be short term, small-scale, and air quality would not be affected to any measurable degree. Actions taken by the USACE at the Project that may impact air quality are subject to compliance with the General Conformity rule, which ensures that those actions do not interfere with the state's plans to attain and maintain national standards for air quality.

Federal Water Pollution Control Act (Clean Water Act) (codified as amended at 33 U.S.C. 1251-1387). *In compliance.* The objective of the Clean Water Act is to restore and maintain the chemical, physical and biological integrity of the Nation's waters (33 U.S.C. § 1251). The USACE regulates discharges of dredged or fill material into waters of the United States pursuant to Section 404 of the Clean Water Act. This permitting authority applies to all waters of the United States including navigable waters and wetlands. Section 404 requires authorization to place dredged or fill material into waters of the United States. If a Section 404 authorization is required, a Section 401 water quality certification from the state in which the discharge originates is also needed. Revision and adoption of the 2024 WCM would not be expected to result in the placement of dredged or fill material into water bodies or wetlands. Any future actions at the Project which would result in the placement of dredged or fill material into waters of the United States would be undertaken in compliance with Section 404 and Section 401 of the Clean Water Act. Effluent discharges are also regulated pursuant to the CWA, but no such discharges are associated with the proposed WCM revision.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). *Not applicable.* CERCLA governs (1) the release or substantial threat of a release of a hazardous substance into the environment; or (2) the release or substantial threat of a release of any pollutant or contaminant into the environment that presents an imminent threat to the public health and welfare. To the extent such knowledge is available, 40 C.F.R. Part 373 requires notification of CERCLA hazardous substances in a land transfer. The revision and adoption of the 2024 WCM would not involve real estate transactions, and no release or threatened release of hazardous substances into the environment at the Project is expected.

Endangered Species Act of 1973 (codified as amended at 16 U.S.C. §§ 1531-1544). *In compliance.* Section 7 of the Endangered Species Act (16 U.S.C. § 1536) states that all Federal departments and agencies shall, in consultation with and with the assistance of the Secretary of the Interior (Secretary), ensure that any actions authorized, funded, or carried out by them do not jeopardize the continued existence of any threatened or endangered (T&E) species, or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary to be critical. This EA represents the assessment and findings regarding the Proposed Action and serves as the Biological Assessment with a determination of no effect to the fanshell, northern riffleshell, pink mucket, ring pink, clubshell, rough pigtoe, rabbitsfoot, salamander mussel, Indiana bat, northern long-eared bat, gray bat, monarch butterfly, and whooping crane. No Critical Habitat was identified in range of the Rough River Lake Project.

Environmental Justice (E.O. 12898). *In compliance.* The Executive Order governing environmental justice directs that every Federal agency shall 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 in the United States. As discussed in Sec. 4.10, revision and adoption of the 2024 WCM would not disproportionately affect minority or low-income populations.

Fish and Wildlife Coordination Act (codified as amended at 16 U.S.C § 661) (FWCA). *In compliance.* The FWCA requires governmental agencies, including the USACE, to coordinate activities so that adverse effects on fish and wildlife would be minimized when water bodies are proposed for modification. In an effort to satisfy the requirements of FWCA, the USACE will coordinate this action with the USFWS (through their review of the draft EA) with regard to potential effects on fish and wildlife resources. No effects are anticipated. Any comments received from resource agencies will be located in the Appendix of the final EA.

Migratory Bird Treaty Act of 1918, 16 U.S.C. §§ 703-712(MBTA). *In compliance.* The MBTA is the domestic law that affirms, or implements, the United States' commitment to four international conventions with Canada, Japan, Mexico, and Russia for the protection of shared migratory bird resources. The MBTA governs the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts and nests. The take of all migratory birds is governed by the MBTA's regulation of taking migratory birds for educational, scientific, and recreational purposes and requiring harvest to be limited to levels that prevent over utilization. Executive Order 13186 (2001) directs agencies to take certain actions to implement the act. The USACE will consult with the USFWS (through their review of the draft EA) with regard to their consideration of the effects of the Proposed Action on migratory birds. No effects are anticipated.

National Historic Preservation Act (codified as amended at 54 U.S.C. § 300101). *In compliance.* The NHPA requires that Federal agencies having direct or indirect jurisdiction over a proposed Federal or federally assisted undertaking take into account the effect of the undertaking on any district, site, building, structure, or object that is included in, or eligible for inclusion in, the National Register of Historic Places (NRHP). The Louisville District has made the determination in accordance with 36 C.F.R. § 800.3 (a)(1) of the NHPA that the Proposed Action is not a type of activity with the potential to cause effect to historic properties, since the Rough River Lake pool would remain within the normal operation range from 490 to 475 feet.

National Environmental Policy Act (NEPA), (codified as amended 42 U.S.C. §§ 4321-4347) as amended, 42 U.S.C. 4321, et seq. *Pending.* This EA and Finding of No Significant Impact (FONSI) has been prepared in accordance with the Council on Environmental Quality's NEPA Implementing Regulations (40 C.F.R. §§ 1500-1508). At the conclusion of public and agency review, if no significant impacts to the environment are identified, an Environmental Impact Statement (EIS) will not be not required. Signing of the FONSI will conclude compliance with the NEPA.

Noise Pollution and Abatement Act of 1972 (42 U.S.C. §§ 4901-4918). *In compliance.* The Noise Pollution and Abatement Act establishes a national policy to promote an environment for all Americans free from noise that jeopardizes their health and welfare. Federal agencies are required to limit noise emissions to within compliance levels. The implementation of the Proposed Action is not anticipated to result in an increase in noise levels at the Project site.

Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. § 403). *In compliance.* Section 10 of the Rivers and Harbors Act prohibits the unauthorized obstruction or alteration of any navigable water of the United States. This section provides that the construction of any structure in or over any navigable water of the United States, or the accomplishment of any other work affecting the course, location, condition, or physical capacity of such waters is unlawful unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of the Army. The Proposed Action would not involve the construction of structures within Rough River or Rough River Lake.

Floodplain Management (E.O. 11988). *In compliance.* Section 1 of the Executive Order on floodplain management requires each agency to provide leadership and take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by flood plains in carrying out its responsibilities for (1) acquiring, managing, and disposing of Federal lands and facilities; (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities. Due to the limited scope and nature of the proposed WCM revision, the Proposed Action is not expected to impact the flood holding capacity or flood surface profiles of the Project.

Protection of Wetlands (E.O. 11990). *In compliance.* The Executive Order on protection of wetlands directs that Federal agencies shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities. Each agency, to the extent permitted by law, shall avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds (1) that there is no practicable alternative to such construction, and (2) that the proposed action includes all practicable measures to minimize harm to wetlands, which may result from such use. As the Proposed Action, the revision and adoption of the 2024 WCM would not involve construction in, or cause effects to, wetland habitats on the Project.

7 PUBLIC INVOLVEMENT

Pending –As a requirement of NEPA, the draft EA will be circulated for a 30-day review to concerned agencies, organizations, and the interested public, along with a copy of the draft 2024 Water Quality Manual. All comments received during this review period will be evaluated and changes to the EA and FONSI will be made, as necessary. All received comments will be included the Appendix of the final EA document. In addition, the final EA and FONSI will be retained in the Louisville District's administrative files for future reference and as a record of NEPA compliance.

Below is a list of resource agencies, Non-Governmental Organizations and tribes contacted during the Proposed Action.

Table 12. List of agency and tribal contacts for the 2024 Rough River Lake Water Control Manual Revision.

United States Fish and Wildlife Service, Kentucky Field Office
Environmental Protection Agency, Region 4 Office
U.S. Geological Survey Ohio-Kentucky-Indiana Water Science Center
Ohio River Alliance, the Institute for Water Resources
National Resource Conservation Service, Kentucky Office
Kentucky Department of Fish and Wildlife Resources
Office of Kentucky Nature Preserves
Kentucky Heritage Council
Kentucky State Historic Preservation Officer
Kentucky Division of Water
Kentucky Division of Air Quality
Kentucky Division of Waste Management
Kentucky Trasportation Cabinet
The Nature Conservancy of Kentucky
The Sierra Club, Kentucky Chapter
Kentucky Environmental Foundation
Kentucky Heartwood
Kentucky Waterways Alliance
Kentucky Resources Council
River Fields
Shawnee Tribe
Cherokee Nation
Eastern Shawnee
Osage Nation
Eastern Shawnee
Absentee Shawnee Tribe
United Keetoowah Band of Indians
Eastern Band of Cherokee Indians

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9 APPENDIX A

Agency and Tribal Coordination

10 APPENDIX B

Supporting Materials

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kentucky Ecological Services Field Office
J C Watts Federal Building, Room 265
330 West Broadway
Frankfort, KY 40601-8670
Phone: (502) 695-0468 Fax: (502) 695-1024
Email Address: kentuckyes@fws.gov

In Reply Refer To: January 11, 2024
Project Code: 2024-0035242
Project Name: 2024 Rough River Lake Water Control Manual Revision

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the

human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see https://www.fws.gov/program/migratory-bird-permit/what-we-do..

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of

this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

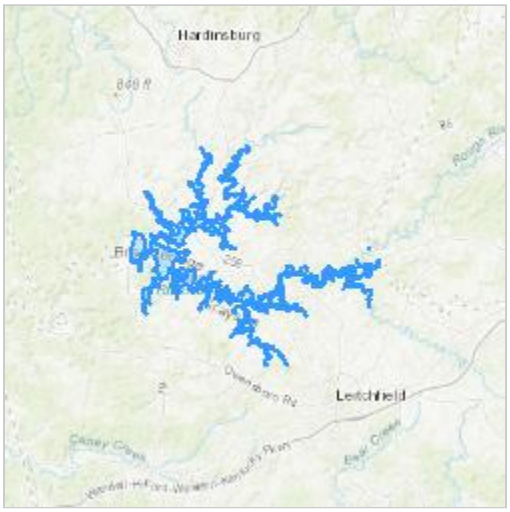
Kentucky Ecological Services Field Office
J C Watts Federal Building, Room 265
330 West Broadway
Frankfort, KY 40601-8670
(502) 695-0468

PROJECT SUMMARY

Project Code: 2024-0035242
Project Name: 2024 Rough River Lake Water Control Manual Revision
Project Type: Dam - Operations
Project Description: Revise the 2022 Water Control Manual and implement the proposed changes to operational levels at the reservoir which are designed to alleviate stress on the Rough River Dam structure and reduce potential threats to downstream communities that could result from degradation or failure of the dam.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@37.60350445,-86.47296520773082,14z



Counties: Breckinridge , Grayson , and Hardin counties, Kentucky

ENDANGERED SPECIES ACT SPECIES

There is a total of 13 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 8 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Gray Bat *Myotis grisescens*	Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The project area includes potential gray bat habitat.

Species profile: https://ecos.fws.gov/ecp/species/6329
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/4ERUR6M2VRGERJXCJFVJOIUJYY/documents/generated/6422.pdf

Indiana Bat *Myotis sodalis*	Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
This species only needs to be considered under the following conditions:
- The project area includes 'potential' habitat. All activities in this location should consider possible effects to this species.
- The project area includes known 'swarming 1' habitat.

Species profile: https://ecos.fws.gov/ecp/species/5949
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/4ERUR6M2VRGERJXCJFVJOIUJYY/documents/generated/6422.pdf

Northern Long-eared Bat *Myotis septentrionalis*	Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/9045
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/4ERUR6M2VRGERJXCJFVJOIUJYY/documents/generated/6422.pdf

BIRDS

NAME	STATUS
Whooping Crane *Grus americana*	Experimental Population, Non-Essential

Population: U.S.A. (AL, AR, CO, FL, GA, ID, IL, IN, IA, KY, LA, MI, MN, MS, MO, NC, NM, OH, SC, TN, UT, VA, WI, WV, western half of WY)
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/758

CLAMS

NAME STATUS

Clubshell *Pleurobema clava* Endangered

Population: Wherever found; Except where listed as Experimental Populations
No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may potentially occur in suitable habitat within the following rivers: Little, Pond, Rough, and Tradewater; and their larger tributaries.

Species profile: https://ecos.fws.gov/ecp/species/3789
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/4ERUR6M2VRGERJXCJFVJOIUJYY/documents/generated/5639.pdf

Fanshell *Cyprogenia stegaria* Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may potentially occur in suitable habitat within the following rivers: Little, Pond, Rough, and Tradewater; and their larger tributaries.

Species profile: https://ecos.fws.gov/ecp/species/4822
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/4ERUR6M2VRGERJXCJFVJOIUJYY/documents/generated/5639.pdf

Northern Riffleshell *Epioblasma rangiana* Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may potentially occur in suitable habitat within the following rivers: Little, Pond, Rough, and Tradewater; and their larger tributaries.

Species profile: https://ecos.fws.gov/ecp/species/527
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/4ERUR6M2VRGERJXCJFVJOIUJYY/documents/generated/5639.pdf

Pink Mucket (pearlymussel) *Lampsilis abrupta* Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/7829
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/4ERUR6M2VRGERJXCJFVJOIUJYY/documents/generated/5639.pdf

Rabbitsfoot *Quadrula cylindrica cylindrica* Threatened

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
This species only needs to be considered under the following conditions:
- The species may potentially occur in suitable habitat within the following rivers: Little, Pond, Rough, and Tradewater; and their larger tributaries.

Species profile: https://ecos.fws.gov/ecp/species/5165
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/4ERUR6M2VRGERJXCJFVJOIUJYY/documents/generated/5639.pdf

Ring Pink (mussel) *Obovaria retusa* Endangered

No critical habitat has been designated for this species.

NAME STATUS

This species only needs to be considered under the following conditions:

- The species may potentially occur in suitable habitat within the following rivers: Little, Pond, Rough, and Tradewater; and their larger tributaries.

Species profile: https://ecos.fws.gov/ecp/species/4128

General project design guidelines:
https://ipac.ecosphere.fws.gov/project/4ERUR6M2VRGERJXCJFVJOIUJYY/documents/generated/5639.pdf

Rough Pigtoe *Pleurobema plenum* — Endangered

No critical habitat has been designated for this species.

This species only needs to be considered under the following conditions:

- The species may potentially occur in suitable habitat within the following rivers: Little, Pond, Rough, and Tradewater; and their larger tributaries.

Species profile: https://ecos.fws.gov/ecp/species/6894

General project design guidelines:
https://ipac.ecosphere.fws.gov/project/4ERUR6M2VRGERJXCJFVJOIUJYY/documents/generated/5639.pdf

Salamander Mussel *Simpsonaias ambigua* — Proposed Endangered

There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat.

Species profile: https://ecos.fws.gov/ecp/species/6208

INSECTS

NAME STATUS

Monarch Butterfly *Danaus plexippus* — Candidate

No critical habitat has been designated for this species.

Species profile: https://ecos.fws.gov/ecp/species/9743

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

IPAC USER CONTACT INFORMATION

Agency: Army Corps of Engineers
Name: Jeffrey Hawkins
Address: 600 Dr. Martin Luther King Jr. Place
City: Louisville
State: KY
Zip: 40202
Email jeffrey.a.hawkins@usace.army.mil
Phone: 8593399414

State listed species documented or potentially occurring at the Rough River Lake Project

Common Name	Scientific Name	County	KY Status[1]
Northern Cavefish	*Amblyopsis spelaea*	Breckinridge, Hart	S
Western Sand Darter	*Ammocrypta clara*	Hart	E
Lake Chubsucker	*Erimyzon sucetta*	Grayson	T
Pallid Shiner	*Hybopsis amnis*	Hart	E
Black Buffalo	*Ictiobus niger*	Breckinridge, Grayson	S
Spotted Darter	*Nothonotus maculatus*	Hart	T
Slender Madtom	*Noturus exilis*	Grayson	E
Longhead Darter	*Percina macrocephala*	Hart	E
Stargazing Minnow	*Phenacobius uranops*	Hart	S
Southern Cavefish	*Typhlichthys subterraneus*	Hart	S
Eastern Hellbender	*Cryptobranchus alleganiensis alleganiensis*	Breckinridge, Grayson, Hart	S
Gray Treefrog	*Hyla versicolor*	Breckinridge	S
A Cave Obligate Pseudoscorpion	*Kleptochthonius attenuatus*	Hart	H
Sharp-shinned Hawk	*Accipiter striatus*	Breckinridge, Grayson, Hart	S
Spotted Sandpiper	*Actitis macularius*	Breckinridge, Grayson, Hart	E
Great Egret	*Ardea alba*	Breckinridge, Hart	T
Short-eared Owl	*Asio flammeus*	Grayson	E
American Bittern	*Botaurus lentiginosus*	Breckinridge, Hart	H
Cattle Egret	*Bubulcus ibis*	Breckinridge, Hart	S
Canada Warbler	*Cardellina canadensis*	Hart	S
Henslow's Sparrow	*Centronyx henslowii*	Breckinridge, Grayson, Hart	S
Brown Creeper	*Certhia americana*	Breckinridge, Hart	T
Lark Sparrow	*Chondestes grammacus*	Breckinridge, Hart	S
Northern Harrier	*Circus hudsonius*	Breckinridge, Grayson, Hart	T
Sedge Wren	*Cistothorus stellaris*	Breckinridge	S
Bobolink	*Dolichonyx oryzivorus*	Hart	S
Little Blue Heron	*Egretta caerulea*	Hart	E
Least Flycatcher	*Empidonax minimus*	Hart	E
Peregrine Falcon	*Falco peregrinus*	Grayson, Hart	E
American Coot	*Fulica americana*	Breckinridge, Grayson, Hart	E
Common Gallinule	*Gallinula galeata*	Hart	T
Bald Eagle	*Haliaeetus leucocephalus*	Breckinridge, Grayson, Hart	S
Dark-eyed Junco	*Junco hyemalis*	Breckinridge, Grayson, Hart	S
Loggerhead Shrike	*Lanius ludovicianus*	Breckinridge, Grayson, Hart	S
Hooded Merganser	*Lophodytes cucullatus*	Hart	T
Yellow-crowned Night-heron	*Nyctanassa violacea*	Grayson	T
Black-crowned Night-heron	*Nycticorax nycticorax*	Hart	T
Osprey	*Pandion haliaetus*	Breckinridge, Grayson, Hart	S
Savannah Sparrow	*Passerculus sandwichensis*	Grayson, Hart	S
Double-crested Cormorant	*Phalacrocorax auritus*	Hart	S
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Grayson, Hart	S
Pied-billed Grebe	*Podilymbus podiceps*	Breckinridge, Grayson, Hart	E
Vesper Sparrow	*Pooecetes gramineus*	Grayson, Hart	E
Bank Swallow	*Riparia riparia*	Breckinridge, Hart	S
Blackburnian Warbler	*Setophaga fusca*	Breckinridge, Hart	T
Red-breasted Nuthatch	*Sitta canadensis*	Hart	E
Blue-winged Teal	*Spatula discors*	Hart	T
Bewick's Wren	*Thryomanes bewickii*	Breckinridge, Grayson, Hart	H
Barn Owl	*Tyto alba*	Breckinridge, Grayson, Hart	S
Golden-winged Warbler	*Vermivora chrysoptera*	Hart	E
Bell's Vireo	*Vireo bellii*	Breckinridge, Hart	S

Elktoe	*Alasmidonta marginata*	Hart	T
Slippershell Mussel	*Alasmidonta viridis*	Grayson, Hart	S
Cylindrical Papershell	*Anodontoides ferussacianus*	Breckinridge	S
Fanshell	*Cyprogenia stegaria*	Hart	E
Elephantear	*Elliptio crassidens*	Breckinridge, Grayson, Hart	S
Catspaw	*Epioblasma obliquata*	Hart	E
Northern Riffleshell	*Epioblasma rangiana*	Grayson, Hart	E
Snuffbox	*Epioblasma triquetra*	Grayson, Hart	E
Longsolid	*Fusconaia subrotunda*	Grayson	S
Longsolid	*Fusconaia subrotunda*	Hart	S
Pink Mucket	*Lampsilis abrupta*	Hart	E
Pocketbook	*Lampsilis ovata*	Hart	E
Little Spectaclecase	*Leaunio lienosus*	Grayson, Hart	T
Kentucky Creekshell	*Leaunio ortmanni*	Grayson, Hart	E
Black Sandshell	*Ligumia recta*	Breckinridge, Hart	S
Spectaclecase	*Margaritifera monodonta*	Hart	E
Ring Pink	*Obovaria retusa*	Hart	E
Round Hickorynut	*Obovaria subrotunda*	Hart	T
Orangefoot Pimpleback	*Plethobasus cooperianus*	Grayson	E
Sheepnose	*Plethobasus cyphyus*	Hart	E
Clubshell	*Pleurobema clava*	Grayson, Hart	E
Rough Pigtoe	*Pleurobema plenum*	Hart	E
Pyramid Pigtoe	*Pleurobema rubrum*	Hart	E
Salamander Mussel	*Simpsonaias ambigua*	Breckinridge, Hart	T
Rabbitsfoot	*Theliderma cylindrica*	Grayson, Hart	E
Shaggy Cavesnail	*Antroselates spiralis*	Breckinridge, Hart	S
Onyx Rocksnail	*Leptoxis praerosa*	Hart	S
Domed Ancylid	*Rhodacme elatior*	Hart	S
Double-ringed Pennant	*Celithemis verna*	Hart	E
Bold Cave Beetle	*Pseudanophthalmus audax*	Hart	H
Round-headed Cave Beetle	*Pseudanophthalmus globiceps*	Hart	E
Cub Run Cave Beetle	*Pseudanophthalmus simulans*	Hart	H
Northern Hairstreak	*Satyrium favonius ontario*	Hart	S
A Stonefly	*Soyedina calcarea*	Hart	E
Elusive Clubtail	*Stylurus notatus*	Breckinridge, Hart	E
A Cave Obligate Beetle	*Tychobythinus hubrichti*	Hart	H
Bottlebrush Crayfish	*Barbicambarus cornutus*	Grayson, Hart	S
Saddle Crayfish	*Faxonius durelli*	Hart	S
Rough River Crayfish	*Faxonius rafinesquei*	Breckinridge, Grayson	S
Devil Crayfish	*Lacunicambarus chimera*	Breckinridge, Grayson	S
Ghost Crayfish	*Orconectes inermis inermis*	Breckinridge, Hart	S
Mammoth Cave Crayfish	*Orconectes pellucidus*	Breckinridge, Hart	S
Mammoth Cave Shrimp	*Palaemonias ganteri*	Hart	E
A Stygobromus Amphipod	*Stygobromus vitreus*	Hart	S
Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii*	Breckinridge, Hart	S
Southeastern Myotis	*Myotis austroriparius*	Breckinridge, Hart	S
Gray Myotis	*Myotis grisescens*	Breckinridge, Grayson, Hart	T
Eastern Small-footed Myotis	*Myotis leibii*	Breckinridge	T
Little Brown Bat	*Myotis lucifugus*	Breckinridge, Hart	T
Northern Myotis	*Myotis septentrionalis*	Breckinridge, Hart	E
Indiana Bat	*Myotis sodalis*	Breckinridge, Grayson, Hart	E
Eastern Pipistrelle	*Perimyotis subflavus*	Breckinridge, Grayson, Hart	T
A Copepod	*Bryocamptus morrisoni elegans*	Hart	T

Chestnut Lamprey	*Ichthyomyzon castaneus*	Breckinridge	S
American Brook Lamprey	*Lethenteron appendix*	Hart	T
Six-lined Racerunner	*Aspidoscelis sexlineata*	Breckinridge, Hart	S
Eastern Slender Glass Lizard	*Ophisaurus attenuatus longicaudus*	Hart	T
Red Cornsnake	*Pantherophis guttatus*	Grayson, Hart	S
Northern Pinesnake	*Pituophis melanoleucus melanoleucus*	Hart	E
Southeastern Five-lined Skink	*Plestiodon inexpectatus*	Hart	S
Southeastern Crowned Snake	*Tantilla coronata*	Hart	T

Total = 112 Species

Source: (KDFWR 2022). Available at http://app.fw.ky.gov/speciesinfo/speciesinfo.asp

1 - E = endangered, T = threatened, S = special concern, H = historic, X = extirpated

United States Department of Agriculture

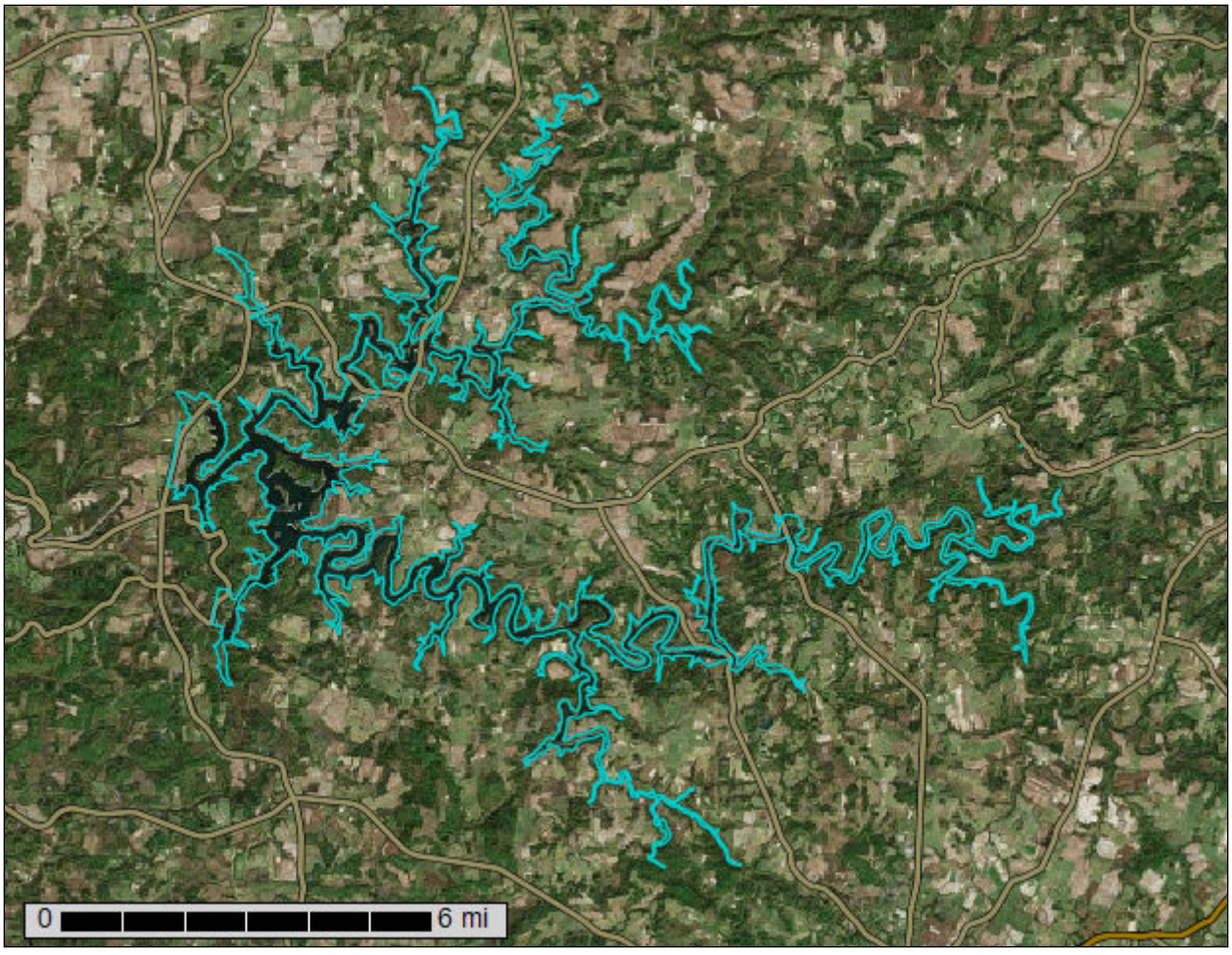
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Breckinridge and Meade Counties, Kentucky, Grayson County, Kentucky, and Hardin and Larue Counties, Kentucky

2023 Rough River Lake Master Plan Update



November 28, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

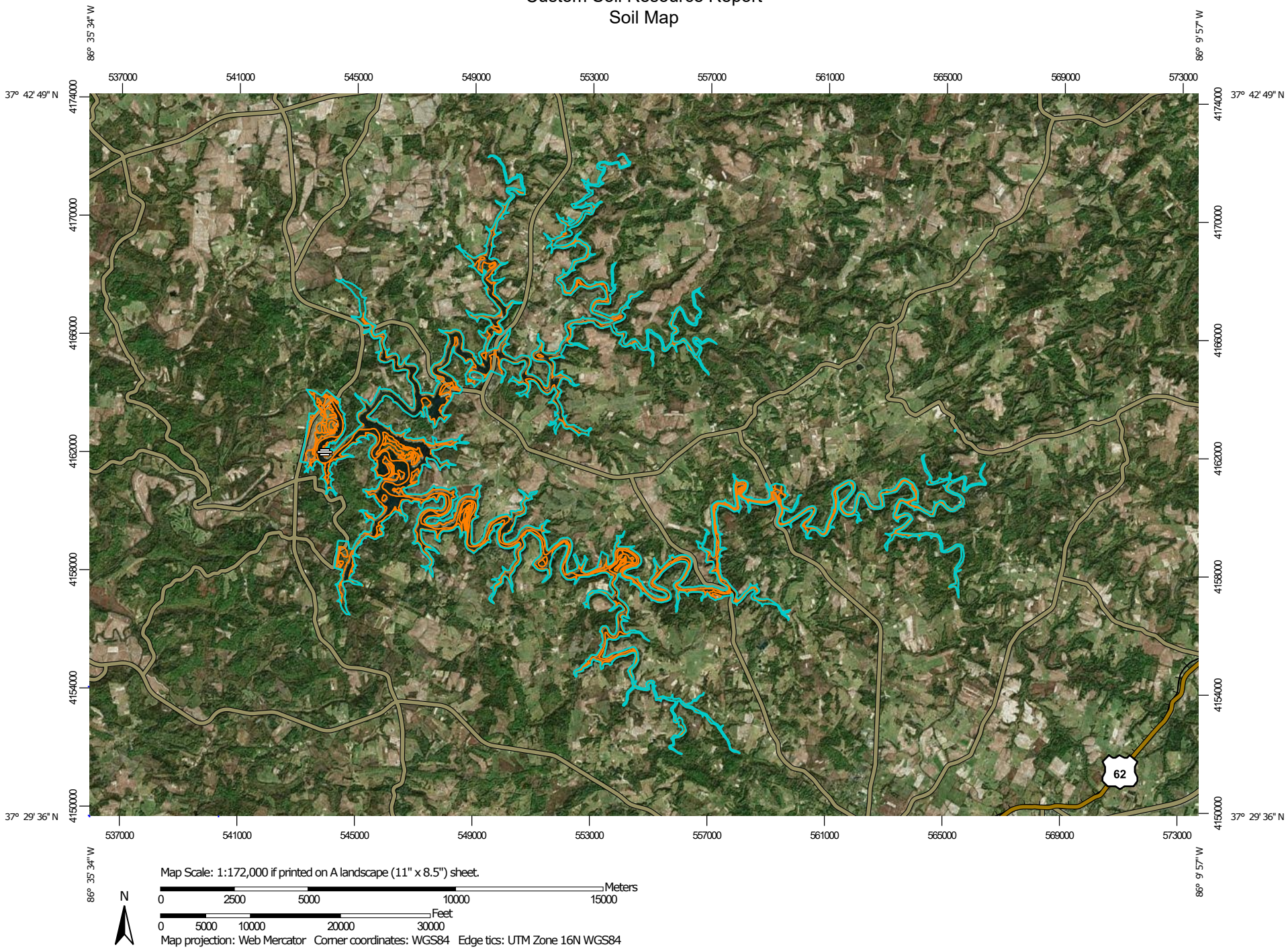
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Breckinridge and Meade Counties, Kentucky
Survey Area Data: Version 21, Sep 2, 2022

Soil Survey Area: Grayson County, Kentucky
Survey Area Data: Version 19, Sep 2, 2022

Soil Survey Area: Hardin and Larue Counties, Kentucky
Survey Area Data: Version 20, Sep 2, 2022

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 1, 1999—Dec 31, 2003

MAP LEGEND

MAP INFORMATION

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BaC2	Baxter very gravelly silt loam, karst, 6 to 12 percent slopes, eroded	0.4	0.0%
CaC2	Caneyville silt loam, 6 to 12 percent slopes, eroded	10.0	0.1%
CeD3	Caneyville silty clay, 12 to 20 percent slopes, severely eroded	2.3	0.0%
CkD	Caneyville-Rock outcrop complex, 12 to 30 percent slopes	15.2	0.2%
Co	Clifty gravelly silt loam, 0 to 2 percent slopes, occasionally flooded	3.7	0.0%
CrB2	Crider silt loam, 2 to 6 percent slopes, eroded	4.0	0.0%
CrC2	Crider silt loam, 6 to 12 percent slopes, eroded	9.7	0.1%
CrD2	Crider silt loam, 12 to 20 percent slopes, eroded	2.4	0.0%
CtC3	Crider silty clay loam, 6 to 12 percent slopes, severely eroded	0.2	0.0%
Cu	Cuba silt loam, occasionally flooded	30.6	0.3%
DAM	Dam, large	3.7	0.0%
GlC2	Gilpin silt loam, 6 to 12 percent slopes, eroded	0.0	0.0%
GlC3	Gilpin silt loam, 6 to 12 percent slopes, severely eroded	0.3	0.0%
GwF	Gilpin-Dekalb-Rock outcrop complex, 30 to 60 percent slopes	616.1	6.7%
No	Nolin silt loam, 0 to 2 percent slopes, occasionally flooded	125.0	1.4%
RnC2	Rosine silt loam, 6 to 12 percent slopes, eroded	135.1	1.5%
RoC3	Rosine silty clay loam, 6 to 12 percent slopes, severely eroded	14.8	0.2%
RsD2	Rosine-Gilpin-Lenberg complex, 12 to 20 percent slopes, eroded	196.3	2.1%
RsD3	Rosine-Gilpin-Lenberg complex, 12 to 20 percent slopes, severely eroded	182.4	2.0%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
RsE	Rosine-Gilpin-Lenberg complex, very rocky, 20 to 30 percent slopes	326.8	3.5%
SaA	Sadler silt loam, 0 to 2 percent slopes	0.0	0.0%
SaB2	Sadler silt loam, 2 to 6 percent slopes, eroded	40.2	0.4%
Sf	Steff silt loam, 0 to 2 percent slopes, occasionally flooded	0.2	0.0%
VrF	Varilla-Gilpin-Rock outcrop complex, very bouldery, 20 to 65 percent slopes	547.1	5.9%
W	Water	2,970.8	32.1%
ZaB2	Zanesville silt loam, 2 to 6 percent slopes, eroded	14.1	0.2%
ZaC2	Zanesville silt loam, 6 to 12 percent slopes, eroded	25.6	0.3%
ZnC3	Zanesville silt loam, 6 to 12 percent slopes, severely eroded	32.2	0.3%
Subtotals for Soil Survey Area		**5,309.3**	**57.4%**
Totals for Area of Interest		**9,241.9**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AeC	Allegheny silt loam, 6 to 12 percent slopes	4.0	0.0%
BcC3	Baxter cherty silty clay loam, 6 to 12 percent slopes, severely eroded	0.0	0.0%
Bp	Borrow pits (borrow areas & urban land)	111.0	1.2%
CcC	Caneyville silty clay loam, 6 to 12 percent slopes	1.5	0.0%
CcD	Caneyville silty clay loam, 12 to 20 percent slopes	9.7	0.1%
CeD	Caneyville very rocky silty clay loam, 10 to 20 percent slopes	31.2	0.3%
CeF	Caneyville very rocky silty clay loam, 20 to 40 percent slopes	29.0	0.3%
ClD3	Caneyville silty clay, 6 to 20 percent slopes, severely eroded	0.3	0.0%
CnD3	Caneyville very rocky silty clay, 8 to 25 percent slopes, severely eroded	38.6	0.4%
Co	Caneyville-Rock outcrop complex	8.9	0.1%
CrB	Christian silt loam, 2 to 6 percent slopes	1.2	0.0%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CrC	Christian silt loam, 6 to 12 percent slopes	2.8	0.0%
CsC3	Christian silty clay loam, 6 to 12 percent slopes, severely eroded	2.6	0.0%
Ct	Clifty gravelly silt loam, 0 to 2 percent slopes, occasionally flooded	15.5	0.2%
CvC3	Crider silty clay loam, 6 to 12 percent slopes, severely eroded	6.0	0.1%
Cw	Cuba silt loam	182.5	2.0%
DAM	Dam, large	10.8	0.1%
GlC	Gilpin silt loam, 6 to 12 percent slopes (frondorf)	2.3	0.0%
GlD	Gilpin silt loam, 12 to 20 percent slopes (frondorf)	53.1	0.6%
GlE	Gilpin silt loam, 20 to 30 percent slopes (frondorf)	6.0	0.1%
GpC3	Gilpin silty clay loam, 6 to 12 percent slopes, severely eroded (frondorf)	37.0	0.4%
GpD3	Gilpin silty clay loam, 12 to 20 percent slopes, severely eroded (frondorf)	108.8	1.2%
GpE3	Gilpin silty clay loam, 20 to 30 percent slopes, severely eroded (frondorf)	12.2	0.1%
Gu	Gullied land	2.4	0.0%
Ld	Lindside silt loam, 0 to 2 percent slopes, occasionally flooded	8.7	0.1%
Ne	Newark silt loam, 0 to 2 percent slopes, occasionally flooded	4.9	0.1%
No	Nolin silt loam, 0 to 2 percent slopes, occasionally flooded	69.2	0.7%
RaE3	Ramsey loam, 10 to 30 percent slopes, severely eroded	7.6	0.1%
SaA	Sadler silt loam, 0 to 2 percent slopes	0.0	0.0%
SaB	Sadler silt loam, 2 to 6 percent slopes	42.5	0.5%
ShC	Shelocta gravelly silt loam, 6 to 12 percent slopes	21.0	0.2%
ShD	Shelocta gravelly silt loam, 12 to 20 percent slopes	38.7	0.4%
ShD3	Shelocta gravelly silt loam, 12 to 20 percent slopes, severely eroded	13.8	0.1%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ss	Steff silt loam, 0 to 2 percent slopes, occasionally flooded	1.6	0.0%
St	Stendal silt loam, 0 to 2 percent slopes, occasionally flooded	39.5	0.4%
W	Water	1,480.8	16.0%
WcE	Weikert channery silt loam, 12 to 30 percent slopes	54.9	0.6%
WcE3	Weikert channery silt loam, 12 to 30 percent slopes, severely eroded	53.8	0.6%
WgE	Weikert-Ramsey-Gilpin stony complex, 20 to 30 percent slopes	312.2	3.4%
WgE3	Weikert-Ramsey-Gilpin stony complex, 20 to 30 percent slopes, severely eroded	25.5	0.3%
WgF	Weikert-Ramsey-Gilpin stony complex, 30 to 50 percent slopes	607.2	6.6%
WlC	Wellston silt loam, 6 to 12 percent slopes	7.8	0.1%
WlD	Wellston silt loam, 12 to 20 percent slopes	24.9	0.3%
WnC3	Wellston silty clay loam, 6 to 12 percent slopes, severely eroded	29.4	0.3%
WnD3	Wellston silty clay loam, 12 to 20 percent slopes, severely eroded	63.6	0.7%
WsD3	Wellston silty clay loam, clayey subsoil variant, 12 to 20 percent slopes, severely eroded (rosine)	31.0	0.3%
ZaB	Zanesville silt loam, 2 to 6 percent slopes	50.8	0.5%
ZaC	Zanesville silt loam, 6 to 12 percent slopes	83.9	0.9%
ZcC3	Zanesville silt loam, 6 to 12 percent slopes, severely eroded	68.0	0.7%
Subtotals for Soil Survey Area		**3,818.8**	**41.3%**
Totals for Area of Interest		**9,241.9**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AlD	Allegheny-Lenberg-Caneyville complex, 12 to 20 percent slopes	2.9	0.0%
CnD	Caneyville-Rock outcrop complex, 6 to 20 percent slopes	2.5	0.0%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CnE	Caneyville-Rock outcrop complex, 20 to 30 percent slopes	6.3	0.1%
FrD	Frondorf-Lenberg silt loams, 12 to 20 percent slopes	2.8	0.0%
HnC	Hagerstown silt loam, 6 to 12 percent slopes	2.3	0.0%
Nb	Newark silt loam, 0 to 2 percent slopes, frequently flooded	0.0	0.0%
No	Nolin silt loam, 0 to 2 percent slopes, frequently flooded	56.4	0.6%
RaE	Ramsey-Steinsburg-Allegheny complex, 20 to 40 percent slopes	10.4	0.1%
W	Water	17.4	0.2%
WlB	Wellston silt loam, 2 to 6 percent slopes	0.1	0.0%
WlC	Wellston silt loam, 6 to 12 percent slopes	7.7	0.1%
WlC3	Wellston silt loam, 6 to 12 percent slopes, severely eroded	5.0	0.1%
Subtotals for Soil Survey Area		**113.9**	**1.2%**
Totals for Area of Interest		**9,241.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They

generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Breckinridge and Meade Counties, Kentucky

BaC2—Baxter very gravelly silt loam, karst, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: lfvk
Elevation: 360 to 1,020 feet
Mean annual precipitation: 41 to 56 inches
Mean annual air temperature: 42 to 67 degrees F
Frost-free period: 154 to 212 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Baxter and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Baxter

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Clayey residuum weathered from cherty limestone

Typical profile

H1 - 0 to 5 inches: very gravelly silt loam
H2 - 5 to 11 inches: gravelly silty clay
H3 - 11 to 37 inches: gravelly clay
H4 - 37 to 97 inches: gravelly clay

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F122XY001KY - Deep Well Drained Cherty Uplands
Other vegetative classification: Deep Well Drained Upland Soils 0-30% (PHG-5)
Hydric soil rating: No

Minor Components

Caneyville
Percent of map unit: 4 percent
Hydric soil rating: No

Crider
Percent of map unit: 4 percent
Hydric soil rating: No

Hammack
Percent of map unit: 4 percent
Hydric soil rating: No

Fredonia
Percent of map unit: 3 percent
Hydric soil rating: No

Vertrees
Percent of map unit: 2 percent
Hydric soil rating: No

Newark
Percent of map unit: 1 percent
Hydric soil rating: No

Nolin
Percent of map unit: 1 percent
Hydric soil rating: No

Lindside
Percent of map unit: 1 percent
Hydric soil rating: No

CaC2—Caneyville silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting
National map unit symbol: lfvs
Elevation: 360 to 1,020 feet
Mean annual precipitation: 41 to 56 inches
Mean annual air temperature: 42 to 67 degrees F
Frost-free period: 154 to 212 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Caneyville and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Caneyville

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Clayey residuum weathered from limestone

Typical profile

H1 - 0 to 6 inches: silt loam
H2 - 6 to 10 inches: silty clay loam
H3 - 10 to 24 inches: clay
R - 24 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F122XY005KY - Moderately Deep Well Drained Uplands
Other vegetative classification: Moderately Deep Upland Soils (PHG-7)
Hydric soil rating: No

Minor Components

Lenberg

Percent of map unit: 6 percent
Hydric soil rating: No

Rosine

Percent of map unit: 5 percent
Hydric soil rating: No

Hagerstown

Percent of map unit: 2 percent
Hydric soil rating: No

Gilpin

Percent of map unit: 2 percent
Hydric soil rating: No

CeD3—Caneyville silty clay, 12 to 20 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: lfvw
Elevation: 360 to 1,020 feet
Mean annual precipitation: 41 to 56 inches
Mean annual air temperature: 42 to 67 degrees F
Frost-free period: 154 to 212 days
Farmland classification: Not prime farmland

Map Unit Composition

Caneyville, severely eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Caneyville, Severely Eroded

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Clayey residuum weathered from limestone

Typical profile

H1 - 0 to 5 inches: silty clay
H2 - 5 to 23 inches: clay
R - 23 to 33 inches: unweathered bedrock

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F122XY005KY - Moderately Deep Well Drained Uplands
Other vegetative classification: Severely Eroded Soils (PHG-10)
Hydric soil rating: No

Minor Components

Gilpin
Percent of map unit: 5 percent
Hydric soil rating: No

Lenberg
Percent of map unit: 4 percent
Hydric soil rating: No

Rosine
Percent of map unit: 4 percent
Hydric soil rating: No

Hagerstown
Percent of map unit: 2 percent
Hydric soil rating: No

CkD—Caneyville-Rock outcrop complex, 12 to 30 percent slopes

Map Unit Setting
National map unit symbol: lfvx
Elevation: 360 to 1,020 feet
Mean annual precipitation: 41 to 56 inches
Mean annual air temperature: 42 to 67 degrees F
Frost-free period: 154 to 212 days
Farmland classification: Not prime farmland

Map Unit Composition
Caneyville and similar soils: 40 percent
Rock outcrop: 30 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Caneyville

Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Clayey residuum weathered from limestone

Typical profile
H1 - 0 to 6 inches: silt loam
H2 - 6 to 10 inches: silty clay loam
H3 - 10 to 24 inches: clay
R - 24 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 12 to 30 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F122XY005KY - Moderately Deep Well Drained Uplands
Other vegetative classification: Moderately Deep Upland Soils (PHG-7)
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Hills
Landform position (three-dimensional): Free face
Parent material: Limestone

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Other vegetative classification: Not Rated (NR)
Hydric soil rating: No

Minor Components

Fredonia

Percent of map unit: 6 percent
Hydric soil rating: No

Gilpin

Percent of map unit: 6 percent
Hydric soil rating: No

Wellston

Percent of map unit: 6 percent
Hydric soil rating: No

Lenberg

Percent of map unit: 5 percent
Hydric soil rating: No

Rosine

Percent of map unit: 5 percent
Hydric soil rating: No

Crider

Percent of map unit: 2 percent
Hydric soil rating: No

Co—Clifty gravelly silt loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2r14j
Elevation: 380 to 760 feet
Mean annual precipitation: 38 to 58 inches
Mean annual air temperature: 44 to 69 degrees F
Frost-free period: 154 to 212 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Clifty, occasionally flooded, and similar soils: 86 percent
Minor components: 14 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Clifty, Occasionally Flooded

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Acid fine-loamy alluvium

Typical profile

Ap - 0 to 8 inches: gravelly silt loam
Bw - 8 to 30 inches: gravelly silt loam
C - 30 to 80 inches: gravelly loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F120AY015KY - Loamy Alluvial Headwaters
Hydric soil rating: No

Minor Components

Skidmore, occasionally flooded
Percent of map unit: 6 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Blackford, occasionally flooded
Percent of map unit: 4 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Sharon, occasionally flooded
Percent of map unit: 2 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Cuba, occasionally flooded
Percent of map unit: 2 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

CrB2—Crider silt loam, 2 to 6 percent slopes, eroded

Map Unit Setting
National map unit symbol: lfw0
Elevation: 360 to 1,020 feet
Mean annual precipitation: 41 to 56 inches
Mean annual air temperature: 42 to 67 degrees F
Frost-free period: 154 to 212 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Crider and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Crider

Setting
Landform: Ridges

Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from cherty limestone

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 31 inches: silt loam
H3 - 31 to 80 inches: clay

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F122XY004KY - Loess Veneered Uplands
Other vegetative classification: Deep Well Drained Upland Soils 0-30% (PHG-5)
Hydric soil rating: No

Minor Components

Baxter

Percent of map unit: 3 percent
Hydric soil rating: No

Nicholson

Percent of map unit: 3 percent
Hydric soil rating: No

Hammack

Percent of map unit: 3 percent
Hydric soil rating: No

Nolin

Percent of map unit: 2 percent
Hydric soil rating: No

Caneyville

Percent of map unit: 2 percent
Hydric soil rating: No

Fredonia

Percent of map unit: 2 percent
Hydric soil rating: No

CrC2—Crider silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2wv4v
Elevation: 400 to 1,050 feet
Mean annual precipitation: 38 to 66 inches
Mean annual air temperature: 42 to 68 degrees F
Frost-free period: 139 to 212 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Crider, eroded, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Crider, Eroded

Setting

Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-silty noncalcareous loess over clayey residuum weathered from limestone

Typical profile

Ap - 0 to 6 inches: silt loam
Bt1 - 6 to 26 inches: silty clay loam
2Bt2 - 26 to 80 inches: clay

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F122XY004KY - Loess Veneered Uplands
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Caneyville, eroded
Percent of map unit: 10 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Bedford, eroded
Percent of map unit: 7 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Nolin, ponded
Percent of map unit: 3 percent
Landform: Sinkholes
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

CrD2—Crider silt loam, 12 to 20 percent slopes, eroded

Map Unit Setting
National map unit symbol: lfw2
Elevation: 360 to 1,020 feet
Mean annual precipitation: 41 to 56 inches
Mean annual air temperature: 42 to 67 degrees F
Frost-free period: 154 to 212 days
Farmland classification: Not prime farmland

Map Unit Composition
Crider and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Crider

Setting
Landform: Hills

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from cherty limestone

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 31 inches: silt loam
H3 - 31 to 80 inches: clay

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Other vegetative classification: Deep Well Drained Upland Soils >12% (PHG-6)
Hydric soil rating: No

Minor Components

Rosine

Percent of map unit: 5 percent
Hydric soil rating: No

Baxter

Percent of map unit: 5 percent
Hydric soil rating: No

Nolin

Percent of map unit: 4 percent
Hydric soil rating: No

Fredonia

Percent of map unit: 3 percent
Hydric soil rating: No

Caneyville

Percent of map unit: 3 percent
Hydric soil rating: No

CtC3—Crider silty clay loam, 6 to 12 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: lfw3
Elevation: 360 to 1,020 feet
Mean annual precipitation: 41 to 56 inches
Mean annual air temperature: 42 to 67 degrees F
Frost-free period: 154 to 212 days
Farmland classification: Not prime farmland

Map Unit Composition

Crider, severely eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Crider, Severely Eroded

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from cherty limestone

Typical profile

H1 - 0 to 6 inches: silty clay loam
H2 - 6 to 26 inches: silt loam
H3 - 26 to 75 inches: clay

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Other vegetative classification: Severely Eroded Soils (PHG-10)
Hydric soil rating: No

Minor Components

Hammack
Percent of map unit: 3 percent
Hydric soil rating: No

Baxter
Percent of map unit: 3 percent
Hydric soil rating: No

Nicholson
Percent of map unit: 3 percent
Hydric soil rating: No

Nolin
Percent of map unit: 2 percent
Hydric soil rating: No

Caneyville
Percent of map unit: 2 percent
Hydric soil rating: No

Fredonia
Percent of map unit: 2 percent
Hydric soil rating: No

Cu—Cuba silt loam, occasionally flooded

Map Unit Setting
National map unit symbol: lfw5
Elevation: 360 to 1,020 feet
Mean annual precipitation: 41 to 56 inches
Mean annual air temperature: 42 to 67 degrees F
Frost-free period: 154 to 212 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Cuba, occasionally flooded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cuba, Occasionally Flooded

Setting
Landform: Drainageways, flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed fine-silty alluvium

Typical profile
H1 - 0 to 30 inches: silt loam
H2 - 30 to 66 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very high (about 12.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Ecological site: F120AY017KY - Well Drained Silty Alluvium
Other vegetative classification: Well Drained Bottomland Soils (PHG-1)
Hydric soil rating: No

Minor Components

Steff

Percent of map unit: 4 percent
Hydric soil rating: No

Clifty

Percent of map unit: 4 percent
Hydric soil rating: No

Stendal

Percent of map unit: 4 percent
Hydric soil rating: No

Nolin

Percent of map unit: 2 percent
Hydric soil rating: No

Lindside

Percent of map unit: 1 percent
Hydric soil rating: No

DAM—Dam, large

Map Unit Setting

National map unit symbol: 1j1j3
Elevation: 360 to 1,020 feet
Mean annual precipitation: 41 to 56 inches
Mean annual air temperature: 42 to 67 degrees F
Frost-free period: 154 to 212 days
Farmland classification: Not prime farmland

Map Unit Composition

Dam, large: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dam, Large

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Other vegetative classification: Not Rated (NR)
Hydric soil rating: No

GIC2—Gilpin silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: lfwj
Elevation: 360 to 1,020 feet
Mean annual precipitation: 41 to 56 inches
Mean annual air temperature: 42 to 67 degrees F
Frost-free period: 154 to 212 days
Farmland classification: Not prime farmland

Map Unit Composition

Gilpin and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gilpin

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Fine-loamy residuum weathered from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 5 inches: silt loam
H2 - 5 to 24 inches: loam
H3 - 24 to 29 inches: very channery loam
R - 29 to 39 inches: unweathered bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Other vegetative classification: Moderately Deep Upland Soils (PHG-7)
Hydric soil rating: No

Minor Components

Zanesville

Percent of map unit: 3 percent
Hydric soil rating: No

Lenberg

Percent of map unit: 3 percent
Hydric soil rating: No

Rosine

Percent of map unit: 3 percent
Hydric soil rating: No

Wellston

Percent of map unit: 1 percent
Hydric soil rating: No

GIC3—Gilpin silt loam, 6 to 12 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: lfwk
Elevation: 360 to 1,020 feet
Mean annual precipitation: 41 to 56 inches
Mean annual air temperature: 42 to 67 degrees F
Frost-free period: 154 to 212 days
Farmland classification: Not prime farmland

Map Unit Composition

Gilpin, severely eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gilpin, Severely Eroded

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope

Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Fine-loamy residuum weathered from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 3 inches: silt loam
H2 - 3 to 19 inches: loam
H3 - 19 to 24 inches: very channery loam
R - 24 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Other vegetative classification: Severely Eroded Soils (PHG-10)
Hydric soil rating: No

Minor Components

Zanesville

Percent of map unit: 4 percent
Hydric soil rating: No

Lenberg

Percent of map unit: 4 percent
Hydric soil rating: No

Wellston

Percent of map unit: 4 percent
Hydric soil rating: No

Rosine

Percent of map unit: 3 percent
Hydric soil rating: No

GwF—Gilpin-Dekalb-Rock outcrop complex, 30 to 60 percent slopes

Map Unit Setting

National map unit symbol: lfwl
Elevation: 360 to 1,020 feet
Mean annual precipitation: 41 to 56 inches
Mean annual air temperature: 42 to 67 degrees F
Frost-free period: 154 to 212 days
Farmland classification: Not prime farmland

Map Unit Composition

Gilpin and similar soils: 35 percent
Dekalb and similar soils: 25 percent
Rock outcrop: 15 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gilpin

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-loamy residuum weathered from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 10 inches: loam
H2 - 10 to 24 inches: channery loam
H3 - 24 to 29 inches: very channery loam
R - 29 to 39 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 60 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C

Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Other vegetative classification: Not Rated (NR)
Hydric soil rating: No

Description of Dekalb

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coarse-loamy residuum weathered from sandstone and shale

Typical profile

H1 - 0 to 5 inches: loam
H2 - 5 to 28 inches: very channery sandy loam
H3 - 28 to 38 inches: extremely channery sandy loam
R - 38 to 48 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 60 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: F120AY008KY - Loamy Skeletal Uplands
Other vegetative classification: Not Rated (NR)
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Hills
Landform position (three-dimensional): Free face
Parent material: Sandstone

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Other vegetative classification: Not Rated (NR)
Hydric soil rating: No

Minor Components

Caneyville

Percent of map unit: 5 percent
Hydric soil rating: No

Rosine
Percent of map unit: 5 percent
Hydric soil rating: No

Varilla
Percent of map unit: 5 percent
Hydric soil rating: No

Lenberg
Percent of map unit: 5 percent
Hydric soil rating: No

Wellston
Percent of map unit: 3 percent
Hydric soil rating: No

Nolin
Percent of map unit: 2 percent
Hydric soil rating: No

No—Nolin silt loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting
National map unit symbol: 2qykn
Elevation: 300 to 810 feet
Mean annual precipitation: 35 to 56 inches
Mean annual air temperature: 42 to 69 degrees F
Frost-free period: 154 to 221 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Nolin, occasionally flooded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nolin, Occasionally Flooded

Setting
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed fine-silty alluvium

Typical profile
Ap - 0 to 9 inches: silt loam
Bw - 9 to 48 inches: silt loam
C - 48 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Ecological site: F120AY018KY - Riverbank Loamy Alluvium
Other vegetative classification: Well Drained Bottomland Soils (PHG-1)
Hydric soil rating: No

Minor Components

Lindside, occasionally flooded

Percent of map unit: 10 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Newark, occasionally flooded

Percent of map unit: 3 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Nolin, frequent(hydric)

Percent of map unit: 1 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Huntington, occasionally flooded

Percent of map unit: 1 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

RnC2—Rosine silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2rmw0
Elevation: 380 to 1,010 feet
Mean annual precipitation: 40 to 56 inches
Mean annual air temperature: 42 to 69 degrees F
Frost-free period: 154 to 212 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Rosine, eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rosine, Eroded

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from shale and siltstone

Typical profile

Ap - 0 to 7 inches: silt loam
Bt1 - 7 to 21 inches: silty clay loam
2Bt2 - 21 to 54 inches: silty clay
2C - 54 to 64 inches: parachannery silty clay loam
2Cr - 64 to 74 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 60 to 74 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F120AY004KY - Loess Veneered Sandstone-Shale Uplands

Hydric soil rating: No

Minor Components

Zanesville, eroded

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Moderately Well Drained Soils With a Fragipan (PHG-11)
Hydric soil rating: No

Lenberg, eroded

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Deep Well Drained Upland Soils >12% (PHG-6)
Hydric soil rating: No

Gilpin, eroded

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Moderately Deep Upland Soils (PHG-7)
Hydric soil rating: No

RoC3—Rosine silty clay loam, 6 to 12 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: lfxn
Elevation: 360 to 1,020 feet
Mean annual precipitation: 41 to 56 inches
Mean annual air temperature: 42 to 67 degrees F
Frost-free period: 154 to 212 days
Farmland classification: Not prime farmland

Map Unit Composition

Rosine, severely eroded, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rosine, Severely Eroded

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from shale and siltstone

Typical profile

H1 - 0 to 6 inches: silty clay loam
H2 - 6 to 16 inches: silt loam
H3 - 16 to 49 inches: channery silty clay loam
H4 - 49 to 61 inches: silty clay loam
Cr - 61 to 71 inches: weathered bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 60 to 80 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F120AY004KY - Loess Veneered Sandstone-Shale Uplands
Other vegetative classification: Severely Eroded Soils (PHG-10)
Hydric soil rating: No

Minor Components

Gilpin

Percent of map unit: 5 percent
Hydric soil rating: No

Zanesville

Percent of map unit: 5 percent
Hydric soil rating: No

Lenberg

Percent of map unit: 4 percent
Hydric soil rating: No

Caneyville

Percent of map unit: 3 percent
Hydric soil rating: No

Other soils

Percent of map unit: 3 percent

Hydric soil rating: No

RsD2—Rosine-Gilpin-Lenberg complex, 12 to 20 percent slopes, eroded

Map Unit Setting

National map unit symbol: lfxp
Elevation: 360 to 1,020 feet
Mean annual precipitation: 41 to 56 inches
Mean annual air temperature: 42 to 67 degrees F
Frost-free period: 154 to 212 days
Farmland classification: Not prime farmland

Map Unit Composition

Rosine and similar soils: 35 percent
Gilpin and similar soils: 25 percent
Lenberg and similar soils: 20 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rosine

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from shale and siltstone

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 21 inches: silt loam
H3 - 21 to 54 inches: channery silty clay loam
H4 - 54 to 64 inches: silty clay loam
Cr - 64 to 74 inches: weathered bedrock

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 60 to 80 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F120AY004KY - Loess Veneered Sandstone-Shale Uplands
Other vegetative classification: Deep Well Drained Upland Soils >12% (PHG-6)
Hydric soil rating: No

Description of Gilpin

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-loamy residuum weathered from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 10 inches: loam
H2 - 10 to 24 inches: channery loam
H3 - 24 to 29 inches: very channery loam
R - 29 to 39 inches: unweathered bedrock

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Other vegetative classification: Deep Well Drained Upland Soils >12% (PHG-6)
Hydric soil rating: No

Description of Lenberg

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Clayey residuum weathered from acid shale

Typical profile

H1 - 0 to 3 inches: silt loam
H2 - 3 to 15 inches: silty clay
H3 - 15 to 31 inches: silty clay

Cr - 31 to 41 inches: weathered bedrock

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Other vegetative classification: Deep Well Drained Upland Soils >12% (PHG-6)
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 5 percent
Hydric soil rating: No

Dekalb

Percent of map unit: 5 percent
Hydric soil rating: No

Caneyville

Percent of map unit: 5 percent
Hydric soil rating: No

Clifty

Percent of map unit: 3 percent
Hydric soil rating: No

Cuba

Percent of map unit: 2 percent
Hydric soil rating: No

RsD3—Rosine-Gilpin-Lenberg complex, 12 to 20 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: lfxq
Elevation: 360 to 1,020 feet

Mean annual precipitation: 41 to 56 inches
Mean annual air temperature: 42 to 67 degrees F
Frost-free period: 154 to 212 days
Farmland classification: Not prime farmland

Map Unit Composition

Rosine, severely eroded, and similar soils: 35 percent
Gilpin, severely eroded, and similar soils: 25 percent
Lenberg, severely eroded, and similar soils: 20 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rosine, Severely Eroded

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from shale and siltstone

Typical profile

H1 - 0 to 4 inches: silt loam
H2 - 4 to 16 inches: silt loam
H3 - 16 to 49 inches: channery silty clay loam
H4 - 49 to 61 inches: silty clay loam
Cr - 61 to 71 inches: weathered bedrock

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 60 to 80 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F120AY004KY - Loess Veneered Sandstone-Shale Uplands
Other vegetative classification: Severely Eroded Soils (PHG-10)
Hydric soil rating: No

Description of Gilpin, Severely Eroded

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex

Across-slope shape: Linear
Parent material: Fine-loamy residuum weathered from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 4 inches: loam
H2 - 4 to 18 inches: channery loam
H3 - 18 to 23 inches: very channery loam
R - 23 to 33 inches: unweathered bedrock

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Other vegetative classification: Severely Eroded Soils (PHG-10)
Hydric soil rating: No

Description of Lenberg, Severely Eroded

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Clayey residuum weathered from acid shale

Typical profile

H1 - 0 to 4 inches: silty clay loam
H2 - 4 to 12 inches: silty clay
H3 - 12 to 28 inches: silty clay
Cr - 28 to 38 inches: weathered bedrock

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Other vegetative classification: Severely Eroded Soils (PHG-10)
Hydric soil rating: No

Minor Components

Dekalb

Percent of map unit: 5 percent
Hydric soil rating: No

Caneyville

Percent of map unit: 5 percent
Hydric soil rating: No

Other soils

Percent of map unit: 4 percent
Hydric soil rating: No

Clifty

Percent of map unit: 3 percent
Hydric soil rating: No

Cuba

Percent of map unit: 3 percent
Hydric soil rating: No

RsE—Rosine-Gilpin-Lenberg complex, very rocky, 20 to 30 percent slopes

Map Unit Setting

National map unit symbol: lfxr
Elevation: 360 to 1,020 feet
Mean annual precipitation: 41 to 56 inches
Mean annual air temperature: 42 to 67 degrees F
Frost-free period: 154 to 212 days
Farmland classification: Not prime farmland

Map Unit Composition

Rosine and similar soils: 31 percent
Gilpin and similar soils: 29 percent
Lenberg and similar soils: 15 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rosine

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from shale and siltstone

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 21 inches: silt loam
H3 - 21 to 54 inches: channery silty clay loam
H4 - 54 to 64 inches: silty clay loam
Cr - 64 to 74 inches: weathered bedrock

Properties and qualities

Slope: 20 to 30 percent
Depth to restrictive feature: 60 to 80 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F120AY004KY - Loess Veneered Sandstone-Shale Uplands
Other vegetative classification: Deep Well Drained Upland Soils >12% (PHG-6)
Hydric soil rating: No

Description of Gilpin

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-loamy residuum weathered from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 10 inches: loam
H2 - 10 to 24 inches: channery loam
H3 - 24 to 29 inches: very channery loam
R - 29 to 39 inches: unweathered bedrock

Properties and qualities

Slope: 20 to 30 percent

Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Other vegetative classification: Deep Well Drained Upland Soils >12% (PHG-6)
Hydric soil rating: No

Description of Lenberg

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Clayey residuum weathered from acid shale

Typical profile

H1 - 0 to 3 inches: silt loam
H2 - 3 to 15 inches: silty clay
H3 - 15 to 31 inches: silty clay
Cr - 31 to 41 inches: weathered bedrock

Properties and qualities

Slope: 20 to 30 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Other vegetative classification: Deep Well Drained Upland Soils >12% (PHG-6)
Hydric soil rating: No

Minor Components

Caneyville
Percent of map unit: 6 percent
Hydric soil rating: No

Dekalb
Percent of map unit: 6 percent
Hydric soil rating: No

Other soils
Percent of map unit: 5 percent
Hydric soil rating: No

Rock outcrop
Percent of map unit: 4 percent
Hydric soil rating: No

Clifty
Percent of map unit: 2 percent
Hydric soil rating: No

Cuba
Percent of map unit: 2 percent
Hydric soil rating: No

SaA—Sadler silt loam, 0 to 2 percent slopes

Map Unit Setting
National map unit symbol: 2vtzn
Elevation: 380 to 890 feet
Mean annual precipitation: 38 to 58 inches
Mean annual air temperature: 42 to 69 degrees F
Frost-free period: 154 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Sadler and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sadler

Setting
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear

Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 7 inches: silt loam
Bt - 7 to 20 inches: silt loam
E/B - 20 to 24 inches: silt loam
2Btx - 24 to 62 inches: silt loam
2C - 62 to 76 inches: very gravelly fine sandy loam
2R - 76 to 86 inches: bedrock

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 22 to 31 inches to fragipan; 72 to 80 inches to lithic bedrock
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.13 in/hr)
Depth to water table: About 19 to 28 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F120AY002KY - Fragipan Uplands
Hydric soil rating: No

Minor Components

Zanesville

Percent of map unit: 7 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Robbs

Percent of map unit: 4 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Wellston

Percent of map unit: 4 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear

Across-slope shape: Linear
Hydric soil rating: No

SaB2—Sadler silt loam, 2 to 6 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2vtzm
Elevation: 360 to 910 feet
Mean annual precipitation: 40 to 58 inches
Mean annual air temperature: 46 to 69 degrees F
Frost-free period: 148 to 215 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Sadler, eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sadler, Eroded

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 6 inches: silt loam
Bt - 6 to 20 inches: silt loam
E/B - 20 to 24 inches: silt loam
2Btx - 24 to 62 inches: silt loam
2C - 62 to 76 inches: very gravelly fine sandy loam
2R - 76 to 86 inches: bedrock

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 22 to 28 inches to fragipan; 72 to 80 inches to lithic bedrock
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.13 in/hr)
Depth to water table: About 19 to 25 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: F120AY002KY - Fragipan Uplands
Hydric soil rating: No

Minor Components

Zanesville, eroded

Percent of map unit: 7 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Robbs

Percent of map unit: 4 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Wellston, eroded

Percent of map unit: 4 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Sf—Steff silt loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2wlvp
Elevation: 350 to 820 feet
Mean annual precipitation: 40 to 58 inches
Mean annual air temperature: 42 to 69 degrees F
Frost-free period: 154 to 212 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Steff, occasionally flooded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Steff, Occasionally Flooded

Setting

Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Acid fine-silty alluvium

Typical profile

Ap - 0 to 7 inches: silt loam
Bw - 7 to 23 inches: silt loam
Bg - 23 to 48 inches: silt loam
Cg - 48 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 20 to 39 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very high (about 13.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: F120AY019KY - Moist Silty Alluvium
Hydric soil rating: No

Minor Components

Stendal, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Lindside, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Cuba, occasionally flooded

Percent of map unit: 3 percent
Landform: Flood plains
Landform position (three-dimensional): Rise

Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Bonnie, occasionally flooded
Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: Yes

VrF—Varilla-Gilpin-Rock outcrop complex, very bouldery, 20 to 65 percent slopes

Map Unit Setting
National map unit symbol: lfxz
Elevation: 360 to 1,020 feet
Mean annual precipitation: 41 to 56 inches
Mean annual air temperature: 42 to 67 degrees F
Frost-free period: 154 to 212 days
Farmland classification: Not prime farmland

Map Unit Composition
Varilla and similar soils: 35 percent
Gilpin and similar soils: 20 percent
Rock outcrop: 15 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Varilla

Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Rocky loamy colluvium derived from sandstone

Typical profile
H1 - 0 to 6 inches: flaggy fine sandy loam
H2 - 6 to 24 inches: very channery sandy loam
H3 - 24 to 62 inches: extremely channery sandy loam
R - 62 to 80 inches: bedrock

Properties and qualities
Slope: 20 to 65 percent
Surface area covered with cobbles, stones or boulders: 2.0 percent
Depth to restrictive feature: 61 to 80 inches to lithic bedrock

Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: F120AY008KY - Loamy Skeletal Uplands
Other vegetative classification: Not Rated (NR)
Hydric soil rating: No

Description of Gilpin

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Fine-loamy residuum weathered from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 10 inches: loam
H2 - 10 to 24 inches: channery loam
H3 - 24 to 29 inches: very channery loam
R - 29 to 39 inches: unweathered bedrock

Properties and qualities

Slope: 20 to 65 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Other vegetative classification: Not Rated (NR)
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Free face
Parent material: Sandstone

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Other vegetative classification: Not Rated (NR)
Hydric soil rating: No

Minor Components

Dekalb

Percent of map unit: 8 percent
Hydric soil rating: No

Rosine

Percent of map unit: 7 percent
Hydric soil rating: No

Lenberg

Percent of map unit: 7 percent
Hydric soil rating: No

Alluvial soils

Percent of map unit: 3 percent
Hydric soil rating: No

Other upland soils

Percent of map unit: 3 percent
Hydric soil rating: No

Markland

Percent of map unit: 2 percent
Hydric soil rating: No

W—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

ZaB2—Zanesville silt loam, 2 to 6 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2s2cq
Elevation: 360 to 1,010 feet
Mean annual precipitation: 40 to 58 inches
Mean annual air temperature: 42 to 69 degrees F
Frost-free period: 154 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Zanesville, eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Zanesville, Eroded

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 6 inches: silt loam
Bt - 6 to 28 inches: silt loam
Btx - 28 to 39 inches: silty clay loam
2BC - 39 to 60 inches: sandy clay loam
2R - 60 to 70 inches: bedrock

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 20 to 30 inches to fragipan; 40 to 80 inches to lithic bedrock
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.13 in/hr)
Depth to water table: About 17 to 28 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F120AY002KY - Fragipan Uplands
Hydric soil rating: No

Minor Components

Hosmer, eroded

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Wellston, eroded

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Sadler, eroded

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Moderately Well Drained Soils With a Fragipan (PHG-11)
Hydric soil rating: No

ZaC2—Zanesville silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2s2cs
Elevation: 350 to 1,010 feet
Mean annual precipitation: 35 to 58 inches
Mean annual air temperature: 42 to 69 degrees F
Frost-free period: 154 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Zanesville, eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Zanesville, Eroded

Setting

Landform: Ridges

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and siltstone

Typical profile

Ap - 0 to 6 inches: silt loam
Bt - 6 to 24 inches: silt loam
Btx - 24 to 40 inches: silty clay loam
2C - 40 to 60 inches: clay loam
2R - 60 to 70 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 22 to 30 inches to fragipan; 40 to 79 inches to lithic bedrock
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.13 in/hr)
Depth to water table: About 19 to 28 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Ecological site: F120AY002KY - Fragipan Uplands
Hydric soil rating: No

Minor Components

Hosmer, eroded

Percent of map unit: 5 percent
Landform: Loess hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Moderately Well Drained Soils With a Fragipan (PHG-11)
Hydric soil rating: No

Sadler, eroded

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Wellston, eroded

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

ZnC3—Zanesville silt loam, 6 to 12 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: 2s2ct
Elevation: 320 to 970 feet
Mean annual precipitation: 30 to 61 inches
Mean annual air temperature: 42 to 70 degrees F
Frost-free period: 154 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Zanesville, severely eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Zanesville, Severely Eroded

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and siltstone

Typical profile

Ap - 0 to 4 inches: silt loam
Bt - 4 to 23 inches: silt loam
Btx - 23 to 34 inches: silty clay loam
2C - 34 to 56 inches: clay loam
R - 56 to 66 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 20 to 28 inches to fragipan; 38 to 75 inches to lithic bedrock
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.13 in/hr)

Depth to water table: About 17 to 26 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C/D
Ecological site: F120AY002KY - Fragipan Uplands
Hydric soil rating: No

Minor Components

Sadler, eroded

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Wellston, severely eroded

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hosmer, severely eroded

Percent of map unit: 5 percent
Landform: Loess hills
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Severely Eroded Soils (PHG-10)
Hydric soil rating: No

Grayson County, Kentucky

AeC—Allegheny silt loam, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: lfyb
Elevation: 430 to 770 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Allegheny, rarely flooded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Allegheny, Rarely Flooded

Setting

Landform: Stream terraces
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Mixed fine-loamy alluvium

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 39 inches: clay loam
H3 - 39 to 70 inches: sandy clay loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F120AY010KY - Well-Drained High Terraces
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 3 percent
Hydric soil rating: No

Shelocta
Percent of map unit: 3 percent
Hydric soil rating: No

Frondorf
Percent of map unit: 3 percent
Hydric soil rating: No

Zanesville
Percent of map unit: 3 percent
Hydric soil rating: No

Wellston
Percent of map unit: 3 percent
Hydric soil rating: No

BcC3—Baxter cherty silty clay loam, 6 to 12 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: lfyd
Elevation: 530 to 720 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition

Baxter, severely eroded, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Baxter, Severely Eroded

Setting

Landform: Ridges
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Clayey residuum weathered from cherty limestone

Typical profile

H1 - 0 to 6 inches: gravelly silty clay loam
H2 - 6 to 10 inches: gravelly silty clay loam
H3 - 10 to 39 inches: gravelly clay
H4 - 39 to 75 inches: clay

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 5 percent
Hydric soil rating: No

Christian

Percent of map unit: 5 percent
Hydric soil rating: No

Caneyville

Percent of map unit: 5 percent
Hydric soil rating: No

Crider

Percent of map unit: 5 percent
Hydric soil rating: No

Bp—Borrow pits (borrow areas & urban land)

Map Unit Setting

National map unit symbol: lfyc
Elevation: 510 to 840 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition

Pits, (borrow pits & urban land): 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pits, (borrow Pits & Urban Land)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

CcC—Caneyville silty clay loam, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: lfyk
Elevation: 450 to 880 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Caneyville and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Caneyville

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from limestone

Typical profile

H1 - 0 to 5 inches: silty clay loam
H2 - 5 to 18 inches: silty clay
H3 - 18 to 24 inches: clay
R - 24 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F122XY005KY - Moderately Deep Well Drained Uplands
Hydric soil rating: No

Minor Components

Other soils
Percent of map unit: 5 percent
Hydric soil rating: No

Christian
Percent of map unit: 5 percent
Hydric soil rating: No

Nicholson
Percent of map unit: 5 percent
Hydric soil rating: No

CcD—Caneyville silty clay loam, 12 to 20 percent slopes

Map Unit Setting
National map unit symbol: lfyl
Elevation: 460 to 840 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition
Caneyville and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Caneyville

Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Clayey residuum weathered from limestone

Typical profile
H1 - 0 to 5 inches: silty clay loam
H2 - 5 to 18 inches: silty clay
H3 - 18 to 24 inches: clay
R - 24 to 34 inches: unweathered bedrock

Properties and qualities
Slope: 12 to 20 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F122XY005KY - Moderately Deep Well Drained Uplands
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 8 percent
Hydric soil rating: No

Christian

Percent of map unit: 5 percent
Hydric soil rating: No

Baxter

Percent of map unit: 5 percent
Hydric soil rating: No

Frondorf

Percent of map unit: 2 percent
Hydric soil rating: No

CeD—Caneyville very rocky silty clay loam, 10 to 20 percent slopes

Map Unit Setting

National map unit symbol: lfym
Elevation: 420 to 820 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition

Caneyville and similar soils: 80 percent
Rock outcrop: 10 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Caneyville

Setting

Landform: Hills

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Clayey residuum weathered from limestone

Typical profile

H1 - 0 to 5 inches: silty clay loam
H2 - 5 to 18 inches: silty clay
H3 - 18 to 24 inches: clay
R - 24 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 10 to 20 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: F122XY005KY - Moderately Deep Well Drained Uplands
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Hills
Landform position (three-dimensional): Free face
Parent material: Limestone

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Minor Components

Baxter

Percent of map unit: 4 percent
Hydric soil rating: No

Christian

Percent of map unit: 3 percent
Hydric soil rating: No

Frondorf

Percent of map unit: 3 percent
Hydric soil rating: No

CeF—Caneyville very rocky silty clay loam, 20 to 40 percent slopes

Map Unit Setting

National map unit symbol: lfyn
Elevation: 420 to 870 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition

Caneyville and similar soils: 75 percent
Rock outcrop: 10 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Caneyville

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Clayey residuum weathered from limestone

Typical profile

H1 - 0 to 5 inches: silty clay loam
H2 - 5 to 18 inches: silty clay
H3 - 18 to 24 inches: clay
R - 24 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 20 to 40 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F122XY005KY - Moderately Deep Well Drained Uplands

Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Hills
Landform position (three-dimensional): Free face
Parent material: Limestone

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Minor Components

Frondorf

Percent of map unit: 8 percent
Hydric soil rating: No

Weikert

Percent of map unit: 7 percent
Hydric soil rating: No

CID3—Caneyville silty clay, 6 to 20 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: lfyp
Elevation: 430 to 890 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition

Caneyville, severely eroded, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Caneyville, Severely Eroded

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from limestone

Typical profile

H1 - 0 to 4 inches: silty clay

H2 - 4 to 15 inches: silty clay
H3 - 15 to 21 inches: clay
R - 21 to 31 inches: unweathered bedrock

Properties and qualities

Slope: 6 to 20 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F122XY005KY - Moderately Deep Well Drained Uplands
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 10 percent
Hydric soil rating: No

Christian

Percent of map unit: 5 percent
Hydric soil rating: No

Nicholson

Percent of map unit: 5 percent
Hydric soil rating: No

CnD3—Caneyville very rocky silty clay, 8 to 25 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: lfyq
Elevation: 420 to 860 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition

Caneyville, severely eroded, and similar soils: 80 percent
Rock outcrop: 10 percent

Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Caneyville, Severely Eroded

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from limestone

Typical profile

H1 - 0 to 4 inches: silty clay
H2 - 4 to 15 inches: silty clay
H3 - 15 to 21 inches: clay
R - 21 to 31 inches: unweathered bedrock

Properties and qualities

Slope: 8 to 25 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F122XY005KY - Moderately Deep Well Drained Uplands
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Hills
Landform position (three-dimensional): Free face
Parent material: Limestone

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Minor Components

Frondorf

Percent of map unit: 5 percent
Hydric soil rating: No

Weikert

Percent of map unit: 5 percent

Hydric soil rating: No

Co—Caneyville-Rock outcrop complex

Map Unit Setting

National map unit symbol: lfyr
Elevation: 430 to 820 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition

Caneyville and similar soils: 55 percent
Rock outcrop: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Caneyville

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from limestone

Typical profile

H1 - 0 to 5 inches: silty clay loam
H2 - 5 to 18 inches: silty clay
H3 - 18 to 24 inches: clay
R - 24 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 90 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C

Ecological site: F122XY005KY - Moderately Deep Well Drained Uplands
Hydric soil rating: No

Description of Rock Outcrop

Setting
Landform: Hills
Landform position (three-dimensional): Free face
Parent material: Limestone

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Minor Components

Other soils
Percent of map unit: 4 percent
Hydric soil rating: No

Christian
Percent of map unit: 2 percent
Hydric soil rating: No

Rarden
Percent of map unit: 2 percent
Hydric soil rating: No

Frondorf
Percent of map unit: 2 percent
Hydric soil rating: No

CrB—Christian silt loam, 2 to 6 percent slopes

Map Unit Setting
National map unit symbol: lfyv
Elevation: 440 to 800 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Christian and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Christian

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from limestone, sandstone, and shale

Typical profile

H1 - 0 to 6 inches: silt loam
H2 - 6 to 12 inches: silty clay loam
H3 - 12 to 40 inches: silty clay
H4 - 40 to 60 inches: clay

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Baxter

Percent of map unit: 4 percent
Hydric soil rating: No

Wellston

Percent of map unit: 4 percent
Hydric soil rating: No

Allegheny

Percent of map unit: 4 percent
Hydric soil rating: No

Other soils

Percent of map unit: 3 percent
Hydric soil rating: No

CrC—Christian silt loam, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: lfyw
Elevation: 490 to 800 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Christian and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Christian

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from limestone, sandstone, and shale

Typical profile

H1 - 0 to 6 inches: silt loam
H2 - 6 to 12 inches: silty clay loam
H3 - 12 to 40 inches: silty clay
H4 - 40 to 60 inches: clay

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Rarden
Percent of map unit: 4 percent
Hydric soil rating: No

Caneyville
Percent of map unit: 4 percent
Hydric soil rating: No

Wellston
Percent of map unit: 4 percent
Hydric soil rating: No

Other soils
Percent of map unit: 3 percent
Hydric soil rating: No

CsC3—Christian silty clay loam, 6 to 12 percent slopes, severely eroded

Map Unit Setting
National map unit symbol: lfyx
Elevation: 450 to 810 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition
Christian, severely eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Christian, Severely Eroded

Setting
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from limestone, sandstone, and shale

Typical profile
H1 - 0 to 6 inches: silty clay loam
H2 - 6 to 36 inches: silty clay
H3 - 36 to 56 inches: clay

Properties and qualities
Slope: 6 to 12 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Wellston

Percent of map unit: 4 percent
Hydric soil rating: No

Caneyville

Percent of map unit: 4 percent
Hydric soil rating: No

Rarden

Percent of map unit: 4 percent
Hydric soil rating: No

Other soils

Percent of map unit: 3 percent
Hydric soil rating: No

Ct—Clifty gravelly silt loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2r14j
Elevation: 380 to 760 feet
Mean annual precipitation: 38 to 58 inches
Mean annual air temperature: 44 to 69 degrees F
Frost-free period: 154 to 212 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Clifty, occasionally flooded, and similar soils: 86 percent
Minor components: 14 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Clifty, Occasionally Flooded

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Acid fine-loamy alluvium

Typical profile

Ap - 0 to 8 inches: gravelly silt loam
Bw - 8 to 30 inches: gravelly silt loam
C - 30 to 80 inches: gravelly loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F120AY015KY - Loamy Alluvial Headwaters
Hydric soil rating: No

Minor Components

Skidmore, occasionally flooded

Percent of map unit: 6 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Blackford, occasionally flooded

Percent of map unit: 4 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Cuba, occasionally flooded

Percent of map unit: 2 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Sharon, occasionally flooded

Percent of map unit: 2 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

CvC3—Crider silty clay loam, 6 to 12 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: lfz1
Elevation: 470 to 780 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition

Crider, severely eroded, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Crider, Severely Eroded

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from cherty limestone

Typical profile

H1 - 0 to 5 inches: silty clay loam
H2 - 5 to 40 inches: silty clay loam
H3 - 40 to 75 inches: silty clay

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F122XY004KY - Loess Veneered Uplands
Hydric soil rating: No

Minor Components

Baxter

Percent of map unit: 5 percent
Hydric soil rating: No

Other soils

Percent of map unit: 5 percent
Hydric soil rating: No

Caneyville

Percent of map unit: 5 percent
Hydric soil rating: No

Christian

Percent of map unit: 5 percent
Hydric soil rating: No

Cw—Cuba silt loam

Map Unit Setting

National map unit symbol: lfz2
Elevation: 390 to 780 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Cuba, occasionally flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cuba, Occasionally Flooded

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed fine-silty alluvium

Typical profile

H1 - 0 to 28 inches: silt loam
H2 - 28 to 64 inches: stratified fine sand to silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 48 to 72 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very high (about 12.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Ecological site: F120AY017KY - Well Drained Silty Alluvium
Hydric soil rating: No

Minor Components

Clifty

Percent of map unit: 4 percent
Hydric soil rating: No

Steff

Percent of map unit: 4 percent
Hydric soil rating: No

Other soils

Percent of map unit: 2 percent
Hydric soil rating: No

DAM—Dam, large

Map Unit Setting

National map unit symbol: 1jxpv
Elevation: 450 to 560 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition

Dam, large: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dam, Large

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8
Hydric soil rating: No

GIC—Gilpin silt loam, 6 to 12 percent slopes (frondorf)

Map Unit Setting

National map unit symbol: lfz3
Elevation: 430 to 920 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Frondorf and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Frondorf

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Thin fine-silty noncalcareous loess over residuum weathered from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 19 inches: silt loam
H2 - 19 to 27 inches: channery loam
R - 27 to 37 inches: unweathered bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Weikert
Percent of map unit: 4 percent
Hydric soil rating: No

Wellston
Percent of map unit: 4 percent
Hydric soil rating: No

Zanesville
Percent of map unit: 4 percent
Hydric soil rating: No

Other soils
Percent of map unit: 3 percent
Hydric soil rating: No

GID—Gilpin silt loam, 12 to 20 percent slopes (frondorf)

Map Unit Setting
National map unit symbol: lfz4
Elevation: 410 to 900 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition
Frondorf and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Frondorf

Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over residuum weathered from sandstone and siltstone and/or shale

Typical profile
H1 - 0 to 19 inches: silt loam
H2 - 19 to 27 inches: channery loam
R - 27 to 37 inches: unweathered bedrock

Properties and qualities
Slope: 12 to 20 percent

Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Zanesville

Percent of map unit: 5 percent
Hydric soil rating: No

Wellston

Percent of map unit: 5 percent
Hydric soil rating: No

Other soils

Percent of map unit: 5 percent
Hydric soil rating: No

Weikert

Percent of map unit: 5 percent
Hydric soil rating: No

GIE—Gilpin silt loam, 20 to 30 percent slopes (frondorf)

Map Unit Setting

National map unit symbol: lfz5
Elevation: 420 to 850 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition

Frondorf and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Frondorf

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over residuum weathered from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 19 inches: silt loam
H2 - 19 to 27 inches: channery loam
R - 27 to 37 inches: unweathered bedrock

Properties and qualities

Slope: 20 to 30 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Wellston

Percent of map unit: 5 percent
Hydric soil rating: No

Shelocta

Percent of map unit: 5 percent
Hydric soil rating: No

Other soils

Percent of map unit: 5 percent
Hydric soil rating: No

Weikert

Percent of map unit: 5 percent
Hydric soil rating: No

GpC3—Gilpin silty clay loam, 6 to 12 percent slopes, severely eroded (frondorf)

Map Unit Setting

National map unit symbol: lfz6
Elevation: 440 to 870 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition

Frondorf, severely eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Frondorf, Severely Eroded

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Thin fine-silty noncalcareous loess over residuum weathered from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 15 inches: silty clay loam
H2 - 15 to 23 inches: channery loam
R - 23 to 33 inches: unweathered bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Zanesville
Percent of map unit: 4 percent
Hydric soil rating: No

Weikert
Percent of map unit: 4 percent
Hydric soil rating: No

Wellston
Percent of map unit: 4 percent
Hydric soil rating: No

Other soils
Percent of map unit: 3 percent
Hydric soil rating: No

GpD3—Gilpin silty clay loam, 12 to 20 percent slopes, severely eroded (frondorf)

Map Unit Setting
National map unit symbol: lfz7
Elevation: 420 to 930 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition
Frondorf, severely eroded, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Frondorf, Severely Eroded

Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over residuum weathered from sandstone and siltstone and/or shale

Typical profile
H1 - 0 to 15 inches: silty clay loam
H2 - 15 to 23 inches: channery loam
R - 23 to 33 inches: unweathered bedrock

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 5 percent
Hydric soil rating: No

Weikert

Percent of map unit: 5 percent
Hydric soil rating: No

Wellston

Percent of map unit: 5 percent
Hydric soil rating: No

Zanesville

Percent of map unit: 5 percent
Hydric soil rating: No

GpE3—Gilpin silty clay loam, 20 to 30 percent slopes, severely eroded (frondorf)

Map Unit Setting

National map unit symbol: lfz8
Elevation: 430 to 890 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition

Frondorf, severely eroded, and similar soils: 80 percent
Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Frondorf, Severely Eroded

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over residuum weathered from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 15 inches: silty clay loam
H2 - 15 to 23 inches: channery loam
R - 23 to 33 inches: unweathered bedrock

Properties and qualities

Slope: 20 to 30 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Weikert

Percent of map unit: 7 percent
Hydric soil rating: No

Wellston

Percent of map unit: 7 percent
Hydric soil rating: No

Other soils

Percent of map unit: 6 percent
Hydric soil rating: No

Gu—Gullied land

Map Unit Setting

National map unit symbol: lfz9
Elevation: 440 to 960 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition

Gullied land: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gullied Land

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Ld—Lindside silt loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2wh4g
Elevation: 310 to 880 feet
Mean annual precipitation: 30 to 60 inches
Mean annual air temperature: 42 to 69 degrees F
Frost-free period: 154 to 221 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Lindside, occasionally flooded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lindside, Occasionally Flooded

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Non-acid fine-silty alluvium

Typical profile

Ap - 0 to 7 inches: silt loam
Bw - 7 to 27 inches: silt loam
C - 27 to 80 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.02 to 1.98 in/hr)
Depth to water table: About 20 to 36 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Ecological site: F120AY019KY - Moist Silty Alluvium
Hydric soil rating: No

Minor Components

Huntington, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Newark, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Steff, occasionally flooded

Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Nolin, occasionally flooded

Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Lindside, frequently flooded

Percent of map unit: 1 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Ne—Newark silt loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2s2cl
Elevation: 310 to 770 feet
Mean annual precipitation: 30 to 56 inches
Mean annual air temperature: 42 to 69 degrees F
Frost-free period: 154 to 221 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Newark, occasionally flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Newark, Occasionally Flooded

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Mixed fine-silty alluvium

Typical profile

Ap - 0 to 7 inches: silt loam
Bg - 7 to 66 inches: silty clay loam
Cg - 66 to 80 inches: loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 6 to 20 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: F120AY019KY - Moist Silty Alluvium
Hydric soil rating: No

Minor Components

Nolin, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Lindside, occasionally flooded

Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Melvin, ocassionally flooded

Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: Yes

Newark, frequent(hydric)

Percent of map unit: 1 percent
Landform: Sloughs on flood plains
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: Yes

No—Nolin silt loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2qykn
Elevation: 300 to 810 feet

Mean annual precipitation: 35 to 56 inches
Mean annual air temperature: 42 to 69 degrees F
Frost-free period: 154 to 221 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Nolin, occasionally flooded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nolin, Occasionally Flooded

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed fine-silty alluvium

Typical profile

Ap - 0 to 9 inches: silt loam
Bw - 9 to 48 inches: silt loam
C - 48 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Ecological site: F120AY018KY - Riverbank Loamy Alluvium
Other vegetative classification: Well Drained Bottomland Soils (PHG-1)
Hydric soil rating: No

Minor Components

Lindside, occasionally flooded

Percent of map unit: 10 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Newark, occasionally flooded

Percent of map unit: 3 percent
Landform: Flood plains

Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Nolin, frequent(hydric)
Percent of map unit: 1 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Huntington, occasionally flooded
Percent of map unit: 1 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

RaE3—Ramsey loam, 10 to 30 percent slopes, severely eroded

Map Unit Setting
National map unit symbol: lfzj
Elevation: 460 to 820 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition
Ramsey, severely eroded, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ramsey, Severely Eroded

Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy residuum weathered from sandstone and siltstone

Typical profile
H1 - 0 to 5 inches: loam
H2 - 5 to 15 inches: gravelly fine sandy loam
R - 15 to 25 inches: unweathered bedrock

Properties and qualities

Slope: 10 to 30 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: F120AY006KY - Shallow Sandstone Uplands
Hydric soil rating: No

Minor Components

Frondorf

Percent of map unit: 8 percent
Hydric soil rating: No

Weikert

Percent of map unit: 8 percent
Hydric soil rating: No

Other soils

Percent of map unit: 4 percent
Hydric soil rating: No

SaA—Sadler silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2vtzn
Elevation: 380 to 890 feet
Mean annual precipitation: 38 to 58 inches
Mean annual air temperature: 42 to 69 degrees F
Frost-free period: 154 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Sadler and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sadler

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 7 inches: silt loam
Bt - 7 to 20 inches: silt loam
E/B - 20 to 24 inches: silt loam
2Btx - 24 to 62 inches: silt loam
2C - 62 to 76 inches: very gravelly fine sandy loam
2R - 76 to 86 inches: bedrock

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 22 to 31 inches to fragipan; 72 to 80 inches to lithic bedrock
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.13 in/hr)
Depth to water table: About 19 to 28 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F120AY002KY - Fragipan Uplands
Hydric soil rating: No

Minor Components

Zanesville

Percent of map unit: 7 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Robbs

Percent of map unit: 4 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave

Across-slope shape: Linear
Hydric soil rating: No

Wellston

Percent of map unit: 4 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

SaB—Sadler silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2vtzl
Elevation: 360 to 990 feet
Mean annual precipitation: 30 to 58 inches
Mean annual air temperature: 44 to 69 degrees F
Frost-free period: 157 to 213 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Sadler and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sadler

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 7 inches: silt loam
Bt - 7 to 20 inches: silt loam
E/B - 20 to 24 inches: silt loam
2Btx - 24 to 62 inches: silt loam
2C - 62 to 76 inches: very gravelly fine sandy loam
2R - 76 to 86 inches: bedrock

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 22 to 31 inches to fragipan; 72 to 80 inches to lithic bedrock
Drainage class: Moderately well drained

Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.13 in/hr)
Depth to water table: About 19 to 28 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: F120AY002KY - Fragipan Uplands
Hydric soil rating: No

Minor Components

Zanesville

Percent of map unit: 7 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Robbs

Percent of map unit: 4 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Wellston

Percent of map unit: 4 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

ShC—Shelocta gravelly silt loam, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: lfzs
Elevation: 420 to 830 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F

Frost-free period: 157 to 198 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Shelocta and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Shelocta

Setting

Landform: Hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Mixed fine-loamy colluvium derived from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 7 inches: gravelly silt loam
H2 - 7 to 52 inches: gravelly silty clay loam
H3 - 52 to 60 inches: channery silt loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Wellston

Percent of map unit: 6 percent
Hydric soil rating: No

Zanesville

Percent of map unit: 6 percent
Hydric soil rating: No

Other soils

Percent of map unit: 3 percent
Hydric soil rating: No

ShD—Shelocta gravelly silt loam, 12 to 20 percent slopes

Map Unit Setting

National map unit symbol: lfzt
Elevation: 450 to 900 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition

Shelocta and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Shelocta

Setting

Landform: Hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-loamy colluvium derived from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 7 inches: gravelly silt loam
H2 - 7 to 52 inches: gravelly silty clay loam
H3 - 52 to 60 inches: channery silt loam

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Wellston
Percent of map unit: 7 percent
Hydric soil rating: No

Frondorf
Percent of map unit: 7 percent
Hydric soil rating: No

Other soils
Percent of map unit: 6 percent
Hydric soil rating: No

ShD3—Shelocta gravelly silt loam, 12 to 20 percent slopes, severely eroded

Map Unit Setting
National map unit symbol: lfzv
Elevation: 450 to 770 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition
Shelocta, severely eroded, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Shelocta, Severely Eroded

Setting
Landform: Hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-loamy colluvium derived from sandstone and siltstone and/or shale

Typical profile
H1 - 0 to 6 inches: gravelly silt loam
H2 - 6 to 45 inches: gravelly silty clay loam
H3 - 45 to 53 inches: channery silt loam

Properties and qualities
Slope: 12 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Wellston

Percent of map unit: 7 percent
Hydric soil rating: No

Frondorf

Percent of map unit: 7 percent
Hydric soil rating: No

Other soils

Percent of map unit: 6 percent
Hydric soil rating: No

Ss—Steff silt loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2wlvp
Elevation: 350 to 820 feet
Mean annual precipitation: 40 to 58 inches
Mean annual air temperature: 42 to 69 degrees F
Frost-free period: 154 to 212 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Steff, occasionally flooded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Steff, Occasionally Flooded

Setting

Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Acid fine-silty alluvium

Typical profile

Ap - 0 to 7 inches: silt loam
Bw - 7 to 23 inches: silt loam
Bg - 23 to 48 inches: silt loam
Cg - 48 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 20 to 39 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very high (about 13.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: F120AY019KY - Moist Silty Alluvium
Hydric soil rating: No

Minor Components

Lindside, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Stendal, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Cuba, occasionally flooded

Percent of map unit: 3 percent
Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Bonnie, occasionally flooded

Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Dip

Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: Yes

St—Stendal silt loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2wh44
Elevation: 370 to 830 feet
Mean annual precipitation: 40 to 58 inches
Mean annual air temperature: 42 to 69 degrees F
Frost-free period: 154 to 212 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Stendal, occasionally flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Stendal, Occasionally Flooded

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Acid fine-silty alluvium

Typical profile

Ap - 0 to 8 inches: silt loam
Bw - 8 to 18 inches: silt loam
Bg - 18 to 40 inches: silt loam
Cg - 40 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 12 to 20 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very high (about 13.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: F120AY019KY - Moist Silty Alluvium

Hydric soil rating: No

Minor Components

Steff, occasionally flooded
Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Cuba, occasionally flooded
Percent of map unit: 3 percent
Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Bonnie, occasionally flooded
Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: Yes

Newark, occasionally flooded
Percent of map unit: 1 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

W—Water

Map Unit Setting
National map unit symbol: lfzy
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition
Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

WcE—Weikert channery silt loam, 12 to 30 percent slopes

Map Unit Setting

National map unit symbol: lfzz
Elevation: 440 to 900 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition

Weikert and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Weikert

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-loamy residuum weathered from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 6 inches: channery silt loam
H2 - 6 to 17 inches: very channery silt loam
Cr - 17 to 27 inches: weathered bedrock

Properties and qualities

Slope: 12 to 30 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: F120AY006KY - Shallow Sandstone Uplands
Hydric soil rating: No

Minor Components

Ramsey
Percent of map unit: 4 percent
Hydric soil rating: No

Caneyville
Percent of map unit: 4 percent
Hydric soil rating: No

Frondorf
Percent of map unit: 4 percent
Hydric soil rating: No

Other soils
Percent of map unit: 4 percent
Hydric soil rating: No

Shelocta
Percent of map unit: 4 percent
Hydric soil rating: No

WcE3—Weikert channery silt loam, 12 to 30 percent slopes, severely eroded

Map Unit Setting
National map unit symbol: lg00
Elevation: 440 to 950 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition
Weikert, severely eroded, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Weikert, Severely Eroded

Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-loamy residuum weathered from sandstone and siltstone and/or shale

Typical profile
H1 - 0 to 5 inches: channery silt loam

H2 - 5 to 13 inches: very channery silt loam
Cr - 13 to 23 inches: weathered bedrock

Properties and qualities

Slope: 12 to 30 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: F120AY006KY - Shallow Sandstone Uplands
Hydric soil rating: No

Minor Components

Ramsey

Percent of map unit: 4 percent
Hydric soil rating: No

Shelocta

Percent of map unit: 4 percent
Hydric soil rating: No

Other soils

Percent of map unit: 4 percent
Hydric soil rating: No

Frondorf

Percent of map unit: 4 percent
Hydric soil rating: No

Caneyville

Percent of map unit: 4 percent
Hydric soil rating: No

WgE—Weikert-Ramsey-Gilpin stony complex, 20 to 30 percent slopes

Map Unit Setting

National map unit symbol: lg01
Elevation: 420 to 930 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days

Farmland classification: Not prime farmland

Map Unit Composition

Weikert, stony, and similar soils: 50 percent
Ramsey, stony, and similar soils: 20 percent
Gilpin, stony, and similar soils: 15 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Weikert, Stony

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-loamy residuum weathered from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 6 inches: stony silt loam
H2 - 6 to 17 inches: very channery silt loam
Cr - 17 to 27 inches: weathered bedrock

Properties and qualities

Slope: 20 to 30 percent
Surface area covered with cobbles, stones or boulders: 0.1 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F120AY006KY - Shallow Sandstone Uplands
Hydric soil rating: No

Description of Ramsey, Stony

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy residuum weathered from sandstone

Typical profile

H1 - 0 to 6 inches: loam

H2 - 6 to 18 inches: stony fine sandy loam
R - 18 to 28 inches: unweathered bedrock

Properties and qualities

Slope: 20 to 30 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F120AY006KY - Shallow Sandstone Uplands
Hydric soil rating: No

Description of Gilpin, Stony

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-loamy residuum weathered from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 6 inches: stony silt loam
H2 - 6 to 19 inches: channery silt loam
H3 - 19 to 27 inches: channery loam
R - 27 to 37 inches: unweathered bedrock

Properties and qualities

Slope: 20 to 30 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Rarden
Percent of map unit: 4 percent
Hydric soil rating: No

Caneyville
Percent of map unit: 4 percent
Hydric soil rating: No

Shelocta
Percent of map unit: 4 percent
Hydric soil rating: No

Other soils
Percent of map unit: 3 percent
Hydric soil rating: No

WgE3—Weikert-Ramsey-Gilpin stony complex, 20 to 30 percent slopes, severely eroded

Map Unit Setting
National map unit symbol: lg02
Elevation: 420 to 890 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition
Weikert, stony, severely eroded, and similar soils: 50 percent
Ramsey, stony, severely eroded, and similar soils: 20 percent
Gilpin, stony, severely eroded, and similar soils: 15 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Weikert, Stony, Severely Eroded

Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-loamy residuum weathered from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 5 inches: stony silt loam
H2 - 5 to 13 inches: very channery silt loam
Cr - 13 to 23 inches: weathered bedrock

Properties and qualities

Slope: 20 to 30 percent
Surface area covered with cobbles, stones or boulders: 0.1 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F120AY006KY - Shallow Sandstone Uplands
Hydric soil rating: No

Description of Ramsey, Stony, Severely Eroded

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy residuum weathered from sandstone

Typical profile

H1 - 0 to 5 inches: loam
H2 - 5 to 15 inches: stony fine sandy loam
R - 15 to 25 inches: unweathered bedrock

Properties and qualities

Slope: 20 to 30 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F120AY006KY - Shallow Sandstone Uplands

Hydric soil rating: No

Description of Gilpin, Stony, Severely Eroded

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-loamy residuum weathered from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 2 inches: stony silt loam
H2 - 2 to 15 inches: channery silt loam
H3 - 15 to 23 inches: channery loam
R - 23 to 33 inches: unweathered bedrock

Properties and qualities

Slope: 20 to 30 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Shelocta

Percent of map unit: 4 percent
Hydric soil rating: No

Rarden

Percent of map unit: 4 percent
Hydric soil rating: No

Caneyville

Percent of map unit: 4 percent
Hydric soil rating: No

Other soils

Percent of map unit: 3 percent
Hydric soil rating: No

WgF—Weikert-Ramsey-Gilpin stony complex, 30 to 50 percent slopes

Map Unit Setting

National map unit symbol: lg03
Elevation: 420 to 970 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition

Weikert, stony, and similar soils: 50 percent
Ramsey, stony, and similar soils: 20 percent
Gilpin, stony, and similar soils: 15 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Weikert, Stony

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-loamy residuum weathered from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 6 inches: stony silt loam
H2 - 6 to 17 inches: very channery silt loam
Cr - 17 to 27 inches: weathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Surface area covered with cobbles, stones or boulders: 0.1 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F120AY006KY - Shallow Sandstone Uplands
Hydric soil rating: No

Description of Ramsey, Stony

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy residuum weathered from sandstone

Typical profile

H1 - 0 to 6 inches: loam
H2 - 6 to 18 inches: stony fine sandy loam
R - 18 to 28 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F120AY006KY - Shallow Sandstone Uplands
Hydric soil rating: No

Description of Gilpin, Stony

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-loamy residuum weathered from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 6 inches: stony silt loam
H2 - 6 to 19 inches: channery silt loam
H3 - 19 to 27 inches: channery loam
R - 27 to 37 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Caneyville

Percent of map unit: 4 percent
Hydric soil rating: No

Rarden

Percent of map unit: 4 percent
Hydric soil rating: No

Shelocta

Percent of map unit: 4 percent
Hydric soil rating: No

Other soils

Percent of map unit: 3 percent
Hydric soil rating: No

WIC—Wellston silt loam, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: 2vtzy
Elevation: 330 to 1,160 feet
Mean annual precipitation: 30 to 60 inches
Mean annual air temperature: 44 to 68 degrees F
Frost-free period: 157 to 215 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Wellston and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wellston

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 7 inches: silt loam
Bt - 7 to 35 inches: silt loam
2C - 35 to 60 inches: fine sandy loam
2R - 60 to 70 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 40 to 72 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.13 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F120AY004KY - Loess Veneered Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Zanesville

Percent of map unit: 4 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Frondorf

Percent of map unit: 3 percent
Landform: Ridges
Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Lenberg

Percent of map unit: 3 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Deep Well Drained Upland Soils >12% (PHG-6)
Hydric soil rating: No

WID—Wellston silt loam, 12 to 20 percent slopes

Map Unit Setting

National map unit symbol: 2wh3r
Elevation: 350 to 830 feet
Mean annual precipitation: 30 to 55 inches
Mean annual air temperature: 44 to 69 degrees F
Frost-free period: 157 to 215 days
Farmland classification: Not prime farmland

Map Unit Composition

Wellston and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wellston

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 7 inches: silt loam
Bt - 7 to 35 inches: silt loam
2C - 35 to 60 inches: fine sandy loam
2R - 60 to 70 inches: bedrock

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 40 to 72 inches to lithic bedrock
Drainage class: Well drained

Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.13 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.8 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F120AY004KY - Loess Veneered Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Lenberg
Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Deep Well Drained Upland Soils >12% (PHG-6)
Hydric soil rating: No

Zanesville
Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Frondorf
Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

WnC3—Wellston silty clay loam, 6 to 12 percent slopes, severely eroded

Map Unit Setting
National map unit symbol: 2wh59
Elevation: 360 to 970 feet
Mean annual precipitation: 37 to 57 inches

Mean annual air temperature: 44 to 69 degrees F
Frost-free period: 157 to 215 days
Farmland classification: Not prime farmland

Map Unit Composition

Wellston, severely eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wellston, Severely Eroded

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 3 inches: silty clay loam
Bt - 3 to 42 inches: silty clay loam
2C - 42 to 64 inches: clay loam
2R - 64 to 74 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 39 to 78 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F120AY004KY - Loess Veneered Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Frondorf, severely eroded

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Zanesville, severely eroded

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

WnD3—Wellston silty clay loam, 12 to 20 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: lg08
Elevation: 420 to 920 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition

Wellston, severely eroded, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wellston, Severely Eroded

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over residuum weathered from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 5 inches: silty clay loam
H2 - 5 to 25 inches: silty clay loam
H3 - 25 to 41 inches: channery clay loam
R - 41 to 51 inches: unweathered bedrock

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: F120AY004KY - Loess Veneered Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Other soils
Percent of map unit: 5 percent
Hydric soil rating: No

Shelocta
Percent of map unit: 3 percent
Hydric soil rating: No

Frondorf
Percent of map unit: 3 percent
Hydric soil rating: No

Ramsey
Percent of map unit: 3 percent
Hydric soil rating: No

Weikert
Percent of map unit: 3 percent
Hydric soil rating: No

Zanesville
Percent of map unit: 3 percent
Hydric soil rating: No

WsD3—Wellston silty clay loam, clayey subsoil variant, 12 to 20 percent slopes, severely eroded (rosine)

Map Unit Setting
National map unit symbol: lg0d
Elevation: 420 to 800 feet
Mean annual precipitation: 42 to 54 inches
Mean annual air temperature: 44 to 67 degrees F
Frost-free period: 157 to 198 days
Farmland classification: Not prime farmland

Map Unit Composition
Rosine, severely eroded, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rosine, Severely Eroded

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 4 inches: silty clay loam
H2 - 4 to 18 inches: silty clay loam
H3 - 18 to 47 inches: silty clay
H4 - 47 to 66 inches: channery silty clay loam
Cr - 66 to 76 inches: weathered bedrock

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 40 to 80 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F120AY004KY - Loess Veneered Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Frondorf

Percent of map unit: 5 percent
Hydric soil rating: No

Other soils

Percent of map unit: 5 percent
Hydric soil rating: No

Rarden

Percent of map unit: 5 percent
Hydric soil rating: No

Shelocta

Percent of map unit: 5 percent
Hydric soil rating: No

ZaB—Zanesville silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2s2cp
Elevation: 350 to 670 feet
Mean annual precipitation: 30 to 60 inches
Mean annual air temperature: 44 to 69 degrees F
Frost-free period: 157 to 213 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Zanesville and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Zanesville

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 7 inches: silt loam
Bt - 7 to 31 inches: silt loam
Btx - 31 to 39 inches: silty clay loam
2C - 39 to 68 inches: silty clay loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 24 to 32 inches to fragipan
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 21 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F120AY002KY - Fragipan Uplands
Hydric soil rating: No

Minor Components

Hosmer

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Sadler

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Wellston

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

ZaC—Zanesville silt loam, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: 2s2cr
Elevation: 330 to 910 feet
Mean annual precipitation: 30 to 61 inches
Mean annual air temperature: 44 to 70 degrees F
Frost-free period: 168 to 212 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Zanesville and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Zanesville

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope

Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and siltstone

Typical profile

Ap - 0 to 8 inches: silt loam
Bt - 8 to 30 inches: silt loam
Btx - 30 to 50 inches: silt loam
2C - 50 to 70 inches: clay loam
R - 70 to 80 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 24 to 32 inches to fragipan; 40 to 79 inches to lithic bedrock
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.13 in/hr)
Depth to water table: About 21 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F120AY002KY - Fragipan Uplands
Hydric soil rating: No

Minor Components

Hosmer

Percent of map unit: 5 percent
Landform: Loess hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Moderately Well Drained Soils With a Fragipan (PHG-11)
Hydric soil rating: No

Wellston

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Sadler

Percent of map unit: 5 percent
Landform: Ridges

Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

ZcC3—Zanesville silt loam, 6 to 12 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: 2s2ct
Elevation: 320 to 970 feet
Mean annual precipitation: 30 to 61 inches
Mean annual air temperature: 42 to 70 degrees F
Frost-free period: 154 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Zanesville, severely eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Zanesville, Severely Eroded

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and siltstone

Typical profile

Ap - 0 to 4 inches: silt loam
Bt - 4 to 23 inches: silt loam
Btx - 23 to 34 inches: silty clay loam
2C - 34 to 56 inches: clay loam
R - 56 to 66 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 20 to 28 inches to fragipan; 38 to 75 inches to lithic bedrock
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.13 in/hr)
Depth to water table: About 17 to 26 inches
Frequency of flooding: None
Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C/D
Ecological site: F120AY002KY - Fragipan Uplands
Hydric soil rating: No

Minor Components

Wellston, severely eroded

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hosmer, severely eroded

Percent of map unit: 5 percent
Landform: Loess hills
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Severely Eroded Soils (PHG-10)
Hydric soil rating: No

Sadler, eroded

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Hardin and Larue Counties, Kentucky

AlD—Allegheny-Lenberg-Caneyville complex, 12 to 20 percent slopes

Map Unit Setting

National map unit symbol: lhcy
Elevation: 380 to 1,060 feet
Mean annual precipitation: 44 to 58 inches
Mean annual air temperature: 46 to 68 degrees F
Frost-free period: 165 to 205 days
Farmland classification: Not prime farmland

Map Unit Composition

Allegheny and similar soils: 40 percent
Lenberg and similar soils: 22 percent
Caneyville and similar soils: 20 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Allegheny

Setting

Landform: Stream terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Fine-loamy colluvium derived from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 6 inches: loam
H2 - 6 to 33 inches: clay loam
H3 - 33 to 50 inches: sandy loam
R - 50 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F120AY010KY - Well-Drained High Terraces
Hydric soil rating: No

Description of Lenberg

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey residuum weathered from acid shale

Typical profile

H1 - 0 to 11 inches: silt loam
H2 - 11 to 25 inches: clay
H3 - 25 to 34 inches: channery clay
Cr - 34 to 44 inches: weathered bedrock

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Hydric soil rating: No

Description of Caneyville

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey residuum weathered from limestone

Typical profile

H1 - 0 to 6 inches: silt loam
H2 - 6 to 31 inches: clay
R - 31 to 41 inches: unweathered bedrock

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F122XY005KY - Moderately Deep Well Drained Uplands
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 15 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 3 percent
Hydric soil rating: No

CnD—Caneyville-Rock outcrop complex, 6 to 20 percent slopes

Map Unit Setting

National map unit symbol: lhd0
Elevation: 380 to 1,060 feet
Mean annual precipitation: 44 to 58 inches
Mean annual air temperature: 46 to 68 degrees F
Frost-free period: 165 to 205 days
Farmland classification: Not prime farmland

Map Unit Composition

Caneyville and similar soils: 65 percent
Rock outcrop: 20 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Caneyville

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey residuum weathered from limestone

Typical profile

H1 - 0 to 5 inches: silt loam
H2 - 5 to 34 inches: clay
R - 34 to 44 inches: unweathered bedrock

Properties and qualities

Slope: 6 to 20 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F122XY005KY - Moderately Deep Well Drained Uplands
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Free face
Parent material: Limestone

Typical profile

R - 0 to 60 inches: unweathered bedrock

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 15 percent
Hydric soil rating: No

CnE—Caneyville-Rock outcrop complex, 20 to 30 percent slopes

Map Unit Setting

National map unit symbol: lhd1

Elevation: 380 to 1,060 feet
Mean annual precipitation: 44 to 58 inches
Mean annual air temperature: 46 to 68 degrees F
Frost-free period: 165 to 205 days
Farmland classification: Not prime farmland

Map Unit Composition

Caneyville and similar soils: 65 percent
Rock outcrop: 20 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Caneyville

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey residuum weathered from limestone

Typical profile

H1 - 0 to 5 inches: silt loam
H2 - 5 to 34 inches: clay
R - 34 to 44 inches: unweathered bedrock

Properties and qualities

Slope: 20 to 30 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F122XY005KY - Moderately Deep Well Drained Uplands
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Free face
Parent material: Limestone

Typical profile

R - 0 to 60 inches: unweathered bedrock

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 15 percent
Hydric soil rating: No

FrD—Frondorf-Lenberg silt loams, 12 to 20 percent slopes

Map Unit Setting

National map unit symbol: lhdg
Elevation: 380 to 1,060 feet
Mean annual precipitation: 44 to 58 inches
Mean annual air temperature: 46 to 68 degrees F
Frost-free period: 165 to 205 days
Farmland classification: Not prime farmland

Map Unit Composition

Frondorf and similar soils: 60 percent
Lenberg and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Frondorf

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Thin fine-loamy noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

H1 - 0 to 20 inches: silt loam
H2 - 20 to 33 inches: gravelly silt loam
R - 33 to 43 inches: unweathered bedrock

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F120AY004KY - Loess Veneered Sandstone-Shale Uplands
Hydric soil rating: No

Description of Lenberg

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey residuum weathered from acid shale

Typical profile

H1 - 0 to 11 inches: silt loam
H2 - 11 to 25 inches: clay
H3 - 25 to 37 inches: channery clay
Cr - 37 to 47 inches: weathered bedrock

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Wellston

Percent of map unit: 4 percent
Hydric soil rating: No

Steinsburg

Percent of map unit: 4 percent
Hydric soil rating: No

Other soils

Percent of map unit: 2 percent
Hydric soil rating: No

HnC—Hagerstown silt loam, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: 2z8yt
Elevation: 380 to 1,060 feet
Mean annual precipitation: 44 to 58 inches
Mean annual air temperature: 46 to 68 degrees F
Frost-free period: 165 to 205 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hagerstown and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hagerstown

Setting

Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Clayey residuum weathered from limestone

Typical profile

Ap - 0 to 6 inches: silt loam
Bt1 - 6 to 13 inches: silty clay loam
Bt2 - 13 to 48 inches: clay
R - 48 to 58 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 40 to 62 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Available water supply, 0 to 60 inches: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F122XY002KY - Deep Well Drained Limestone Uplands
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Caneyville

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F122XY002KY - Deep Well Drained Limestone Uplands
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Crider

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F122XY004KY - Loess Veneered Uplands
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Wilbur, frequently ponded, depression

Percent of map unit: 5 percent
Landform: Sinkholes
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F122XY017KY - Moist Alluvium
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Nb—Newark silt loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2s2cf
Elevation: 390 to 960 feet
Mean annual precipitation: 40 to 66 inches
Mean annual air temperature: 42 to 68 degrees F

Frost-free period: 139 to 205 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Newark, frequently flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Newark, Frequently Flooded

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Mixed fine-silty alluvium

Typical profile

Ap - 0 to 8 inches: silt loam
Bg - 8 to 55 inches: silty clay loam
Cg - 55 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 6 to 20 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Ecological site: F122XY017KY - Moist Alluvium
Hydric soil rating: No

Minor Components

Nolin, frequently flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Lindside, frequently flooded

Percent of map unit: 3 percent
Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear

Across-slope shape: Linear
Hydric soil rating: No

Melvin, frequently flooded
Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: Yes

No—Nolin silt loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting
National map unit symbol: 2s2cx
Elevation: 380 to 970 feet
Mean annual precipitation: 43 to 62 inches
Mean annual air temperature: 42 to 68 degrees F
Frost-free period: 145 to 205 days
Farmland classification: Prime farmland if protected from flooding or not frequently flooded during the growing season

Map Unit Composition
Nolin, frequently flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nolin, Frequently Flooded

Setting
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed fine-silty alluvium

Typical profile
Ap - 0 to 8 inches: silt loam
Bw - 8 to 72 inches: silt loam
C - 72 to 85 inches: loam

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Ecological site: F122XY016KY - Riverbank Loamy Alluvium
Hydric soil rating: No

Minor Components

Newark, frequently flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Sensabaugh, frequently flooded

Percent of map unit: 3 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Melvin, frequently flooded

Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: Yes

RaE—Ramsey-Steinsburg-Allegheny complex, 20 to 40 percent slopes

Map Unit Setting

National map unit symbol: lhf6
Elevation: 380 to 1,060 feet
Mean annual precipitation: 44 to 58 inches
Mean annual air temperature: 46 to 68 degrees F
Frost-free period: 165 to 205 days
Farmland classification: Not prime farmland

Map Unit Composition

Ramsey and similar soils: 40 percent
Steinsburg and similar soils: 20 percent
Allegheny and similar soils: 15 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ramsey

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy residuum weathered from sandstone

Typical profile

H1 - 0 to 5 inches: fine sandy loam
H2 - 5 to 16 inches: gravelly loam
R - 16 to 26 inches: unweathered bedrock

Properties and qualities

Slope: 20 to 40 percent
Depth to restrictive feature: 12 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: F120AY006KY - Shallow Sandstone Uplands
Hydric soil rating: No

Description of Steinsburg

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy residuum weathered from sandstone

Typical profile

H1 - 0 to 7 inches: fine sandy loam
H2 - 7 to 18 inches: sandy loam
H3 - 18 to 35 inches: channery sandy loam
R - 35 to 45 inches: unweathered bedrock

Properties and qualities

Slope: 20 to 40 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Hydric soil rating: No

Description of Allegheny

Setting

Landform: Stream terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Fine-loamy colluvium derived from sandstone and siltstone and/or shale

Typical profile

H1 - 0 to 6 inches: loam
H2 - 6 to 33 inches: clay loam
H3 - 33 to 50 inches: sandy loam
R - 50 to 54 inches: unweathered bedrock

Properties and qualities

Slope: 20 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: F120AY010KY - Well-Drained High Terraces
Hydric soil rating: No

Minor Components

Wellston

Percent of map unit: 7 percent
Hydric soil rating: No

Caneyville

Percent of map unit: 7 percent
Hydric soil rating: No

Lenberg
Percent of map unit: 7 percent
Hydric soil rating: No

Other soils
Percent of map unit: 4 percent
Hydric soil rating: No

W—Water

Map Unit Setting
National map unit symbol: lhfs
Elevation: 380 to 1,060 feet
Mean annual precipitation: 44 to 58 inches
Mean annual air temperature: 46 to 68 degrees F
Frost-free period: 165 to 205 days
Farmland classification: Not prime farmland

Map Unit Composition
Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

WlB—Wellston silt loam, 2 to 6 percent slopes

Map Unit Setting
National map unit symbol: 2wlvj
Elevation: 380 to 960 feet
Mean annual precipitation: 30 to 60 inches
Mean annual air temperature: 44 to 69 degrees F
Frost-free period: 157 to 215 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Wellston and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wellston

Setting
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex

Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 8 inches: silt loam
Bt - 8 to 40 inches: silt loam
2C - 40 to 52 inches: loam
2R - 52 to 62 inches: bedrock

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 40 to 72 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.13 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F120AY004KY - Loess Veneered Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Zanesville

Percent of map unit: 4 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Frondorf

Percent of map unit: 3 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Lenberg

Percent of map unit: 3 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Deep Well Drained Upland Soils >12% (PHG-6)

Hydric soil rating: No

WIC—Wellston silt loam, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: 2vtzy
Elevation: 330 to 1,160 feet
Mean annual precipitation: 30 to 60 inches
Mean annual air temperature: 44 to 68 degrees F
Frost-free period: 157 to 215 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Wellston and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wellston

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 7 inches: silt loam
Bt - 7 to 35 inches: silt loam
2C - 35 to 60 inches: fine sandy loam
2R - 60 to 70 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 40 to 72 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.13 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F120AY004KY - Loess Veneered Sandstone-Shale Uplands

Hydric soil rating: No

Minor Components

Zanesville

Percent of map unit: 4 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Frondorf

Percent of map unit: 3 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Lenberg

Percent of map unit: 3 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Deep Well Drained Upland Soils >12% (PHG-6)
Hydric soil rating: No

WIC3—Wellston silt loam, 6 to 12 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: 2wv4t
Elevation: 360 to 940 feet
Mean annual precipitation: 30 to 58 inches
Mean annual air temperature: 41 to 69 degrees F
Frost-free period: 141 to 212 days
Farmland classification: Not prime farmland

Map Unit Composition

Wellston, severely eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wellston, Severely Eroded

Setting

Landform: Ridges

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 2 inches: silt loam
Bt - 2 to 40 inches: silt loam
2C - 40 to 52 inches: loam
2R - 52 to 62 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 40 to 69 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F120BY007IN - Deep Well Drained Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Rosine, severely eroded

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Zanesville, severely eroded

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Gilpin, severely eroded

Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope

Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Lenberg, severely eroded

Percent of map unit: 2 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Deep Well Drained Upland Soils >12% (PHG-6)
Hydric soil rating: No

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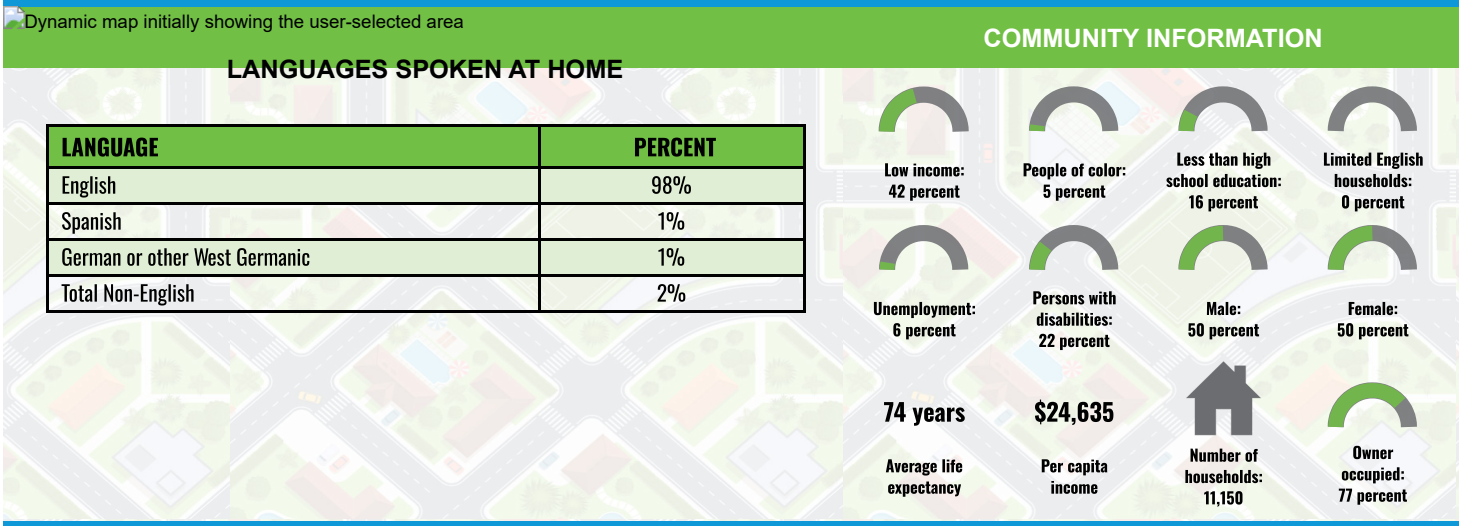
EJScreen Community Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

Breckinridge County, KY

15 miles Ring Centered at 37.590083,-86.445873
Population: 30,800
Area in square miles: 706.66



LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
English	98%
Spanish	1%
German or other West Germanic	1%
Total Non-English	2%

COMMUNITY INFORMATION

- Low income: 42 percent
- People of color: 5 percent
- Less than high school education: 16 percent
- Limited English households: 0 percent
- Unemployment: 6 percent
- Persons with disabilities: 22 percent
- Male: 50 percent
- Female: 50 percent
- 74 years — Average life expectancy
- $24,635 — Per capita income
- Number of households: 11,150
- Owner occupied: 77 percent

BREAKDOWN BY RACE

- White: 95%
- Black: 1%
- American Indian: 0%
- Asian: 0%
- Hawaiian/Pacific Islander: 0%
- Other race: 0%
- Two or more races: 3%
- Hispanic: 2%

BREAKDOWN BY AGE

From Ages 1 to 4	7%
From Ages 1 to 18	24%
From Ages 18 and up	76%
From Ages 65 and up	18%

LIMITED ENGLISH SPEAKING BREAKDOWN

Speak Spanish	64%
Speak Other Indo-European Languages	36%
Speak Asian-Paci c Island Languages	0%
Speak Other Languages	0%

Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race.
Source: U.S. Census Bureau, American Community Survey (ACS) 2017 -2021. Life expectancy data comes from the Centers for Disease Control.

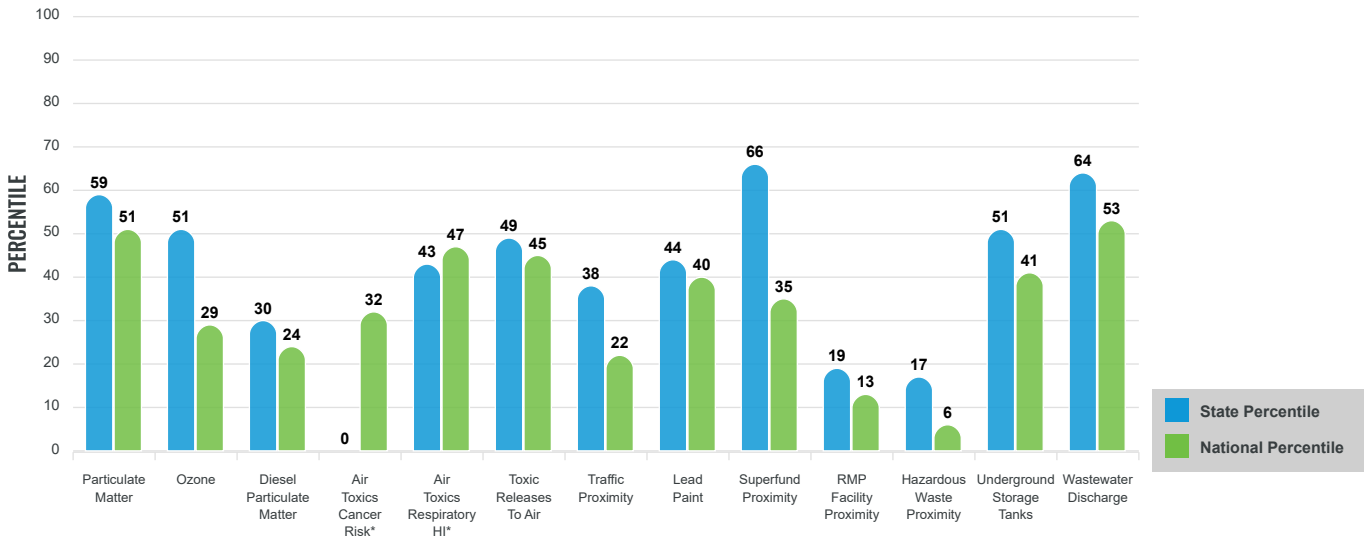
Environmental Justice & Supplemental Indexes

The environmental justice and supplemental indexes are a combination of environmental and socioeconomic information. There are thirteen EJ indexes and supplemental indexes in EJScreen re ecting the 13 environmental indicators. The indexes for a selected area are compared to those for all other locations in the state or nation. For more information and calculation details on the EJ and supplemental indexes, please visit the EJScreen website.

EJ INDEXES

The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low income and people of color populations with a single environmental indicator.

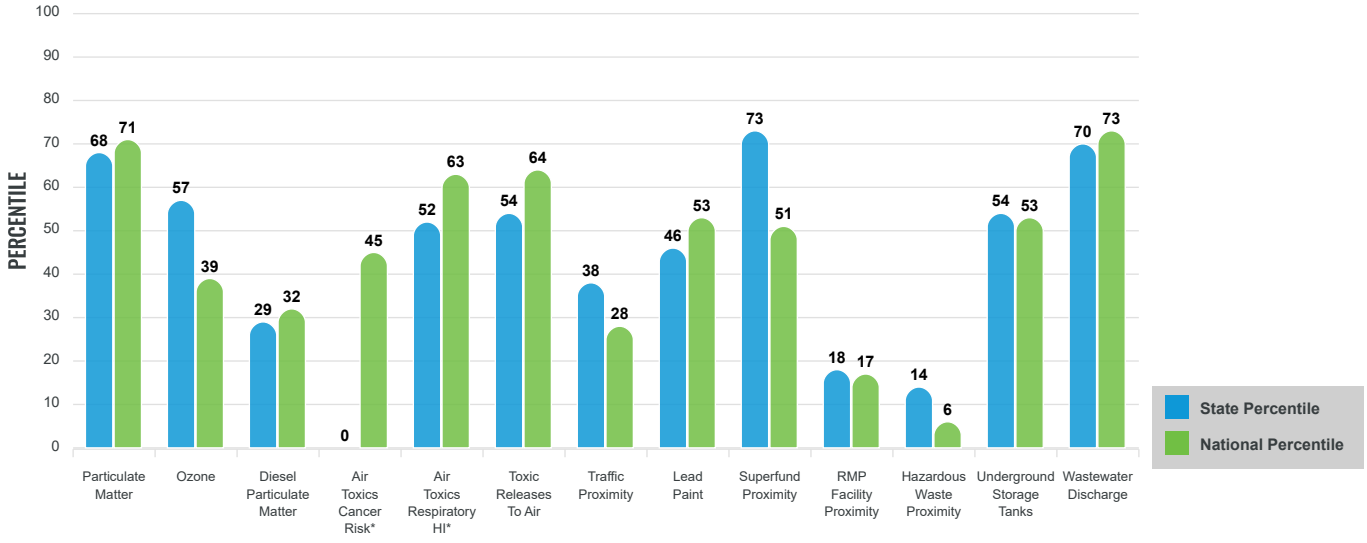
EJ INDEXES FOR THE SELECTED LOCATION



SUPPLEMENTAL INDEXES

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low-income, percent linguistically isolated, percent less than high school education, percent unemployed, and low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



These percentiles provide perspective on how the selected block group or buffer area compares to the entire state or nation.

Report for 15 miles Ring Centered at 37.590083,-86.445873

EJScreen Environmental and Socioeconomic Indicators Data

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter (µg/m^3)	8.35	8.54	47	8.08	54
Ozone (ppb)	58	59.3	43	61.6	24
Diesel Particulate Matter (µg/m^3)	0.105	0.203	21	0.261	18
Air Toxics Cancer Risk* (lifetime risk per million)	20	26	0	25	5
Air Toxics Respiratory HI*	0.3	0.32	2	0.31	31
Toxic Releases to Air	890	7,500	44	4,600	57
Tra c Proximity (daily tra c count/distance to road)	19	78	42	210	23
Lead Paint (% Pre-1960 Housing)	0.13	0.24	40	0.3	39
Superfund Proximity (site count/km distance)	0.036	0.039	64	0.13	33
RMP Facility Proximity (facility count/km distance)	0.044	0.33	15	0.43	8
Hazardous Waste Proximity (facility count/km distance)	0.03	0.78	13	1.9	4
Underground Storage Tanks (count/km^2)	0.42	1.1	52	3.9	37
Wastewater Discharge (toxicity-weighted concentration/m distance)	1.6	0.48	97	22	92
SOCIOECONOMIC INDICATORS					
Demographic Index	23%	26%	49	35%	39
Supplemental Demographic Index	17%	16%	60	14%	70
People of Color	5%	16%	37	39%	13
Low Income	42%	37%	59	31%	71
Unemployment Rate	5%	6%	61	6%	61
Limited English Speaking Households	0%	1%	0	5%	0
Less Than High School Education	16%	13%	65	12%	73
Under Age 5	7%	6%	66	6%	67
Over Age 64	19%	17%	64	17%	64
Low Life Expectancy	24%	22%	66	20%	85

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update, which is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: https://www.epa.gov/haps/air-toxics-data-update.

Sites reporting to EPA within defined area:

Superfund 1
Hazardous Waste, Treatment, Storage, and Disposal Facilities 0
Water Dischargers 128
Air Pollution 7
Brown elds 1
Toxic Release Inventory 6

Other community features within defined area:

Schools 15
Hospitals 2
Places of Worship 58

Other environmental data:

Air Non-attainment ..... No
Impaired Waters ..... Yes

Selected location contains American Indian Reservation Lands* ..... No
Selected location contains a "Justice40 (CEJST)" disadvantaged community ..... Yes
Selected location contains an EPA IRA disadvantaged community ..... Yes

Report for 15 miles Ring Centered at 37.590083,-86.445873

EJScreen Environmental and Socioeconomic Indicators Data

HEALTH INDICATORS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	24%	22%	65	20%	85
Heart Disease	8.8	7.4	77	6.1	91
Asthma	11.7	11.5	59	10	88
Cancer	7	6.5	64	6.1	67
Persons with Disabilities	20.5%	18.3%	64	13.4%	87

CLIMATE INDICATORS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	2%	12%	13	12%	26
Wild re Risk	0%	3%	0	14%	0

CRITICAL SERVICE GAPS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	28%	17%	80	14%	86
Lack of Health Insurance	6%	6%	60	9%	43
Housing Burden	No	N/A	N/A	N/A	N/A
Transportation Access	Yes	N/A	N/A	N/A	N/A
Food Desert	Yes	N/A	N/A	N/A	N/A

Footnotes

Report for 15 miles Ring Centered at 37.590083,-86.445873

Envirofacts Search | US EPA

FACILITY INFORMATION	AFS	ACRES	BR	SEMS	GHG	PCS/ICIS	RADInfo	RCRAInfo	TRI
ASHLAND BRANDED MARKETING 020-204KY STATE HIGHWAY 259 MCDANIELS, KY 40152 Latitude: 37.617472 Longitude: -86.434028								ViewReport	
AT & T CORPORATION17 MI N. ON HWY 259 MADRID, KY 41240 Latitude: 37.617917 Longitude: -86.300972								ViewReport	
BEDROCK PRODUCTS LLC20061 LEITCHFIELD RD KENTUCKY, KY 42754 Latitude: 37.610268 Longitude: -86.347166	ViewReport					ViewReport			
BREEZY HILL ENTERPRISES INC14005 FALLS OF ROUGH RD FALLS OF ROUGH, KY 40119 Latitude: 37.616142 Longitude: -86.504827								ViewReport	
CAMP GREEN SHORES (EASTER SEALS CAMP)BOX 74 AT ROUGH RIVER MCDANIELS, KY 40152 Latitude: 37.600222 Longitude: -86.46675								ViewReport	
CONTRACT NO. 8 - KY 3155 LEITCHFIELD BYPASS3245 LEWIS SCHOOL RD LEITCHFIELD, KY 42754 Latitude: 37.562986 Longitude: -86.388511						ViewReport			
COPPAGE'S GROCERY6581 HWY 54 E FORDSVILLE, KY 42343 Latitude: 37.567056 Longitude: -86.617944								ViewReport	
DOLLAR GENERAL - LEITCHFIELDKY 259 LEITCHFIELD, KY 42754 Latitude: 37.610273 Longitude: -86.347497						ViewReport			
DOLLAR GENERAL STORE #120899375 SOUTH HIGHWAY 259 MCDANIELS, KY 40152 Latitude: 37.62626								ViewReport	

FACILITY INFORMATION	AFS	ACRES	BR	SEMS	GHG	PCS/ICIS	RADInfo	RCRAInfo	TRI
Longitude: -86.43914									
EAST WEST INTERCONNECT517 WATERSIDE DR FALLS OF ROUGH, KY 40119 Latitude: 37.58775 Longitude: -86.459083						ViewReport			
GRAYSON COUNTY WATER DISTRICT517 WATERSIDE DR FALLS OF ROUGH, KY 40119 Latitude: 37.58766 Longitude: -86.45871						ViewReport			
GREEN FARM RESORT SUBD57 JENNIE GREEN RD FALLS OF ROUGH, KY 40119 Latitude: 37.585411 Longitude: -86.554923						ViewReport			
GREEN FARM RESORT UNITS 2 3 &57 JENNIE GREEN RD FALLS OF ROUGH, KY 40119 Latitude: 37.585411 Longitude: -86.554923						ViewReport			
HICKORY SPRINGS GROCERY & BAIT8480 BRANDENBURG RD LEITCHFIELD, KY 42754 Latitude: 37.58718 Longitude: -86.327441								ViewReport	
KY 631 - GRAYSON COKY 631 LEITCHFIELD, KY 42754 Latitude: 37.561389 Longitude: -86.455278						ViewReport			
LASLIE'S COUNTRY STOREHWY 259 MCDANIELS, KY 40152 Latitude: 37.61725 Longitude: -86.434111								ViewReport	
LEITCHFIELD WATER WORKS-LEITCHFIELD WTP3245 LEWIS SCHOOL RD LEITCHFIELD, KY 42754 Latitude: 37.553913 Longitude: -86.375463						ViewReport			
MCDANIELS AUTO SALVAGEKY 259 BRECKINRIDGE COUNTY, KY 40152 Latitude: 37.60589 Longitude: -86.42477						ViewReport			
NATIONAL OFFICE FURNITURE-FORDSVILLE16968 HWY 69 S FORDSVILLE,			ViewReport						

FACILITY INFORMATION	AFS	ACRES	BR	SEMS	GHG	PCS/ICIS	RADInfo	RCRAInfo	TRI
KY 42343 Latitude: 37.65934 Longitude: -86.63985									
NICK'S BOAT DOCKHIGHWAY 79 AXTEL, KY 40103 Latitude: 37.617444 Longitude: -86.450528								ViewReport	
OLD HARDINSBURG WATER TREATMENT PLANT8444 SOUTH HIGHWAY 259 MC DANIELS, KY 40152 Latitude: 37.639008 Longitude: -86.435123		ViewReport							
ROUGH RIVER AIRPORT RUNWAY SAFETY IMPROVEMENTSLODGE RD FALLS OF ROUGH, KY 40119 Latitude: 37.61493 Longitude: -86.50445						ViewReport			
ROUGH RIVER DAM PHASE 1B EXPLORATORY & GROUTING14500 FALLS OF ROUGH RD FALLS OF ROUGH, KY 401199801 Latitude: 37.617635 Longitude: -86.50326						ViewReport			
ROUGH RIVER LAKE AXTEL FORCE MKY 108 AXTEL, KY 40103 Latitude: 37.623271 Longitude: -86.453196						ViewReport			
ROUGH RIVER STATE PARK PARKING LOT450 LODGE RD FALLS OF ROUGH, KY 40119 Latitude: 37.610306 Longitude: -86.502222						ViewReport			
ROUGH RIVER STATE PARK-ROUGH RIVER WTP450 LODGE ROAD FALLS OF ROUGH, KY 40119-6100 Latitude: 37.61459 Longitude: -86.50447								ViewReport	
SHERWOOD AUTO MARINEHWY 79 HARDINSBURG, KY 40143 Latitude: 37.618111 Longitude: -86.451278								ViewReport	
USCOE - ROUGH RIVER LAKE AXTEL SITE14500 FALLS OF ROUGH ROAD						ViewReport		ViewReport	

FACILITY INFORMATION	AFS	ACRES	BR	SEMS	GHG	PCS/ICIS	RADInfo	RCRAInfo	TRI	T
HARDINSBURG, KY 40143 Latitude: 37.624167 Longitude: -86.454722										
USCOE - ROUGH RV LAKE N FORKBEVINS BRANCH RD FALLS OF ROUGH, KY 41501 Latitude: 37.63194 Longitude: -86.43583						ViewReport				
UVT GROUPHIGHWAY 69 NORTH FORDSVILLE, KY 42343 Latitude: 37.65934 Longitude: -86.63985								ViewReport		