U.S. Army Corps of Engineers
Great Lakes and Ohio River Division
Pittsburgh District

Review Plan for *Braddock Locks & Dam Hydroelectric Project, Federal Energy Regulatory Commission Project No. 13739, Implementation Phase,* Pursuant to 33 USC § 408

MSC Approval Date:

Last Revision Date:

US Army Corps of Engineers®

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1. Introduction

a. Purpose of This Review Plan

This Alteration-Specific Review Plan is intended to ensure quality of the review by the Pittsburgh District for the request to alter Braddock Locks and Dam within the Pittsburgh District's area of responsibility. This review plan was prepared in accordance with Engineer Circular (EC) 1165-2-216, "Policy and Procedural Guidance for Processing Requests to Alter US Army Corps of Engineers Civil Works Projects Pursuant to 33 USC 408" (reference paragraph 7.c.(4) in EC 1165-2-216). This review plan provides the review guidelines associated with a specific alteration request pursuant to 33 USC 408 (Section 408).[1]

b. References

i. Engineering Circular 1165-2-216, Policy and Procedural Guidance for Processing Permit Applications for Modifications of US Army Corps of Engineers Projects Pursuant to 33 USC § 408, 31 July 2014
ii. Engineering Circular 1165-2-214, Water Resources Policies and Authorities, Civil Works Review, 15 December 2012
iii. Engineering Regulation 1110-2-1454, Engineering and Design-Corps Responsibilities for Non-Federal Hydroelectric Power Development Under the Federal Power Act, 15 July 1983
iv. Engineering Regulation 1110-2-1156, 28 Oct 2011, Engineering and Design -Safety of Dams - Policy and Procedures
v. Engineering Regulation 1110-2-1150, Engineering and Design for Civil Works Projects, 31 Aug 1999
vi. Engineering Regulation 1110-2-8152, Planning and Design of Temporary Cofferdams and Braced Excavations, 31 Aug 1994 (not necessary)
vii. Engineering Regulation 1110-2-1462, Water Quality and Water Control Considerations for Non-Federal Hydropower Development at Corps of Engineers Projects, 20 February 1991

[1] This project would be designed and constructed by Lock +TM Fund XLII, who received a License from the Federal Energy Regulatory Commission, see reference ix in Section 1.b. This entity is referred to herein as "Licensee" throughout the document.

viii. Memorandum of Understanding between the US Army Corps of Engineers and the Federal Energy Regulatory Commission on Non-Federal Hydropower Projects, dated 30 March 2011.
ix. Order Issuing Original License, the Federal Energy Regulatory Commission, 4 June 2015.

c. Requirements

This review plan was developed in accordance with reference ii which establishes an accountable comprehensive, life-cycle review strategy for Civil Works products. Reference ii outlines three levels of review, District Quality Control/ Quality Assurance, Agency Technical Review, and Independent External Peer Review. In addition to these three levels of review, decision documents are subject to policy and legal compliance review and, if applicable, model certification and approval.

i. Quality Control (DQC). DQC is the review of basic science and engineering work products focused on fulfilling the project quality requirements. Since this is not a Corps of Engineers design the Quality Control/Quality Assurance (QC/QA) review will be undertaken by the developer and or his consultants. (Licensee's designers and reviewers are shown in Exhibit 1, resumes are available on request.) Basic quality control tools include a Quality Management Plan providing for seamless review, quality checks and reviews including calculation checks, supervisory reviews and etc. The licensee is responsible for a complete review of all documents submitted throughout the entire process to assure the overall integrity of the products and to verify that the products have undergone QC reviews prior to submitting the product to the Agency Technical Review Team. However, the District will perform an in-house Quality Control on the Section 408 Permission Decision Document before it is transmitted to LRD. This review will include District managers. Division chiefs will certify the report as shown in Exhibit 2.
ii. Agency Technical Review (ATR). In accordance with reference i., the ATR of Section 408 Permission submittals will be District-led. The review will be conducted by a qualified team of Pittsburgh District and other Corps offices as described in Section 3. If necessary, the district will consider use of experienced staff from other Districts. Any revisions to the review teams will be coordinated with the RMC. The district will utilize vertical team coordination to assure technical requirements are met throughout

the process. Several ATR team members have been identified at this point, but several team members will only be identified after the review schedule has been established in coordination with HGE. See Section 4 for additional details.

iii. Independent External Peer Review (IEPR). As described in Section 2, the District does not recommend that a Type II IEPR (Safety Assurance Review) be included in the review for this project.

iv. Policy and Legal Compliance Review. The Pittsburgh District Office of Counsel will perform the policy and legal compliance review of the Section 408 Permission Decision Document and certify legal sufficiency.

d. Descriptions and Information

This Review Plan covers the proposed alteration of Braddock Locks and Dam by Hydro Green Energy ("HGE"), through a wholly owned project development entity named Lock+™ Hydro Friends Fund XLII, LLC ("Hydro Friends Fund" or "HFF"). HGE is proposing to develop a 5.2 MW low-impact hydropower facility (the "Project") at the U.S. Army Corps of Engineers ("USACE") Braddock Locks and Dam, which is located in an industrial area on the Monongahela River in the Borough of Braddock, Pennsylvania. Braddock Locks and Dam is one of nine navigational structures, known as the USACE Monongahela River Locks and Dams system, which provides year-round navigation on the Monongahela River between Pittsburgh, Pennsylvania, and Fairmont, West Virginia. Below are pertinent information on the existing Braddock Locks and Dam and the proposed Project.

The licensee submitted their application for a preliminary permit to the FERC on May 18, 2010. Several other private firms also submitted competing applications about the same time. FERC selected from among the various applications with a random drawing around February 2011. The preliminary permit was originally issued to the licensee by FERC on April 13, 2011. This permit provides the licensee exclusive rights to study the feasibility of hydroelectric power development at Braddock Dam for a three-year period. The parent firm Hydro Green Energy announced in October 2011 that they had received a $1.8 million grant from the Department of Energy and decided to use it for this hydroelectric project. $1.5 million of that grant is intended to be applied to the final project design, as well as the construction of the large frame module and one of the five HGE low-head hydropower turbines, and $300,000 for final turbine design. Their Notice of Intent to File a License Application and Preliminary Application Document (PAD) was

issued in December 2011. The permit holder applied for and FERC granted permission to follow the Traditional Licensing Procedure (TLP) [2] described in the "Handbook for Hydroelectric Project Licensing and 5 MW Exemptions from Licensing", FERC, April 2004.

The licensee filed their original application for an original license with the FERC in September 2012. They then filed an Updated License Application in September 2013 that increased plant capacity. The Pennsylvania Department of Environmental Protection ("PA DEP") issued their Section 401 Water Quality Certificate on 10 February 2015 and amended on 4 June 2015.

FERC issued the Original License (License) on 4 June 2015.

BRADDOCK LOCKS AND DAM

Braddock Locks and Dam (previously named Monongahela Locks and Dam No.2) is located on the Monongahela River, 11.2 miles upstream of the mouth of the Monongahela River at Pittsburgh, Pennsylvania. The river divides the project into two boroughs with the locks located in the Borough of Braddock and the abutment located in the Borough of West Mifflin. Both boroughs are located in Allegheny County, Pennsylvania. The locks are located on the right bank. The Braddock upper pool extends 12.6 miles to Locks and Dam No.3, Monongahela River. Pertinent info on Braddock Locks and Dam taken from the March 2009 Screening Portfolio Risk Assessment (SPRA) is below.

The locks consist of two chambers side by side on the right bank. The present locks were completed in 1953, replacing the original locks which were constructed at this site between 1902 and 1906. The land chamber measures 110 feet wide by 720 feet long and the river chamber measures 56 feet wide by 360 feet long. The main lock walls are concrete gravity founded on rock. The upper guide wall and both guard walls are supported by steel bearing piles within steel sheet pile diaphragm cells. The lower guide wall is supported by steel bearing piles behind a single line of sheet piling along the river face. The floors of both chambers are paved with concrete slabs. The tops of the lock walls are at elevation 730.5, 11.8 feet above the current interim normal upper pool of 721.7. Normal lower pool elevation is 710.0 for a lift of 11.7 feet.

The original fixed crest dam, which was completed in 1906, was replaced with a new gated dam. The gated dam will allow for the future elimination of Locks and Dam 3. The

[2] The TLP consists of three stages: 1) Series of interactions among the permit holder, resource agencies, affected Indian Tribes, and public sharing initial information; 2) licensee's distribution of draft (license) application to resource agencies, and 3) filing of final license application with the Commission.

original fixed crest dam was a broad crested fixed weir founded on timber piles and rock-filled cribs. The crest of the original dam was at elevation 718.7 feet. When the present locks were constructed in 1953 the dam was shortened from 802 feet to 747.9 feet. To compensate for the decreased length of the dam, a floodway bulkhead structure was constructed in the river chamber to provide for storing and installing bulkheads upstream of the upper gates. The structure permits both upper and lower gates to be open simultaneously, allowing the river chamber to act as a floodway during periods of high water. The new gated dam is located approximately 600 feet upstream of the original fixed crest dam. The original fixed crest dam was demolished in 2004 as part of the new dam construction. The original dam was removed to the level of the riverbed and the demolished concrete materials were placed at downstream locations for fish habitat. The new dam will create a future normal upper pool elevation of 723.7, five feet higher than the normal upper pool that existed prior to construction of the new dam and two feet higher than the current interim upper pool of 721. 7. The future normal upper pool will not be fully established the remaining phases of the Lower Monongahela Project are completed (currently scheduled for around 2030?). Gate No. 1 at Braddock L/D was designed as a mitigation measure for impacts due to the removal of Mon L/D 3 and a fixed weir at Charleroi L/D needed to accommodate a new wider river chamber. This gate has a raised sill weir to maximize entrainment of air to the outflow that was projected during feasibility studies, based on District experience with similar structures, would produce dissolved oxygen saturation downstream of the dam.[3] As noted in the SPRA, the DSAC rating of the dam is IV and the population at risk, loss of life, and expected property damage from a potential failure mode event are all zero. The expected lost economic benefits for a one month disruption to navigation, water supply and recreation is about $11.5 million.

PROPOSED BRADDOCK PROJECT

The Braddock Project will consist of the following new facilities: (1) a 105-foot- wide, 22-foot-deep, and 40-foot-high steel powerhouse anchored to the Corps' left closure weir; (2) a trash rack at the powerhouse intakes, to be constructed approximately 17 feet below the river surface, with 6-inch spacing;[4] (3) seven low-head, horizontal modular bulb turbine/generator units, each with an installed capacity of 0.75 MW, for a

[3] Lower Monongahela River Navigation System Feasibility Study, Interim Report, Pittsburgh District, December 1991, Revised March 1992.

[4] The trash rack would be approximately 95 feet wide and 15 feet deep. Dimensions are estimated by FERC staff, based on Hydro Friends' Exhibit F, filed on November 4, 2013.

total capacity of 5.25 MW;[5] (4) an approach channel to the powerhouse; (5) a tailrace channel returning flow to the Monongahela River; (6) a 0.45-mile-long, 23-kilovolt (kV) transmission line constructed between the powerhouse and an existing Union Railroad substation[6]; (7) an approximately 460-square-foot switchyard; (8) a waterway barrier installed upstream of the project to prevent debris and boats from entering the project; and (9) appurtenant facilities.

The HGE modular system will be manufactured and assembled off-site. The modular hydropower system will be delivered to the site via barge for installation. The majority of site preparations will be conducted from a barge just upstream and downstream from the weir.

Engineering Features of the Proposed Braddock Locks and Dam Project

Civil/Structural Feature	Description
Existing USACE Dam and Reservoir	
Length of Existing Braddock Locks and Dam	1,007 feet
Existing Spillways	Four 110-foot-long gated bays
Sill Elevation of Spillway Sections of Dam	El. 714 feet for Gate Bay 1[1] El. 704 feet for Gate Bays 2-4
Length of Fixed Spill Weir	Approximately 118 feet at the axis
Dimensions of Land Side Lock	110 feet wide by 720 feet long
Dimensions of River Side Lock	56 feet wide by 360 feet long
Left Closure Weir – Material of Construction	Cellular sheeting and tremie concrete founded on rock at ~El. 670.0
Left Closure Weir – Crest Elevation	El. 725.0
Reservoir Surface Area at El.721.8 feet	1,191 acres
Reservoir Gross Storage Capacity at El. 721.8 feet	18,937 acre-feet
Reservoir Net Storage Capacity	0 (Run-of-Release Facility)
Reservoir Pool Length	12.6 miles
Proposed Project Features	
Large Frame Module Powerhouse Dimensions	105 feet long x 22.0 feet wide x 40 feet high
Large Frame Module Powerhouse Construction Materials	Structural grade steel mounted on a concrete foundation on rock
Type of Turbine Units	Horizontal Propeller Type Modular Bulb
Number of Turbine Units	7
Turbine Unit – Hydraulic Design and Maximum Capacity per Unit (based on USACE operations)	1,100 cfs
Turbine Unit – Minimum Hydraulic Capacity per Unit	440 cfs

[5] The seven turbine/generator units will be deployed on a large frame on the upstream face of the left weir. The frame will contain all generating and control systems, and can be removed during maintenance or high water events.

[6] In October 2015 the Licensee notified the District that they must consider a different transmission line route that could involve Braddock Dam in order to accommodate a potential power purchaser.

[1] All elevations shown in this table are in FT NGVD29.

Civil/Structural Feature	Description
Operating Efficiency at Design Flow	88.0%
Installed Capacity per Unit	750 kW
Proposed Authorized Installed Capacity for Project	5.25 MW
Runner Diameter	7.7 feet
Runner Speed	150 rpm
Number of Turbine Blades	4
Rated Gross Head	10 feet
Design Operating Flow (7 units)	7,700 cfs
Maximum Operating Flow (all 7 units)	10,150 cfs
Minimum Operating Flow (1 unit)	440 cfs
Trash rack Clear Spacing Between Bars	6 inches
Maximum Intake Velocities at Trash rack	2.0 feet per second
Concrete Draft Tube Dimensions	52 feet long, 8-foot by 8-foot at the turbine, and 10-foot-wide x 17-foot-high at the tailrace
Centerline Elevations of Draft Tubes	El. 700.5 feet
Generators	1,200 rpm induction
Switchyard Dimensions	25 feet by 50 feet

e. Construction Timeline

The License proscribes that project construction must commence within two years from the issuance date and be completed within five years of that same date. Therefore construction should be initiated no later than 4 June 2017 and be completed (project commences operation) no later than 4 June 2020.

2. Review Requirements

a. Level of Review Required by the Requester

The licensee and requester for this project, HGE, notified the District that they did not recommend a Type II Independent External Peer Review and provided their rationale. They reviewed reference ii and considered risks during project construction and operation. The District will require HGE to perform a Quality Control review prior to their submitting technical reports and drawings to the District for review.

b. Level of Review Required by the District

The review of this alteration request shall include a district-led Agency Technical Review (ATR), reference paragraph 7.c.(4) in EC 1165-2-216. The Pittsburgh District Chief of Engineering and Construction Division has determined that, based on the

design and construction process information received to date, a Type II IEPR is not required for the following reasons:

The prefabricated modular design being proposed will not require conventional cofferdams during the construction of the project. Instead, a permanent sheet pile/tremie concrete structure will be installed on the upstream face of the existing sheet pile cell section of the dam to support the Large Frame Module (LFM). There will be a separate intake gate for each turbine. The intake gates are built into the LFM and are mounted directly in front of each turbine, eliminating the need for pressurized penstocks upstream of the turbines. Draft tubes will be installed through the existing sheet pile cell section of the dam after the LFM is installed. The upstream sheet pile will then be cut to form the intake openings and the downstream sheet pile will be cut to form the discharge openings. The licensee states they will provide a robust design by meeting requirements outlined in applicable USACE Engineering Manuals. After the intake and discharge openings are created, redundancy to stop flow through the hydro units will be provided by the intake gates located upstream of each unit and stop log slots located downstream of each unit. A general construction sequence is outlined below.

General Construction Sequence:

1. Drive new steel sheet piles and attach to the existing sheet pile cell section of the dam to form the perimeter of the permanent rectangular foundation in the upper pool for the pre-fabricated Large Frame Module (LFM). The size will be approximately 22 feet by 105 feet.

2. Remove silt from this rectangular foundation area and install steel tie-in dowels to the existing steel sheet pile dam section.

3. Place tremie concrete inside the new sheet pile structure, to a height of approximately 15 feet then place reinforced high strength concrete up another 10 feet.

4. Install bracing inside of steel sheet pile as the remaining area is dewatered.

5. Install anchor bolts and concrete for the Large Frame Module (LFM) in the dry after dewatering

6. Install the pre-fabricated LFM and test to confirm proper seal.

7. Demo portion of existing sheet pile cell cap for installation of a draft tube for each turbine.

8. Replace portion of cap on existing sheet pile cells that was removed for draft tube installation.

9. Flood inside of the new closure and send divers to cut steel sheet pile on the upstream side to form an intake opening for the turbines.

10. Send divers to cut steel sheet pile on the downstream side of existing sheet pile cells to create discharge openings for the draft tubes.

Risks during construction and operation have been considered by HGE and the District. Underwater divers would be required during steps 2, 9 and 10. The only time when non-divers would be below the water surface elevation is during steps 4 thru 8. As construction would only involve removal of a portion of the weir in step 7 and that would be replaced in step 8, the risks of uncontrolled flow and associated risks to the public should be very low during construction. With proper training and safety precautions during the construction activities, risks to workers should be at acceptable levels. This design should also ensure that uncontrolled releases during operation are also low since USACE construction requirements will be followed. We therefore concur with HGE that a Type II IEPR is not required because neither the construction method outlined above nor the project design and operation pose high risk to public safety.

The Risk Management Center reviewed pertinent project design information available at the time and concurred with this determination. Reference e-mail summaries from [redacted] to Jeffrey Benedict dated 7/23/2015 (Attachment 1) and from [redacted] to [redacted] dated 8/17/2015 (Attachment 2). [redacted] identified several critical issues requiring detailed consideration during the Section 408 review process, these are included in the features of concern in paragraph 3.c.

c. Decision-Level Determination

In accordance with paragraph 6.t in reference i., the Decision Level for Section 408 determinations is at HQUSACE for this proposed hydropower project.

d. District Review Purpose

The review of all work products will be in accordance with the guidelines established within this review plan. The purpose of this review is to ensure the proper application of established criteria, regulations, laws, codes, principles and professional practices.

For the purposes of Section 408, the ATR team will make the following determinations:

1) Impair the Usefulness of the Project Determination. The objective of this determination is to ensure that the proposed alteration will not limit the ability of the project to function as authorized and will not compromise or change any authorized project conditions, purposes or outputs.

2) Injurious to the Public Interest Determination. Proposed alterations will be reviewed to determine the probable impacts, including cumulative impacts, on the public interest, but limited to impacts on Federal Lands. The FERC considers a number of public interest factors when making their determination of whether to issue a license for a hydroelectric project that are broader in perspective, including the economic benefits of project power. As noted in reference viii, paragraph VI.A.1, although the Corps must exercise its independent judgment while carrying out its regulatory responsibilities, the Corps will give deference, to the maximum extent that the Corps determines to be practicable, to the Commission in defining project purpose, project need and project alternatives. This reference also provides a resolution dispute process.
3) Legal and Policy Compliance Determination. A determination will be made as to whether the proposed alteration meets all legal and policy requirements.
4) Verify Appropriate Decision Level. Verify whether or not HQUSACE review and decision is required.

3. District-led Agency Technical Review Team

The District-led Agency Technical Review Team is comprised of reviewers with the appropriate independence and expertise to conduct a comprehensive review in a manner commensurate with the type of proposed alteration described in Section 1.b of this review plan.

The Pittsburgh District ATR team expertise required for this review plan is described below:

ATR Lead: The ATR team lead, [redacted], is a senior professional with extensive experience in facilitating reviews, particularly related to Value Engineering. He has the necessary skills and experience to lead a team through the ATR process. He will not be conducting any technical review.

a. General Requirements. The Corps requirements for approval of non-Federal hydroelectric projects are generally described in paragraph 14.a and Appendix A of reference iii. Item (3) of paragraph 14 a. in reference iii is particularly pertinent to this review plan. It states that “Design, construction, and operation of all power facilities which would affect the structural integrity and operational adequacy of the Federal dam, including construction sequence and procedures, must be approved by the Corps.” Corps reviewers need not be experts in hydropower operation, but must be able to discern potential impacts of the construction and operation of the proposed hydroelectric project on Braddock

Dam infrastructure and/or operations. Each engineering discipline will include at least one reviewer from the Corps of Engineers Reviewer Certification and Access Program (CERCAP).

b. Documentation. The Developer will document his design in a Design Documentation Report (DDR) following the guidance in reference v. Critical features will be designed in accordance with references iv thru vi and meet all applicable technical criteria. This level of documentation for critical hydropower facilities and operations that could impact Braddock Dam is necessary to provide the level of confidence needed in the project modifications to recommend approval to the District Commander. The District Commander's approval is required for the 33 USC 408 submission through the Great Lakes and Ohio River Division to the Chief of Engineers. The District will also review all environmental documentation prepared by the Federal Energy Regulatory Commission in conjunction with the forthcoming issuance of the license. According to Reference i, the minimum level of documentation for ATR is 60% complete plans and specifications and supporting documentation. The ATR Team Leader will prepare the Review Report conforming to requirements in Appendix C of Reference ii.

c. Features of Concern. Significant physical features include, but may not be limited to, permanent sheet pile/tremie concrete structure, trash racks, closure panels, slide gate (including the gate, seals, guides, and mechanical operator), bulkheads or other emergency closure system, concrete pedestal supporting the LFM including excavation, removal of material and foundation preparation, cutting of holes through the existing sheet piles to accommodate the draft tube installation, operational hydraulics of the modified structure and the connection to the existing sheet pile. General discussion on construction sequencing and the equipment to be installed (temporary and permanent), that is attached to the dam, will also be required. Construction drawings and specifications may not need to be developed to the 100% level for the Section 408 submission, but sufficient detail must be provided to ensure the adequacy of the features/appurtenances provided. Pittsburgh District will consider a staged submittal process where less critical features of the project could be submitted subsequent to the development of the Section 408 Permission Decision Document. On the other hand, based on the results of the 60% ATR, it is expected that it will be necessary to conduct a follow-on ATR (approximately 90%) of certain critical hydro project components. For real estate, the licensee will need to supply maps clearly showing the intended use of any Federal lands, as well as lands adjoining Federal property. A legal description/map is preferable, although a GIS map (based on survey results) with an estate

description could also be acceptable. Critical aspects of plant operation and maintenance such as emergency procedures to protect hydropower and Corps infrastructure and impacts on water quality and habitat should be addressed in the Section 408 Permission submittals. More detailed operational aspects will be addressed in the Operations Memorandum of Agreement typically developed after the Section 408 Permission is issued. Environmental documentation to be developed by the FERC based on the license application will form the basis for the District environmental review and conform to requirements in reference vi.

d. Required ATR Expertise. A list of District personnel and/or disciplines is listed as Exhibit 2. Disciplines related to ensuring no impact to project operation, authorized purposes and consideration of appropriate environmental concerns include structural, geotechnical, geologist, hydraulic engineering and environmental sciences. The District has also coordinated with the Hydroelectric Design Center (HDC) to include appropriate staff with knowledge of hydropower operations. Based on coordination with HDC staff, their review would likely only include a mechanical reviewer and, possibly an electrical engineering reviewer, although as of now the latter is not seen as likely. Dam safety and hydraulics issues would be addressed by staff at the District level. Engineering staff with experience in concrete dams, foundations, steel structures, and rock anchors and registered in CERCAP. District-level staff with either at least 5 years' experience in their area of expertise or experience with the prior Section 408 analysis at Mahoning Creek Lake would be considered as most appropriate. The team would also include one primary point of contact from Planning, Operations, Engineering, Real Estate and Office of Counsel to ensure that each Division's concerns are fully addressed during the review. The Operations review staff will include the Braddock Lockmaster to ensure that project concerns are addressed. The District staff would include a Construction Representative with a broad range of experience with projects at locks and dams. Environmental concerns will be met by District staff with NEPA and water quality backgrounds. Regulatory staff will be involved to note any potential conflicts with the Section 404 permit process. Also, the District hydropower coordinator has communicated with his counterparts in LRH and LRL to discuss the possible need for support if LRP staffing is limited due to other work requirements. General qualifications for each District-level ATR team member is also shown in Exhibit 2.

e. Documentation of Review. The ATR will be documented in Dr. Checks. It is expected that each round of review of technical documents will last around four weeks, culminating in closure of all comments or retention until closed in a subsequent review. A draft ATR Certification template to be prepared after all comments in the final round are closed is shown as Exhibit 3.

4. Execution Plan

a. Review Procedures

Reviews will be conducted in a fashion which promotes dialogue regarding the quality and adequacy of the required documentation. The ATR team will review the documents provided.

The four key parts of a review comment will normally include:

1) The review concern – identify the deficiency or incorrect application of policy, guidance, or procedures.
2) The basis for the concern – cite the appropriate law, policy, guidance, or procedure that has not been properly followed.
3) The significance of the concern – indicate the importance of the concern with regard to its potential impact on the district's ability to make a decision as to whether to approve or deny the Section 408 request.
4) The probable specific action needed to resolve the concern – identify the action(s) that the requester must take to resolve the concern.

In some situations, especially addressing incomplete or unclear information, comments may seek clarification in order to then assess whether further specific concerns may exist. The ATR documentation must include the text of each ATR concern, a brief summary of the pertinent points in any discussion, including any vertical coordination, and the agreed upon resolution. The ATR team leader will prepare a Review Report which includes a summary of unresolved issues, if any. Additional details for the ATR process, documentation, and coordination with the RMO are described in paragraph 3.j of Appendix C of reference ii. Upon completion of the district ATR and demonstration of environmental compliance, the district will develop a Summary of Findings to summarize the district rationale and conclusions for recommending approval or denial.

In accordance with reference i, HQ must approve this proposed alteration of Braddock Locks and Dam. The final Section 408 report will be transmitted to HQ through LRD. The final report will fully describe the proposed hydropower project and should fully inform LRD and HQ.

b. Review Schedule

a. Engineering Review Conducted To Date. The draft license application submitted in September 2012 included a Preliminary Supporting Design Report (PSDR) with general design drawings. This information was designated CEII – not for public release. HGE provided the District a copy of this information for review in order to assist the development of more detailed design information that will be

reviewed by the District as part of the Section 408 permit. Engineering comments were provided to the licensee by e-mail on 16 November 2012. No further engineering reviews are anticipated before submission of the 60% documents for ATR. HGE has indicated their intention to drill cores through the weir and into the foundation to confirm engineering parameters of Braddock required to support the modular unit. The District will require that this drilling be conducted and details submitted as part of their initial 60% submittal.

b. Environmental Review Conducted To Date. In response to District concerns about flows diverted from the water quality gate expressed in comments on the Pre-Application Document, the licensee conducted field tests in August 2012 that diverted flows from that gate to a gate on the abutment side (closest to the proposed location of the power plant) in order to simulate field conditions with the hydro plant operating. The issue is that the WQG passes the first 9,500+ cfs before any of the other gates are used. The licensee proposes to use a portion of this low flow while passing a minimum flow through the WQG, approximately 1,000 cfs[7]. The licensee suggested and the District supported and implemented changes in project operation intended to simulate hydropower operations during low flow conditions whereby flow was diverted from the WQG to Gate 4 nearest to the proposed hydropower plant. All gates except the WQG are underflow gates and thereby considered a potentially good replica of turbine flows in terms of water quality impacts. The goal of these tests was to demonstrate the potential impacts on dissolved oxygen of hydropower operations during low flow conditions. Results were provided to District staff for review. These tests were not deemed conclusive by the District. Therefore, the District petitioned FERC that HGE conduct additional studies to facilitate their development of the Environmental Assessment by letter dated 16 November 2012. The FERC issued their opinion by order dated 15 February 2013 that none of the studies were required and on the same date accepted the application for environmental analysis. The District responded to this determination by letter dated 27 March 2013, noting that it is reserving its right to prepare separate NEPA analysis in support of the Section 408 permission decision for this project or to specify appropriate conditions to protect Braddock Dam's function as part of the Section 408 approval process. FERC issued the Draft Environmental Assessment in January 2014, and the District submitted comments by letter dated 19 February

[7] In October 2015, HGE notified the district that they have opted to add air blowers in an attempt to satisfy dissolved oxygen requirements under the condition that all water be routed through the turbines during low flow conditions. The District would need to evaluate this condition during the Section 408 review process. It is not known if this proposal would require changes to their license application and/or the FERC Environmental Assessment.

2014. As a result of these comments, FERC held a teleconference that was publicly noticed, with the District on 30 May 2014. FERC issued its final EA in June 2014 and noted discussions on water quality monitoring. No further environmental review is anticipated prior to submission of the 60% documents for ATR.

c. Future Reviews. The schedule of post-license reviews is dependent upon the capability of the licensee to develop technical information meeting requirements for the initial submittal for the Section 408 package as described in paragraph 7.c.(3) in reference i. Article 309 of the license for this project, issued June 4, 2015, requires the Licensee (HGE) to furnish the Corps and the Federal Energy Regulatory Commission (FERC) a schedule for submission of design documents and the plans and specifications for the project. It is anticipated that the ATR of Section 408 materials will commence when this submission occurs, currently viewed as requiring two iterations. HGE coordinated with this office and submitted their plan to FERC on August 31, 2015, the transmittal letter and schedule are attached. This schedule can be viewed as a tentative proposal, but is already out of date, as the geotechnical drilling scheduled for December has not occurred. As noted above, this drilling is required to prior to submittal of design documents for ATR. The District has requested and is waiting for an update to this schedule.
d. Federal Energy Regulatory Commission Review (FERC). The License requires FERC review of contract plans and specifications based on past licenses. It is not expected that this project will encounter any significant issues requiring a "Board of Consultants." Time requirements for this review are included in the license.
e. Model Certification/Approval Schedule and Cost. Three models were cited by Hydro Green in their license application. One was the ECOM hydrodynamic model, which can compute circulation of water due to freshwater flow, which with geometry is stated to drive the computation of transport and mixing processes within the study area. The RCA hydrodynamic and water quality model framework was interfaced with ECOM to determine through simulations changes in dissolved oxygen due to operation of the turbines. The third model cited was the Finite Element Analysis used in the Preliminary Supporting Design Report.
f. Inspection Costs. Corps staff will be required to be on-site during critical construction and commissioning activities.

The ATRs will be scheduled in coordination with HGE.

c. Review Cost

ATR Schedule and Cost. District and HDC review of the DDR, drawings and plans and specifications will suffice for ATR. Estimated cost is less than $50,000 to be funded by the Corps.

d. Public Participation

The public and Governmental agencies have been offered an opportunity to review many of the documents previously prepared and submitted by the licensee and responses to these comments are available in their License Application. The Review Plan will be posted on the District website to facilitate public review.

e. Risk Management Center (RMC) Coordination

Review plans for decision documents and supporting analyses outlined in EC 1105-2-410 are coordinated with the appropriate Planning Center(s) of Expertise (PCXs) based on the primary purpose of the basic decision document to be reviewed. The lead PCX for this study is the Risk Management Center. The RMC is the review management office whenever Type II IEPR (Safety Assurance Review) is required. As no Type II IEPR is required, LRD will serve as the Review Management Office (RMO) throughout this project.

f. MSC Review Plan Approval

The MSC that oversees the home district is ultimately responsible for approving the review plan. Approval is provided by the MSC Commander. Exhibit 4 contains the District-level certifications that will be transmitted to the MSC Commander along with the Section 408 Permission Decision Document. The commander's approval should reflect vertical team input (involving district, MSC, RMC, and HQUSACE members) as to the appropriate scope and level of review for the decision document. The review plan is a living document and may change as the project progresses. Changes to the review plan should be approved by following the process used for initially approving the plan. In all cases the MSCs will review the decision on the level of review and any changes made in updates to the project.

5. Review Plan Points of Contact

Questions and/or comments on this review plan can be directed to the following points of contact:

Name/Title	Organization	Email
[redacted] District Section 408 Coordinator	CELRP-PM-EF	[redacted]
[redacted] RMC Review Manager	CEIWR-RMC	[redacted]
[redacted] Product Coordinator	CENWP-HDC-C	[redacted]
[redacted] LRD Hydropower Coordinator Manager	CELRD-PDS-O	[redacted]
[redacted] Civil Engineer	CELRD-RBT	[redacted]
[redacted] Dam Safety Program Manager, ,	CELRD-RBT	[redacted]

EXHIBIT 1

BRADDOCK HYDRO LICENSEE PRODUCTION DELIVERY AND REVIEW TEAMS

EMPLOYEES OF HDR

Proposed Study Team	Title	Roles and Responsibilities
[redacted]	Senior Civil Engineer	Reviewer
	Senior Civil Engineer	Reviewer
	Senior Civil Engineer	Reviewer
	Structural Engineer	Designer
	Civil/Hydraulics Engineer	Designer
	Senior Geotechnical Engineer	Reviewer
	Mechanical Engineer	Designer
	Associate Mechanical Enginner	Designer
	Senior Mechanical Engineer	Designer
	Senior Mechanical Engineering	Reviewer
	Senior Mechanical Engineer	Designer
	Electrical Engineer	Designer
	Senior Electrical Engineer	Designer
	Electrical Engineer	Reviewer
	Senior Electrical Engineer	Designer

EXHIBIT 2 BRADDOCK HYDRO CORPS ATR TEAM ROSTER

Discipline or Role	Name	Office/Agency
Hydropower Coordinator/PM Division Coordinator	[redacted]	CELRP-PM-EF
Quality Manager Officer	[redacted]	CELRP-EC-NC
Environmental Protection Specialist & Cultural Resources	[redacted]	CELRP-PM-EV
Biologist/Water Quality	[redacted]	CELRP-EC-DW-Q
Natural Resource Specialist/OP Division Coordinator	[redacted]	CELRP-OP-R
Lockmaster/Braddock	[redacted]	CELRP-OP-SM
Civil Engineer (Operations)	[redacted]	CELRP-OP-MS
Regulatory Specialist	[redacted]	CELRP-OP-F
EC Operation Coordinator	[redacted]	CELRP-EC-NT
Structural Engineer	[redacted]	CELRP-EC-NS
Geologist	[redacted]	CELRH-DSPC-GS
Hydraulic Engineer	[redacted]	CELRP-EC-DH
Construction Representative (Civil Engineer)	[redacted]	CELRP-EC-CA
ATR Team Leader/Facilitator	[redacted]	CELRP-EC-NT
E&C Division Coordinator	[redacted]	CELRP-EC-NT
Real Estate/Mgmt & Acquisition/RE Division Coordinator	[redacted]	CELRP-EC-RM
Office of Counsel	[redacted]	CELRP-OC
Mechanical Engineer	[redacted]	HDC

ATR Qualifications

Review Discipline	Name	Prior Hydro 408 Experience	At Least 5 Years in AoE	Registered in CERCAP	Specific Qualifications
Hydropower Coordinator/PM Division Coordinator	[redacted]	x	x		Planning POC and Overall Coordinator
ATR Team Lead	[redacted]		x		Team Facilitator
Environmental Protection Specialist & Cultural Resources	[redacted]		x		NEPA
Biologist/Water Quality	[redacted]	x	x		Water Quality
Natural Resource Specialist/OP Division Coordinator	[redacted]		x		Operations POC
Lockmaster/Braddock	[redacted]		x		Lock and Dam Operations
Civil Engineer (Operations)	[redacted]		x		Lock and Dam Operations
Regulatory Specialist	[redacted]		x		Regulatory
EC Operation Coordinator	[redacted]	x	x		EC POC
Structural Engineer	[redacted]		x	x	Foundations, Steel Structures, Anchors
Geologist	[redacted]		x	x	Foundations, Anchors
Hydraulic Engineer	[redacted]	x	x	x	Hydraulics
Construction Representative (Civil Engineer)	[redacted]	x	x		Construction
Real Estate/Mgmt & Acquisition/RE Division Coordinator	[redacted]		x		Real Estate
Mechanical Engineer	[redacted]			x	HDC Experience

EXHIBIT 3

Section 408 Permission Report Certifications

District Commander's Approval of Section 408 Permission Decision Document:

I attest that the Braddock Non-Federal Hydropower Section 408 Permission Decision Document is consistent with Army Policy and technical criteria, and has been reviewed for legal sufficiency by District Counsel. Accordingly, I approve this Decision Document.

Date:

Colonel, Corps of Engineers
District Commander

Legal Review Certification

I have reviewed the proposed Braddock Non-Federal Hydropower Section 408 Permission Decision Document and have no legal objection thereto.

Date:

Chief, Office of Counsel

Program and Policy Compliance Certification

My signature below indicates my certification of program and policy compliance with 33 USC 408 (Section 408) for the Braddock Section 408 Permission Decision Document.

Date:

Deputy District Engineer for Project Management

EXHIBIT 3 (Cont.)

Technical Certification

My signature below indicates that the proposed project as outlined in the Braddock Hydropower Section 408 Permission Decision Document is technically correct and consistent with policy.

Date:

Chief, Engineering and Construction Division

Date:

Chief, Operations Division

Real Estate Certification

My signature below indicates that the proposed project as outlined in the Braddock Non-Federal Hydropower Section 408 Permission Decision Document is consistent with Real Estate policy and Requirements.

Date:

Chief, Real Estate Office

Certification of National Environmental Policy Act (NEPA) Compliance

My signature below indicates that the Environmental Documentation included in the Braddock Non-Federal Hydropower Section 408 Permission Decision Document has been prepared in accordance with the requirements of NEPA.

Date:

Chief, Planning and Environmental Branch

EXHIBIT 4

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the Braddock Hydropower Section 408 submittal package describing the modification of Braddock Dam to support a 5.25-Megawatt Hydropower project. The ATR was conducted as defined in the Alteration-Specific Review Plan to comply with the requirements of EC 1165-2-216. During the ATR, compliance with established policy principles and procedures and legal requirements was verified. This included the determination whether the proposed alteration would impair the usefulness of the federal project or was injurious to the public interest. All comments resulting from the ATR have been resolved.

SIGNATURE _____ _____
[redacted] Date
ATR Team Leader
CELRP-EC-

SIGNATURE _____ _____
[redacted] Date
District Section 408 Coordinator
CELRP-PM-EF

SIGNATURE _____ _____
[redacted] Date
Review Management Organization Representative
CELRD-RB

CERTIFICATION OF AGENCY TECHNICAL REVIEW

_____
Chief, Engineering and Construction Division
Pittsburgh District

_____
Chief, Operations Division
Pittsburgh District

_____

Chief, Planning and Environmental Branch
Pittsburgh District

_____

Chief, Real Estate Office
Pittsburgh District