

REVIEW OF APPLICATION FOR CERTIFICATION OF THE MAHONING CREEK HYDROELECTRIC PROJECT

This report provides review findings and recommendations related to the application submitted to the Low Impact Hydropower Institute (LIHI) by Mahoning Creek Hydroelectric Company (Applicant) for Low Impact Hydropower Certification of its hydroelectric facility, the Mahoning Creek Hydroelectric Project (the Project).

I. PROJECT'S GEOGRAPHIC LOCATION

The Project is located at the U.S. Army Corps of Engineers (USACE) flood control dam on Mahoning Creek in Armstrong County, Pennsylvania. Mahoning Creek is a tributary of the Allegheny River, which in turn, flowing in a generally southerly direction, joins the Monongahela River in Pittsburgh to form the Ohio River. As shown in Figure 1, the Allegheny River basin is Pennsylvania's westernmost basin. The project dam is 21.6 miles upstream of the mouth of Mahoning Creek.

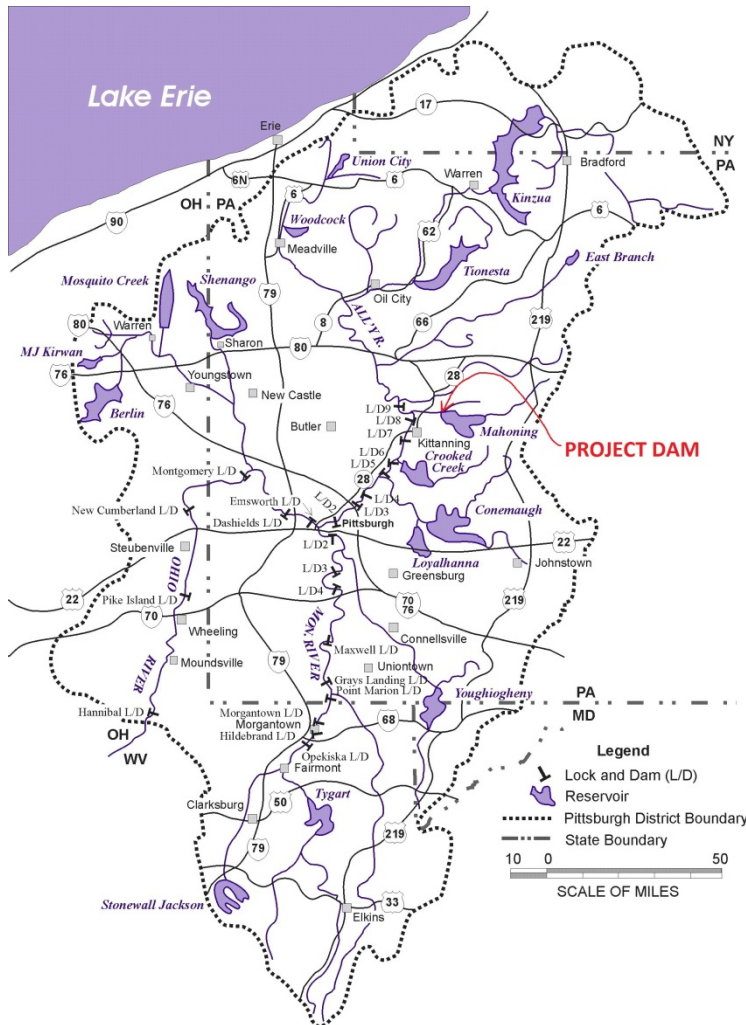


Figure 1. Project location in the upper Ohio River watershed.

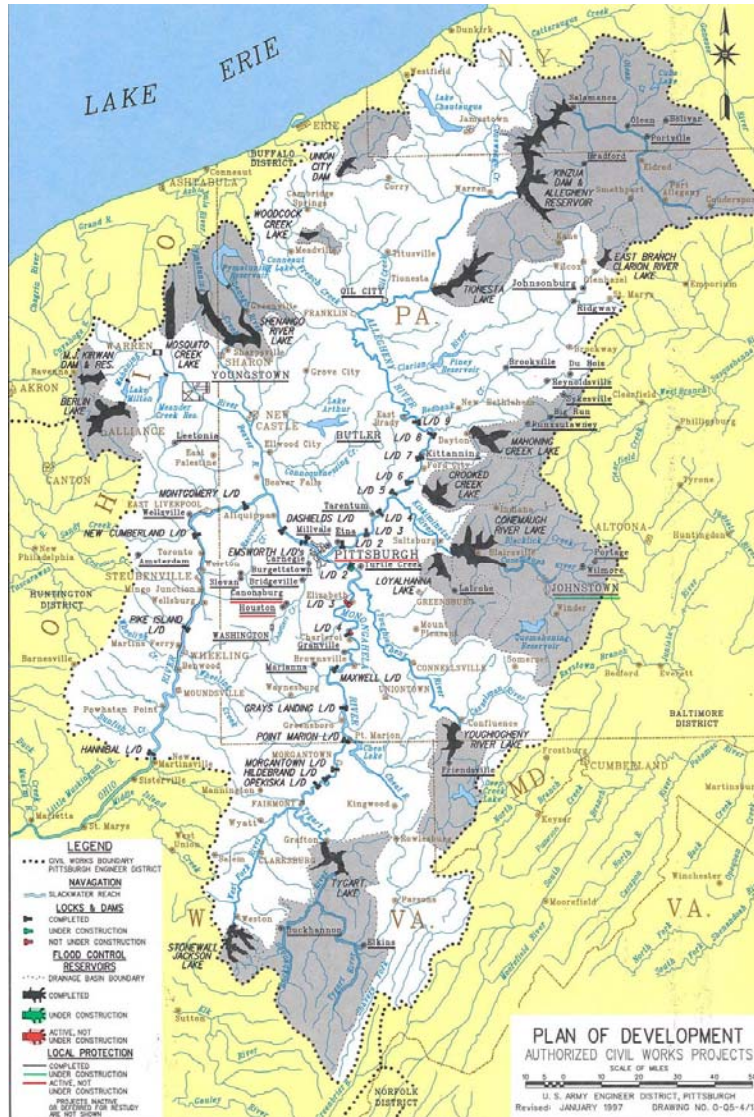


Figure 2. Upper Ohio River basin (Pittsburgh District) map showing existing flood control developments, with the controlled watersheds shown in gray.

II. PROJECT AND IMMEDIATE SITE CHARACTERISTICS

Between 1939 and 1941, the USACE constructed Mahoning dam and reservoir as part the existing network of 16 flood control reservoirs in the USACE Pittsburgh District; the network provides flood protection benefits for development in the lower Allegheny River Valley and along the upper Ohio River. The dam was designed and built with two conduits built into the south abutment of the dam for future hydropower development.

The USACE dam is a concrete gravity structure, 162 feet high and 926 feet long with a 192-foot-long spillway section that incorporates five existing outlet conduits. The three main sluices, 5 foot, 8 inches wide by 10 foot high, are located in the center monoliths 11, 12 and 13 of the spillway. Flows through these outlets are controlled by hydraulically operated slide gates. The

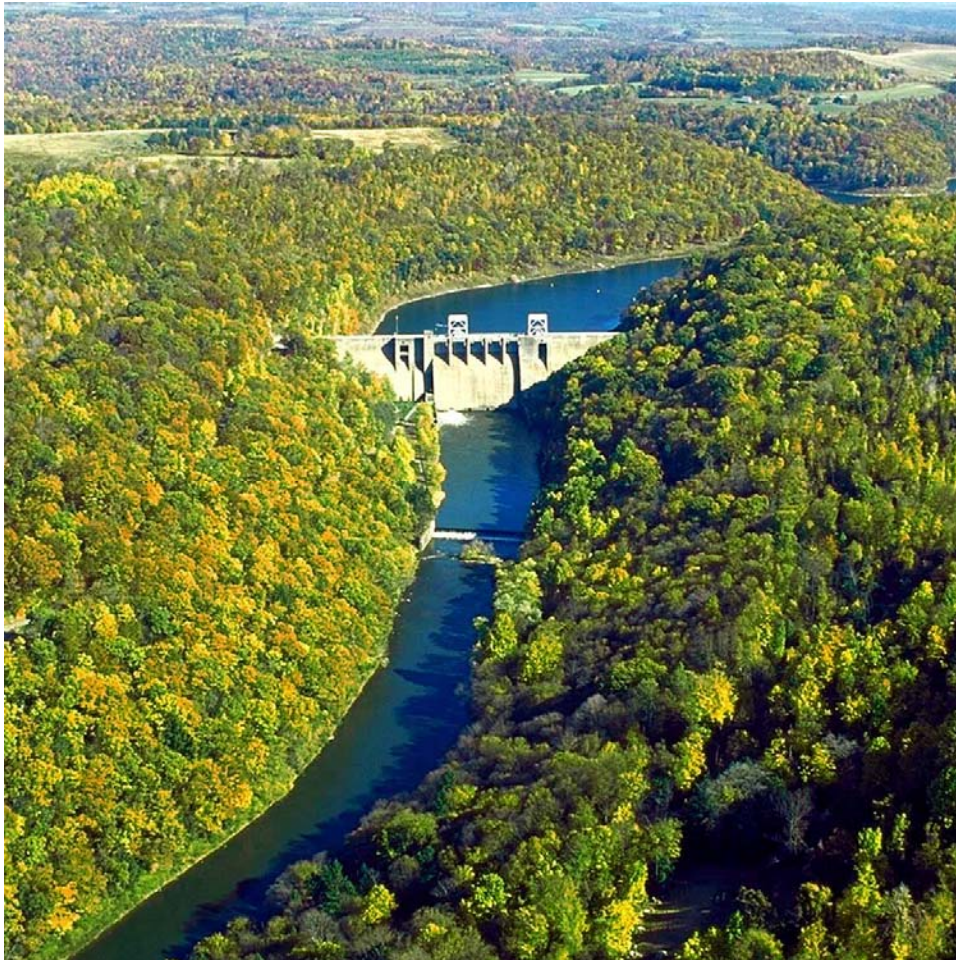


Figure 3. View of flood control dam and stilling pool weir.

invert elevation is 1,015 feet msl¹. In the centerline of the spillway monolith 10 is a low flow conduit, 4 foot in diameter, equipped with a 36-inch electrically operated ring jet valve. In the centerline of monolith 9 there is an electrically operated 24-inch ball valve at centerline elevation 1,026 feet. Five vertical lift gates, 29 feet high and 30 feet wide, are available for release of high flows during flood operations.

The dam impounds a 5-mile-long, 280-acre reservoir with a normal pool elevation of 1,077 feet above mean sea level (msl). Directly downstream of the dam is a 192-foot-wide, 950-foot-long stilling basin created by a 180-foot-long weir. USACE “operates Mahoning Dam as a run-of-river project, where the outflow equals the inflow except during high flow events when water is

¹ Elevations used for the structure are based on the vertical datum NGVD29; however, USACE now uses the 1988 adjustment, NAVD88, for elevations related to water level management. Figures in this report related to the structure should be adjusted by minus 0.86 foot to get NAVD88 values. Water levels are referenced to NAVD88, and no adjustment is necessary.

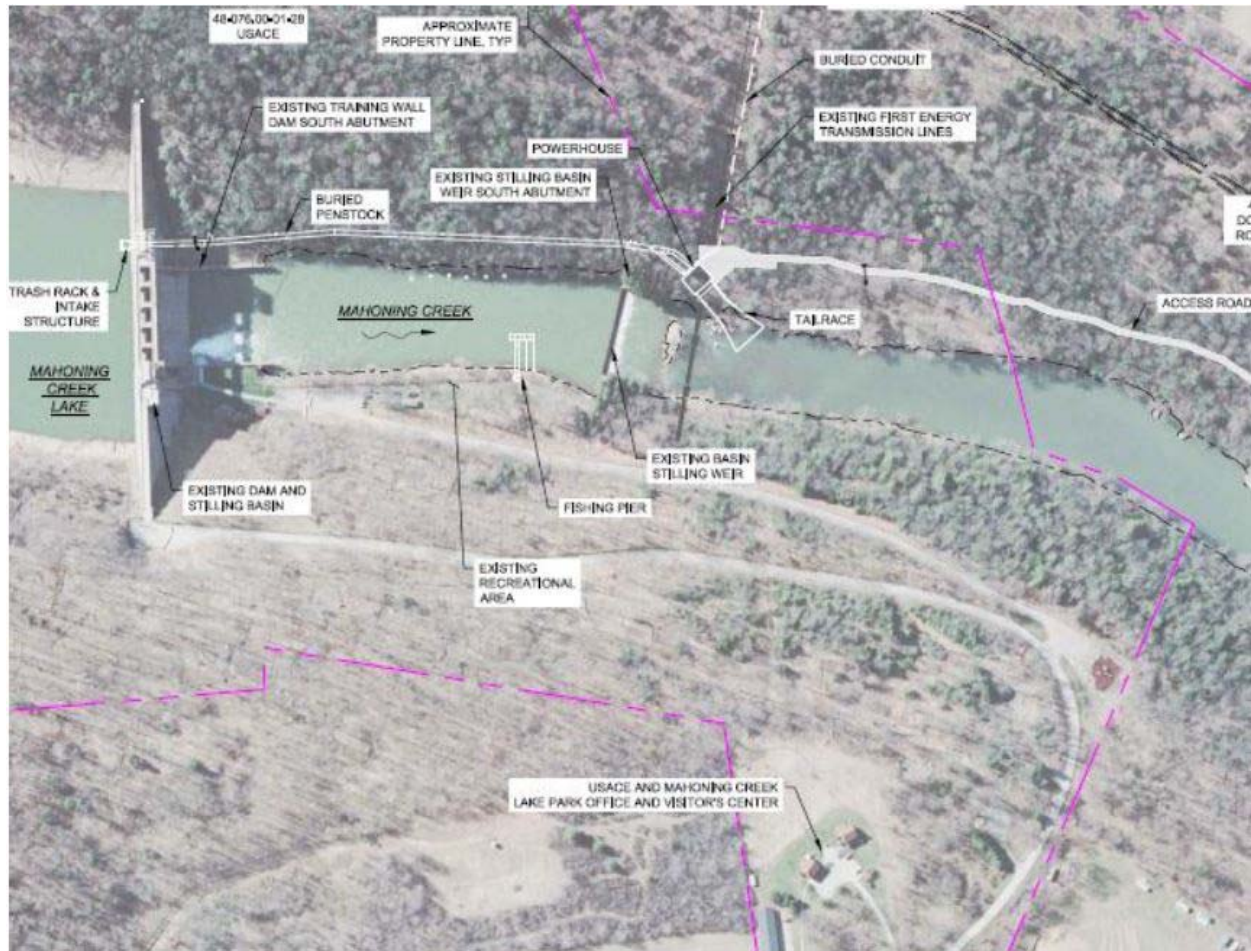


Figure 4. Aerial view showing project layout.

stored for downstream flood control (cutting off the high peaks of the hydrograph).” (e-mail from R. Reilly to J. Cueto, January 2014; App. A).

The hydroelectric facility is a nonfederal development by the Applicant at the existing USACE dam; it includes: (1) a new 16-foot-high intake structure attached to the upstream face of the dam, equipped with removable trashracks (with one-inch bar clear spacing) and a vertical roller gate; (2) a new steel lining of the pre-existing, 108-inch-diameter conduit that passes through the dam; (3) a 108-inch butterfly valve within a valve vault at the downstream toe of the dam; (4) a 43-foot-long, 108-inch-diameter steel penstock that transitions to a 936-foot-long, 10-foot-diameter buried penstock on the left (south) bank, bifurcating into two penstocks, 84 feet long and 96 inch in diameter and 95 feet long and 6-feet in diameter; (5) a powerhouse located approximately 120 feet downstream of the existing stilling basin weir and containing two vertical-shaft Francis turbine/generator units with a total installed capacity of 6.0 MW (4 MW and 2 MW); (6) a 40-foot-wide, 150-foot-long, 10-foot-deep tailrace; (7) a transformer/switching vault, and 630-foot-long underground transmission line connecting to a new 1.12-mile-long, 25-kilovolt transmission line; (8) a new 100-foot-long bridge spanning a small stream and connected to a refurbished existing 0.6-mile-long access road; and (9) appurtenant facilities.

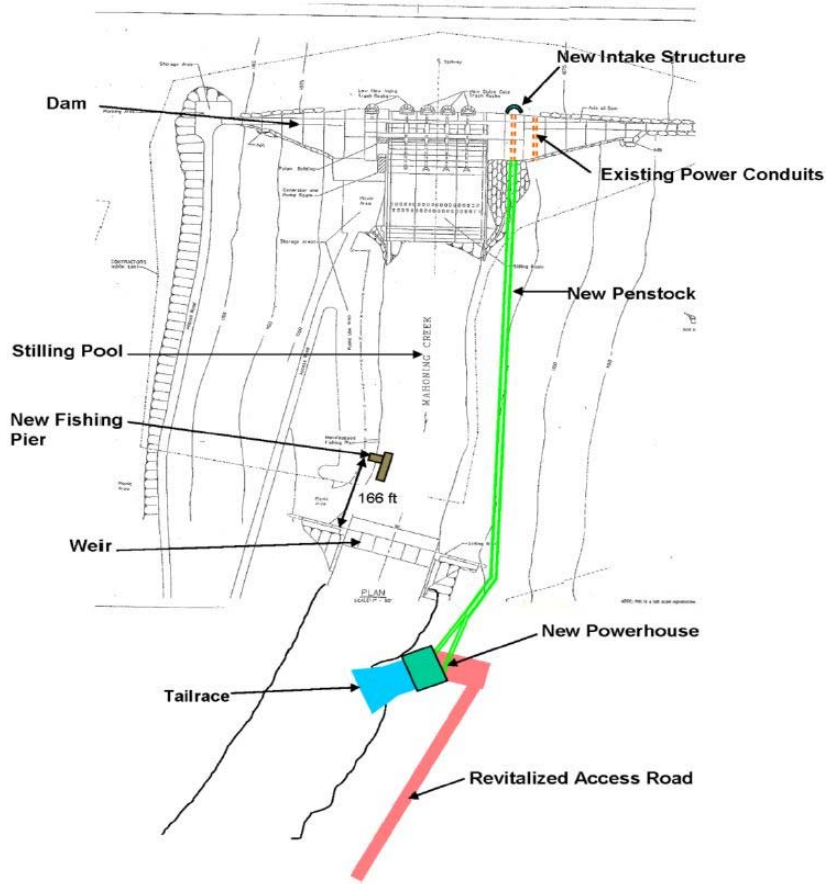


Figure 5. Project layout.



Figure 6. Powerhouse under construction.

The station started commercial generation on December 26, 2013. The Applicant estimates that average annual generation will be 20,000 MWh.

III. REGULATORY AND COMPLIANCE STATUS

The Federal Energy Regulatory Commission (FERC) granted the Project a license as Project No. 12555 on March 4, 2011. The FERC license was issued for a period of 50 years with an expiration date of March 1, 2061.

The license application was filed on July 27, 2009. No motions to intervene were filed with FERC when it noticed the application on September, 3, 2009. Comments on the application were filed by USACE, the U.S. Department of the Interior, and the County of Armstrong.

Several mitigation and enhancement measures are included in the license:

1. *Article 302.* To reduce erosion and sedimentation and minimize hazardous materials from entering the creek during project construction and operation, the license requires a soil erosion and sedimentation control plan, including designation of specific sites for fuel storage and fueling and measures for maintaining on-site sanitation facilities.
2. *Article 402.* To protect fish and aquatic resources in Mahoning Creek, the license requires Mahoning Hydro to implement a water quality monitoring plan that includes the proposed measures for monitoring water quality, as well as establishing DO and water temperature criteria and protocols for modifying project operations if the criteria are violated. Further, the license requires Mahoning Hydro to file a design plan to ensure that the proposed intake structure will achieve an average approach velocity not exceeding 1.0 foot/second and will limit fish entrainment.
3. *Article 403.* To ensure that the intake structure is designed appropriately to protect fisheries resources, the license requires Mahoning Hydro to prepare an intake structure design plan in consultation with the Corps and for Commission approval.
4. *Article 404.* To avoid adverse effects of project construction on existing riparian and wetland habitat located downstream of Mahoning dam, the license requires Mahoning Hydro to develop and implement a wetland protection plan.
5. *Article 405.* To enhance recreation access and fishing opportunities, the license requires Mahoning Hydro to construct the proposed fishing pier and access ramp in the stilling basin, with fish attraction structures, an interpretive display, and stairs leading from the pier to the shoreline. This license requires Mahoning Hydro to submit a recreation and aesthetics plan for providing the proposed fishing access improvements within six months of license issuance, and to minimize effects on visual resources by designing and constructing the powerhouse to blend into the existing environment, as proposed.
6. *Article 406.* To protect cultural resources, this license requires Mahoning Hydro to implement a Programmatic Agreement (PA) executed on November 16, 2010, between

the Commission and the State Historic Preservation Officer (SHPO). The PA requires the licensee to develop a Historic Properties Management Plan (HPMP) that provides for the consideration, management, and protection of both known and newly discovered historic properties during construction, operation, and maintenance of the project.

Although a water quality certification application was filed with the Pennsylvania Department of Environmental Protection (DEP) on October 30, 2009, DEP did not act on the application within one year of receipt of the application. Consequently, FERC waived the federal Clean Water Act certification requirement. On February 19, 2013, after issuance of the license, DEP issued Water Obstruction and Encroachment Permit No. E03-451 authorizing Mahoning Creek Hydroelectric Company to “modify an existing dam across Mahoning Creek (WWF) to generate hydroelectric power...” Subject to several general and specific conditions, the permit certifies construction and operation of the Facility as compliant with the federal Clean Water Act and water quality standards. The key post-construction condition of the state permit, Special Condition F, relates to the same provisions as contained in Article 402 of the license (water quality monitoring and adaptive management). The permit/water quality certification is cited in a March 11, 2013, letter from USACE authorizing dredge/fill activities for project construction under federal Clean Water Act Section 404 using the Pennsylvania State Programmatic General Permit (PA SPGP-4). The Section 404 authorization incorporates three specific conditions, as well as several general conditions. Only one specific condition relates to post-construction. The Applicant proposed over one acre of riparian planting at the site, and the authorization requires annual monitoring and reporting on the condition of the plantings for a minimum of five years, with a planting density of 400 stems per acre and a minimum survival of 80% at the end of the third growing season.

No fishway prescriptions or reservations of authority were filed under section 18 of the FPA. The dam does not incorporate any passage facilities.

The FERC eLibrary record was reviewed going back to March 2011 to determine whether any compliance issues have arisen subsequent to license issuance. Although there were no issues were apparent in that record, no documentation was found related to FERC approval of the Article 402 water quality monitoring plan. The plan was to be filed a minimum of 90 days before the start of operations. The Applicant (memorandum to LIHI, February 3, 2014, attached) indicated that this was an administrative oversight and followed up by formally filing the plan with FERC by letter dated January 29, 2014. The plan had been developed in consultation with USACE and DEP and monitoring is underway.

With respect to the USACE Section 404 permit, the Applicant reported that it is in the process of preparing the riparian area monitoring plan for submittal to USACE and will be performing the planting and revegetation activities this spring. Temporary stream construction accesses and tailrace dewatering structures have been removed.

IV. PUBLIC COMMENTS RECEIVED BY LIHI

The LIHI application was publicly noticed on November 14, 2013. No comments were received during the notice period, which ended on January 13, 2014.

V. LIHI CRITERIA REVIEW

Under each of the issue sections that follow, a table is provided that contains the related LIHI questionnaire sections, plus reviewer analysis and conclusions.

General Conclusions and Recommendations. The major issue at Mahoning Creek relative to LIHI certification is whether it passes the LIHI Flows criterion. With this facility being a nonfederal hydropower development at an existing federal, nonpowered dam, the new facility is constrained to use dam releases that are consistent with the existing USACE operating rules, or Water Control Manual (WCM). Available data at the downstream U.S. Geological Survey gage and information obtained from USACE suggests that Mahoning Creek dam releases sometimes drop below minimum flows that would satisfy either the Tennant or New England Base Flow standards. Nevertheless, the state resource agency has stated that dam releases are appropriately protective of aquatic life, and sensitive warmwater fish species are showing substantial recovery in Mahoning Creek below the project.

USACE has worked with federal and state resource agencies, as well as the Nature Conservancy², to develop environmentally acceptable operating protocols at many of its dams nationwide. Very recently, TNC and USACE announced that USACE reservoirs in the upper Allegheny river basin, including Mahoning Creek, would be added to their joint Sustainable Rivers Project, and that studies that could lead to improved ecological flow requirements at these reservoirs would be initiated. This is a very positive development that should be encouraged, but the results, including potential changes in the USACE operating rules, are likely to take many years to be concluded and implemented. Rather than wait for an indeterminate result, the best path forward will be to encourage participation by the Applicant now in the Sustainable Rivers studies and to report progress back to LIHI.

All LIHI criteria other than Flows are satisfied.

Regarding water quality, the Applicant is required to monitor water quality at several sampling stations and to modify operations if needed to meet anti-degradation standards set by USACE. The waters are not 303(d) listed.

Regarding fish passage, there is no evidence of historic migratory fish use, and passage of resident riverine fish has not been required. Intake structure design, however, was made subject to FERC approval after consultation with USACE and the Pennsylvania Fish and Boat Commission (PFBC). Although the design was filed with FERC, FERC apparently neglected to issue an order formally approving the plan. Further action is warranted here.

² <http://www.nature.org/ourinitiatives/habitats/riverslakes/sustainable-rivers-project-fact-sheetpdfnull.pdf>

Regarding recreation, the Project is on federal lands and there are no restrictions to access and use, except where warranted for protection of the facilities or public. The Applicant will be constructing certain recreational improvements under a recreation and aesthetics plan, including floats accessed via a gangway for access to the stilling pool for angling.

Regarding other LIHI criteria, there are no known listed T&E species at the site. Historic resources are protected under a HPMP. The watershed protection criteria are generally not applicable; the shorelands are managed by USACE, and there is no watershed enhancement fund that would qualify the facility for extension of the certification term by three years. And there is no record of a resource agency requesting dam removal.

Given these findings, the Mahoning Creek hydropower facility is recommended for LIHI certification, with three conditions:

1. The Applicant shall cooperate and participate in any new studies of ecological flow requirements below the Mahoning Creek dam, especially those of the Sustainable Rivers Project by TNC and USACE. Further, within 60 days of notification of any new studies of ecological flows by others in Mahoning Creek, the applicant shall notify LIHI and submit a letter defining MCHC's commitment to participate in that study. MCHC shall report progress on the study to LIHI in its annual compliance letter.
2. The Applicant shall work with the USACE District office to investigate whether there is flexibility within the existing WCM to keep short-term dam releases at higher, more stable minimum levels. The applicant will report back to LIHI on progress in this topic in its annual compliance reports to LIHI. If such flexibility can be agreed to between USACE and the Applicant, the Applicant shall implement improved minimum releases. Further, the Applicant shall provide a record of average daily flows from their powerhouse and from the Mahoning Creek dam with their annual compliance letter.
3. The Applicant shall contact FERC within 30 days of issuance of the certification and request final action on the Article 403 intake design, with documentation of the contact copied to LIHI within 45 days after certification. Documentation of FERC's response also copied to LIHI within 7 days of such action.

Flows

USACE operates the dam in as a "run-of-release" facility in a coordinated manner as part of its Allegheny River dam network, the primary purposes of which are flood control and navigation. USACE maintains the summer pool elevation at 1,100 feet msl \pm 0.5 foot; during the fall, the pool level is lowered 25 feet to elevation 1,075 feet msl to provide additional flood storage capacity. A flow of about 40 cfs has been released during the winter period through the ring jet valve to prevent it from freezing. The two new turbines have low-end hydraulic capacities of 109 cfs and 280 cfs, and a combined maximum capacity of 875 cfs.

Article 401 of the license requires continuing the run-of-release operation using flows as directed by USACE. Article 307 requires the development of an operating plan describing (a) the design mode of hydropower operation; (b) reservoir flow diversion and regulation requirements for operation of the USACE project during construction as established by USACE; and (c) integration of the operation of the hydroelectric facility into the USACE emergency action plan. The operating plan was made subject to FERC approval, which was granted by order dated September 6, 2013. Additionally, Article 307 requires the licensee to enter into an operating Memorandum of Agreement (MOA) with USACE prior to the start of operation. The MOA was finalized on December 16, 2013 and filed with FERC by letter dated March 5, 2014. Under the MOA, USACE daily sets the flow release schedule and rate for the hydroelectric facility, and USACE staff continue to control gate operations at the dam itself, releasing flows when the hydroelectric facility is off line or when releases are outside the hydraulic capacity of the facility.

The FERC license does not prescribe environmental flows, and no flow recommendations were made by resource agencies during the licensing process. Flow management is deferred to USACE. The only conservation flows discussed in the FERC environmental assessment (EA) related to flows in the bypassed reach. Because flows in this reach are provided by the USACE staff normally via operation of the ring jet valve, FERC did not consider the minimum flows to be part of the licensing proposal (reference Footnote 6 on p. 3 of the license).

To address potential impacts of the hydroelectric facility operation on downstream water quality, USACE controls normal releases from the dam and powerhouse in accordance with an adaptive management plan (AMP)(*USACE Water Quality and Aquatic Life Adaptive Management Plan for the Proposed FERC Hydropower Project No. 12555 at Mahoning Creek Lake Dam*, October 2012). The goal of the AMP is to prevent a degradation of water quality, for which baseline conditions have been defined by USACE's monitoring efforts since 1972. USACE indicates that operation of the flood control dam has resulted in enhanced conditions well above the minimum criteria set by the state water quality standards for the designated warmwater fish habitat downstream. The low-level release through the ring jet valve results in high dissolved oxygen concentrations and summer water temperatures that are relatively cold. These conditions support a coolwater fishery, including rainbow trout stocked by the Pennsylvania Fish and Boat Commission, as well as northern pike and muskellunge.

The AMP establishes minimum bypass flows of 30 cfs from April 1 through June 14 and September 16 through October 31; 60 cfs from June 15 through September 15; and 40 cfs from November 1 through March 31. The flow releases are specifically to prevent a degradation of water quality and protect the ring jet valve from freezing during the winter. It establishes worse-case values for dissolved oxygen, water temperature, and total dissolved gas saturation and requires continuous water quality monitoring in the reservoir and downstream. Any degradation of water quality, as measured at three downstream stations or at a fourth station in the reservoir at a depth of 24 feet, can result in an increase in the release from the ring jet valve and reduction of flows routed to the powerhouse.

FERC determined in its review that the proposed flows in the bypassed reach would be sufficient to protect physical habitat for aquatic biota. The reach consists entirely of pool habitat. The

upper 905 feet is the dam stilling pool. Below the stilling pool weir down to the project tailrace is a 100-foot-long section of channel that is also pool habitat.

USACE currently does not have operating protocols in place to provide conservation flows and ramping procedures to protect physical habitat in the free-flowing reach of Mahoning Creek downstream of the Project tailrace, a reach approximately 21 miles long. Rosemary Reilly, a biologist with the USACE Pittsburgh District, was contacted for more information; she provided flow and water level management data from 2012 and 2013 (see appended e-mail thread starting on p. A-8). Outflows have commonly been regulated to releases less than the hydrologic standards referenced in Criterion A.2. For example, the Montana method conservation flow for “good” habitat is 30% of the average daily flow, or approximately 180 cfs at the site using the downstream U.S. Geological Survey gage record from 1941-2013 (599 cfs x 30%). In late May 2013, USACE was releasing only 50 cfs (0.15 csm) for five consecutive days.³ In August 2012, USACE was releasing 58 cfs (0.17 csm) for five consecutive days. On both occasions, inflows were substantially higher.⁴

The Pittsburgh District of USACE is in the process of revising the water control manuals for the 16 reservoirs under its management. Mahoning is scheduled for 2015/2016 according to the USACE website:

<http://www.lrp.usace.army.mil/Missions/Planning,ProgramsProjectManagement/HotProjects/WaterControlManuals.aspx>

This revision represents an opportunity to address downstream flow management issues with resource agencies. (For example, the current manual prescribes a minimum flow of only 30 cfs (0.09 csm) when the summer pool is being reestablished in May.)

The record on whether the flows downstream of the new hydroelectric facility will be managed in a manner that protects aquatic resources is mixed. Under Criterion A.3, the applicant is responsible for demonstrating that flows are adequately protective and for furnishing a Resource Agency letter or letters confirming the demonstration. Based on personal communications with the PFBC during this application review, habitat conditions, including water quality, have improved in the river basin, leading to the recolonization of sensitive fish species in the mainstem of the river and its tributaries, including Mahoning Creek. Recent surveys (2008-2011, unpublished) on lower Mahoning Creek documented the recent return of several sensitive native fish including the Tippecanoe darter, the Bluebreast darter, Streamlined chub, River redhorse, Ohio lamprey and Freshwater Drum (personal communication with PFBC, 2014). Concern has been expressed by fish resource managers that elevated reservoir releases that may be colder may disrupt the ongoing recovery of the warmwater fish populations.

³ See the e-mail and graph in the Appendix, pp. A-12 to 13.

⁴ The spreadsheet contains estimates of hourly inflow and outflow. A U.S. Geological Survey gaging station (#03036000) is located 0.9 mile downstream of the dam. A second mainstem gage (#03034000) is located well upstream of the reservoir. The respective drainage areas at the gage stations are 344 square miles and 158 square miles; the drainage area at the USACE dam is 340 square miles.

PFBC filed a letter dated April 2, 2014, with LIHI supporting the certification application (see pp. A-6 to 7 of the Appendix). Although PFBC states that flows are “appropriately protective of habitat and aquatic life in bypassed reaches and further downstream”, it does not explain the basis for its assertion that the flows downstream of the tailrace are protective.



Figure 7. Stilling basin below the Mahoning Creek dam

LIHI Questionnaire: Flows	
A.1	Is the Facility in <i>Compliance with Resource Agency Recommendations</i> issued after December 31, 1986 regarding flow conditions for fish and wildlife protection, mitigation and enhancement (including in-stream flows, ramping and peaking rate conditions, and seasonal and episodic instream flow variations) for both the reach below the tailrace and all bypassed reaches?
	Reviewer Analysis/Conclusions: No Resource Agency Recommendations have been made in a regulatory or legal proceeding. N/A = Go to A.2
A.2	If there is no flow condition recommended by any Resource Agency for the Facility, or if the recommendation was issued prior to January 1, 1987, is the Facility in Compliance with a flow release schedule, both below the tailrace and in all bypassed reaches, that at a minimum meets Aquatic Base Flow standards or “good” habitat

	flow standards calculated using the Montana-Tennant method?
	Reviewer Analysis/Conclusions: USACE regulates downstream flows, and no environmental flows are provided for habitat protection consistent with the A.2 hydrologic standard setting values (e.g., Montana method conservation flow of 180 cfs). No = Go to A.3
A.3	If the Facility is unable to meet the flow standards in A.2., has the Applicant demonstrated, and obtained a letter from the relevant Resource Agency confirming that demonstration, that the flow conditions at the Facility are appropriately protective of fish, wildlife, and water quality?
	A letter from PFBC was provided representing that flows are appropriately protective. The only substantiation is in the fact that warmwater fish populations are recovering below the dam. YES = PASS

A. Water Quality

As discussed above under Flows, post-construction water quality impacts are controlled under the USACE adaptive management plan and the MOA. DEP's Water Obstruction and Encroachment Permit No. E03-451 (February 19, 2013) certifies the Facility for the purposes of federal Clean Water Act Section 401. Special Condition F of the permit requires the operation to conform to the AMP "to insure that water quality is maintained within the reservoir, stilling basin, and within Mahoning Creek below the stilling basin." The permit makes any revisions of the AMP subject to DEP approval prior to implementation. Special Condition G requires monthly and annual water quality reporting; if deviations from the standards are detected, reporting becomes weekly and corrective actions must be taken. If the Applicant's corrective actions are unsuccessful, Special Condition H requires consultation with DEP to identify ways of coming into compliance.

The waters of Mahoning Creek from and including the reservoir waterbody downstream to the Allegheny River are not 303(d) listed as impaired. (2012 Pennsylvania Integrated Water Quality Monitoring and Assessment Report)

LIHI Questionnaire: Water Quality	
B.1	Is the Facility either: a) In Compliance with all conditions issued pursuant to a Clean Water Act Section 401 water quality certification issued for the Facility after December 31, 1986? Or b) In Compliance with the quantitative water quality standards established by the state that support designated uses pursuant to the federal Clean Water Act in the Facility area and in the downstream reach?
	Reviewer Analysis/Conclusions: The Project is subject to a water quality certification issued by Pennsylvania DEP in 2013, and the Applicant appears to be in compliance. YES to (a)
B.2	Is the Facility area or the downstream reach currently identified by the state as not meeting water quality standards (including narrative and numeric criteria and

	<p>designated uses) pursuant to Section 303(d) of the Clean Water Act?</p> <p>Reviewer Analysis/Conclusions: Swift Creek is not 303(d) listed (2012 list).</p> <p>NO = PASS</p>
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B. Fish Passage and Protection

There are no migratory or riverine fish passage prescriptions for Mahoning Creek nor are there any reservations of authority to prescribe passage in the existing license (License at p. 6). The river is a headwater stream in the Ohio River basin; the Ohio River is a major branch of the Mississippi River. Mahoning Creek did not historically support migratory fish.

In FERC's Supplemental EA (October 20, 2010), FERC staff estimated that the passage survival of fish entrained at the project would likely exceed 90 percent for the proposed turbines; however, staff concluded that the intake structure design, including trashracks with a 1-inch clear spacing and approach velocities of no greater than 1 foot per second, would limit entrainment and adequately protect the upstream fish community. To ensure that the intake structure is designed appropriately to protect fisheries resources, Article 403 required Mahoning Hydro to prepare an intake structure design plan in consultation with the Corps and for Commission approval. By letter dated October 19, 2012, the intake design was filed with FERC; however, there is no record that FERC ever issued an order approving the design. Nonetheless, FERC's New York Regional Office, which oversees construction, did issue a notice to process with construction of the intake on March 12, 2013. Since it appears that the intake design was never approved by FERC, I recommend that a LIHI certification, if granted, be conditional on the Applicant following through with FERC to insure that the design is sufficient for its intended purpose.

PFBC indicated that, while passage measures for connectivity would be desirable, it has not requested such measures at Mahoning Creek Dam.

LIHI Questionnaire: Fish Passage and Protection	
C.1	<p>Are anadromous and/or catadromous fish present in the Facility area or are they know to have been present historically?</p> <p>Reviewer Analysis/Conclusions: No.</p> <p>NO= Go to C.6</p>
C.6	<p>Is the Facility in Compliance with Mandatory Fish Passage Prescriptions for upstream and/or downstream passage of Riverine fish?</p> <p>Reviewer Analysis/Conclusions: There are no prescriptions for riverine fish.</p> <p>N/A = Go to C.7</p>
C.7	<p>Is the Facility in Compliance with Resource Agency Recommendations for Riverine, anadromous and catadromous fish entrainment protection, such as tailrace barriers?</p> <p>Reviewer Analysis/Conclusions: Entrainment protection is required under the license, Article 403. It appears that, through an administrative oversight at FERC, no order approving the design was ever issued prior to construction.</p> <p>YES (so long as the condition recommended on p. 8 is attached to the certification)</p>

	= PASS
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C. Watershed Protection

The lands at the Project site are primarily in USACE ownership or control, including the reservoir flowage. The Applicant does not have any control or land management obligations with respect to the reservoir shoreline, nor is there an Applicant administered shoreland management plan. The Applicant has not created a watershed enhancement fund, nor has the Applicant conserved lands in the basin for mitigation purposes.

LIHI Questionnaire: Watershed Protection	
D.1	Is there a buffer zone dedicated for conservation purposes (to protect fish and wildlife habitat, water quality, aesthetics and/or low-impact recreation) extending 200 feet from the high water mark in an average water year around 50 - 100% of the impoundment, and for all of the undeveloped shoreline?
	<i>Reviewer Analysis/Conclusions:</i> The shorelands are owned or controlled, and managed , by USACE. NO = Go to D.2
D.2	Has the facility owner/operator established an approved watershed enhancement fund that: 1) could achieve within the project's watershed the ecological and recreational equivalent of land protection in D.1.,and 2) has the agreement of appropriate stakeholders and state and federal resource agencies?
	<i>Reviewer Analysis/Conclusions:</i> There is no watershed enhancement fund. NO = Go to D.3
D.3	Has the facility owner/operator established through a settlement agreement with appropriate stakeholders and that has state and federal resource agencies agreement an appropriate shoreland buffer or equivalent watershed land protection plan for conservation purposes (to protect fish and wildlife habitat, water quality, aesthetics and/or low impact recreation).
	<i>Reviewer Analysis/Conclusions:</i> There is no settlement agreement. NO = Go to D.4
D.4	Is the facility in compliance with both state and federal resource agencies recommendations in a license approved shoreland management plan regarding protection, mitigation or enhancement of shorelands surrounding the project?
	<i>Reviewer Analysis/Conclusions:</i> There is no license approved shoreland management plan. N/A = PASS

D. Threatened and Endangered Species Protection

As part of the licensing and permitting process, the Applicant evaluated the potential for the Project to negatively impact threatened and endangered species. A natural resource and wetland Study was completed in order to determine the potential for listed species to occur in the project

area. The study included a search of the Pennsylvania Natural Diversity Inventory (PNDI) to identify known endangered species in the project area and a review of the USFWS's Federally Listed, Proposed, and Candidate Species in Pennsylvania. In addition, a freshwater mussel and fish survey was completed. These studies indicated that the Project would have no significant impact on any threatened or endangered species.

Because the results of the PNDI search are only considered valid for one year, additional PNDI searches have been conducted periodically to support various permit applications, with the latest conducted in late 2012. These searches indicate that the project would have no impact on any threatened or endangered species.

PFBC indicated in a letter dated April 2, 2014 (appended), that it is unaware of any listed species "affected by the project."

LIHI Questionnaire: Threatened and Endangered Species Protection	
E.1	Are threatened or endangered species listed under state or federal Endangered Species Acts present in the Facility area and/or downstream reach?
	<i>Reviewer Analysis/Conclusions:</i> The available documentation does not indicate current presence of state or federally listed T&E species in the Facility area. NO = PASS

E. Cultural Resource Protection

License Article 406 requires the Applicant to implement a Programmatic Agreement (PA) executed on November 16, 2010, between the Commission and the State Historic Preservation Officer (SHPO). The PA requires the licensee to develop a Historic Properties Management Plan (HPMP) that provides for the consideration, management, and protection of both known and newly discovered historic properties during construction, operation, and maintenance of the project. The HPMP was to be filed within one year of license issuance (by March 3, 2012) for FERC approval. The plan was approved by FERC order dated January 7, 2013.

The Project's HPMP (March 2012) indicates, based on research and a 2007 Phase I archaeological survey, that there were no identifiable potential effects on historic properties from construction and operation of the Facility. The HPMP controls future activities to assure continued protection.

LIHI Questionnaire: Cultural Resource Protection	
F.1	If FERC-regulated, is the Facility in Compliance with all requirements regarding Cultural Resource protection, mitigation or enhancement included in the FERC license or exemption?
	<i>Reviewer Analysis/Conclusions:</i> No conflicts were identified in the record. The HPMP provides for future protection of previously unidentified historic properties during the course of constructing, maintaining, or developing project works. YES = PASS

F. Recreation

The USACE Mahoning Creek Lake project area covers approximately 2,707 acres of land and 280 acres of water. The lake provides fish and wildlife habitat and recreation opportunities such as picnicking, sightseeing, hiking, camping, boating, and fishing. Sport fishing occurs for pike, walleye, muskellunge, channel catfish, crappie, and bass. Two USACE-operated recreation areas are located on the north shore of Mahoning Creek directly across from the hydropower project site. The outflow fishing area provides fishing access to the stilling basin, a playground, accessible restroom facilities, potable water, a picnic shelter and 17 picnic tables, and bank fishing access. The dam site picnic area is adjacent to the fishing area and provides a picnic area with tables and grills, a playground, potable water, walking trails, an overlook pavilion, and a visitors' center. An additional parking area serves an angler trail that leads from the parking area to the shoreline upstream from the dam. A 12.5-mile section of Class I-II whitewater is located starting about 4,000 feet below the dam. (FERC Supplemental EA, October 20, 2010)

As part of the licensing, the Applicant proposed construction of an ADA compliant fishing pier on the north shoreline of the stilling basin. Article 405 requires Mahoning Hydro to construct the proposed fishing pier and access ramp in the stilling basin, with fish attraction structures, an interpretive display, and stairs leading from the pier to the shoreline. The licensee was further required to submit a recreation and aesthetics plan for providing the proposed fishing access improvements within six months of license issuance, and to minimize effects on visual resources by designing and constructing the powerhouse to blend into the existing environment, as proposed. The Article 405 plan was filed with FERC by letter dated January 13, 2012. By order dated May 15, 2012, FERC modified and approved the plan, requiring completion of construction within 90 days of order issuance. The completion deadline has been extended three times, with the latest extension to August 13, 2014 granted by order dated February 7, 2014. The Applicant is presently redesigning the pier.

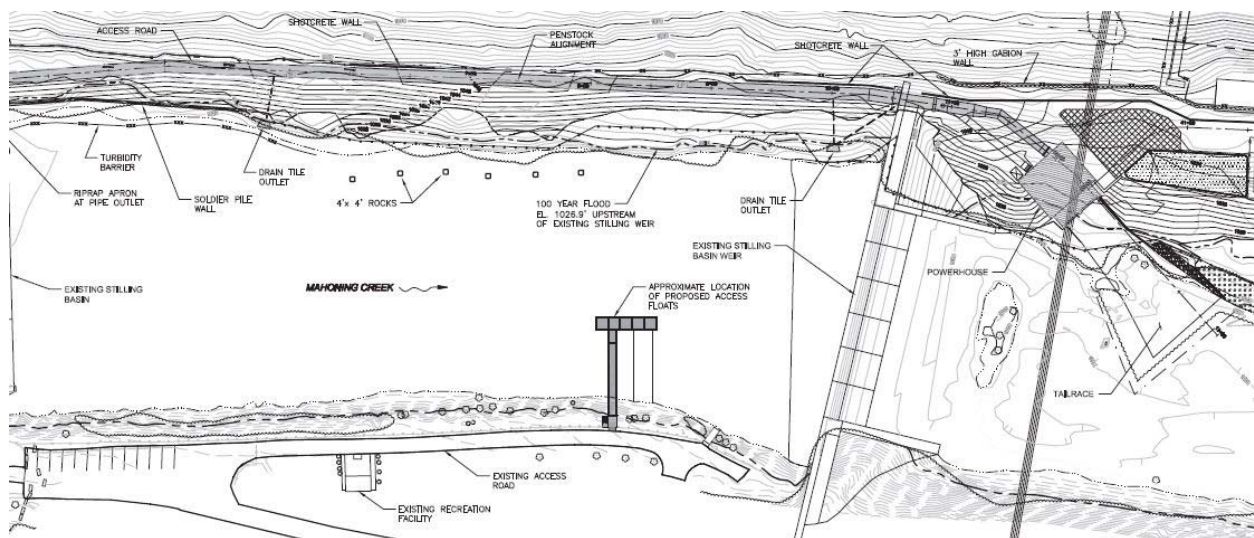


Figure 8. Location of proposed fishing access floats and gangway.

The lands enclosed in the project boundary are limited, encompassing the project civil works and the fishing access area on the north bank.

LIHI Questionnaire: Recreation	
G.1	If FERC-regulated, is the Facility in Compliance with the recreational access, accommodation (including recreational flow releases) and facilities conditions in its FERC license or exemption?
	<i>Reviewer Analysis/Conclusions:</i> FERC has granted an extension until August 13, 2014 for completion of improvements under the recreation plan. YES = Go to G.3
G.3	Does the Facility allow access to the reservoir and downstream reaches without fees or charges?
	<i>Reviewer Analysis/Conclusions:</i> Access is available on USACE lands. YES = PASS

G. Facilities Recommended for Removal

This is a USACE flood control dam. There is no record of a dam removal request during the licensing process.

LIHI Questionnaire: Facilities Recommended for Removal	
H.1	Is there a Resource Agency Recommendation for removal of the dam associated with the Facility?
	<i>Reviewer Analysis/Conclusions:</i> There is no record that dam removal has been recommended at any time by a resource agency. NO = PASS

APPENDIX

Contents

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TO: LOW IMPACT HYDROPOWER INSTITUTE
FROM: DAVID FOX
SUBJECT: RESPONSES TO LIHI FOLLOW UP QUESTIONS RE: MAHONING CREEK HYDRO APPLICATION
DATE: FEBRUARY 3, 2014

LIHI Question 1:

Would you mind letting me know whether the description (pasted below) from the FERC license accurately describes the project as constructed

C. Hydropower Project Facilities

8. The proposed project will include:

(1) a new 50-foot-high intake structure attached to the upstream face of the dam, equipped with removable trashracks (with 1-inch spacing), dewatering bulkhead panels, and a vertical slide gate; (2) a new lining on the existing (currently plugged), 108-inch-diameter conduit that passes through the dam; (3) a new buried 1,090-foot-long, 120-inch-diameter penstock on the left (south) bank, bifurcating into two new 110-foot-long, 96-inch-diameter penstocks; (4) a new powerhouse located approximately 100 feet downstream of the existing stilling basin weir and containing two new Kaplan turbine generator units with a total installed capacity of 6.0 MW; (5) a new 40-foot-wide, 150-foot-long, 10-foot-deep tailrace; (6) a new 2.2-mile-long, 25-kilovolt transmission line; (7) a new 100-foot-long bridge spanning a small stream and connected to a refurbished existing 0.5-mile-long access road; and (8) appurtenant facilities.

EH Response:

Minor changes have been made to the project design since the FERC license was issued. Because these changes were not considered material, it was determined that they do not require a license amendment. FERC reviewed the final design and granted approval to start construction. In addition, FERC was involved in project oversight during the construction of the facility.

The project description above should read as follows:

1. A 16-foot-high intake structure attached to the upstream face of the dam, equipped with removable trashracks (with 1-inch spacing), and a vertical roller gate.
2. A steel lining of the existing (previously plugged), 108-inch-diameter conduit that passes through the dam.
3. A 108-inch butterfly valve within a valve vault at the downstream toe of the dam.
4. A 43-foot-long 108-inch buried steel penstock transitioning to a 936-foot-long 120-inch buried steel penstock that bifurcates into a 84-foot-long 96-inch steel penstock and a 95-foot-long 72-inch steel penstock.
5. A powerhouse located approximately 120 feet downstream of the existing stilling basin weir and containing two new vertical Francis turbine generator units (one 4 MW unit and one 2 MW unit) with a total installed capacity of 6.0 MW.
6. A 40-foot-wide, 150-foot-long, 10-foot-deep tailrace.
7. A transformer, switching vault, and 630-foot-long underground transmission line connecting to a new 1.12-mile-long, 25-kilovolt transmission line.
8. A 100-foot-long bridge spanning a small stream and connected to a refurbished existing 0.56-mile-long access road.
9. Appurtenant facilities



LIHI Question 2:

There is a discrepancy between the description of the sluice gates in your LIHI application and the description contained in the Article 307 plan. Both are also pasted below. Your description appears to be the same as is in the FERC license; the Art. 307 plan, however, is consistent with information on the Corps website.

Article 307 Description:

length of 926 ft and a maximum height above the creek bed of 162 ft. There are five existing outlet conduits passing through the dam. The three main sluices are 5 ft, 10-in wide by 10 ft high located in the center monoliths 11, 12 and 13 of the spillway. Flows through these outlets are controlled by hydraulically operated slide gates. The gates open upward. The invert elevation is EL 1,015 ft¹². In the centerline of the spillway monolith 10 is a low flow conduit, 4 ft in diameter equipped with a 36 inch electrically operated ring jet valve. In the centerline of monolith 9 there is an electrically operated 24-inch ball valve at centerline elevation EL 1,026 ft.

Our LIHI Application and FERC License:

the dam for future hydropower development. The USACE project consists of: a 162-foot-high, 926-foot-long dam with 192-foot-long spillway section equipped with five 29-foot-high, 30-foot-long vertical lift gates (i.e., sluice gates),

EH Response:

The Mahoning Dam outlet works consist of the following:

- Three 5-ft 8-in wide by 10-ft high sluice gates.
- One 4-ft diameter low flow conduit with a 36-inch electrically operated ring jet valve.
- One 24-inch electrically operated ball valve.
- Five 29-ft high by 30-ft wide vertical lift gates.

The sluice gates, ring jet valve, and ball valve are used for normal flow releases. The five vertical lift gates were installed to release water during significant flooding events.

LIHI Question 3:

In your license status table, you indicate that Article 402 (water quality monitoring plan) was satisfied; however, I didn't find the FERC order. Could you provide a copy of the order and the plan? Perhaps that is the same as the Adaptive Management Plan.

EH Response:

The WQ Monitoring Plan was approved by both the USACE and the PA DEP, and is being fully implemented as required. However, the plan was not submitted to FERC until January 29, 2014 due to an administrative oversight. MCHC discussed this issue with the FERC Aquatic Resources Branch Chief prior to filing the Water Quality Monitoring Plan. Please see the 1/29/2014 FERC filing for a full explanation and a copy of the Plan.



LIHI Question 4:

The Response Narrative for Flows filed as part of your LIHI application indicates that a minimum flow of 60 cfs applies to the period June 15 – September 15. However, the FERC order approving the Operations Plan has 30 cfs from April through October and 40 cfs for the rest of the year. Apparently, FERC was approving the Kleinschmidt filing dated October 24, 2012 (Construction Regulating Plan) and not the November 2012, Operations Plan, a copy of which you provided with the LIHI application. The later has the 60 cfs in it. Can you please clarify?

EH Response:

The FERC order approving the Operations Plan was issued prior to the final negotiations with the USACE regarding minimum releases

Subsequently, MCHC completed final negotiations with the USACE, which resulted in the following minimum flow requirements:

- June 15 through September 15: 60 CFS
- November 1 through March 31: 40 CFS
- April 1 through June 14: 30 CFS
- September 16 through October 31: 30 CFS

The Adaptive Management Plan (AMP), dated October 2012 is the primary document that establishes the agreed upon minimum flows. The December 2013 Operational Memorandum of Agreement between MCHC and the USACE, the Section 401 Permit, and the Section 404 permits all require that MCHC adhere to the AMP.

LIHI Question 5:

The license describes the turbine capacity as follows, “The operational range of each of the two turbines will be from 79 to 438 cfs; therefore, the minimum and maximum hydraulic capacity of the project will be 79 and 876 cfs, respectively.” However, later documents, including the FERC order approving the operations plan, contain a table showing the flow to the powerhouse as ranging from 109-875 cfs. Please clarify what the low end capacity of the station is.

EH Response:

Following the issuance of the Original FERC license, the turbines were switched from Kaplan machines to Francis machines. The final low end capacity specifications of the turbines are as follows:

- 2-MW Francis Turbine: 109 CFS
- 4-MW Francis Turbine: 280 CFS

As a result, the low end capacity of the station is 109 CFS.



LIHI Question 6:

What the status is with respect to the Corps 404 authorization special conditions?

1. You must develop and implement a yearly monitoring plan and report for the mitigation/replanted riparian area. This monitoring plan shall be submitted to this office annually (by December 31st of the year) for a minimum of five years. This will include a minimum of two inspections per year for the first three years, and one inspection per year for the remaining years (site inspections should occur during the growing season). This report should include but is not limited to information regarding the survival rate of the trees, shrubs, and herbaceous vegetation planted in the impacted riparian areas. Plantings must meet or exceed an 80% survival rate (planted at 400 stems per acre) by the end of the third growing season. No less than 4 species (native to Pennsylvania) per stratum should be planted, and no single species planted shall comprise greater than 33% of total area coverage or corrective measures will be required. The monitoring area consists of: a 1000 foot by 50 foot riparian area (1.1 acre) starting at the gate valve and ending at the unnamed tributary crossing, additionally a floodplain riparian planting area of trees and woody plant species to the west of the tailrace which totals 0.077 acre. Monitoring information collected should include but is not limited to:
 - Colored photographs (location and direction of the photos must be indicated on plan view drawings).
 - Description of physical conditions before and after restoration activities.
 - A description of any adaptive management performed during the monitoring period.
2. All temporary stream construction entrances must be removed, stabilized, and re-seeded immediately upon project completion.
3. The 260 linear foot temporary bladder dam to be used during the construction of the tailrace, and 0.06 acre of riprap for temporary work pad associated with bladder dam must be completely removed from the Mahoning River upon completion of the phase of the project it is installed for. The waterway must be completely restored to original contours. You must notify this office in writing upon removal/restoration of this location.



EH Response:

Special Condition 1:

The required monitoring plan is currently being developed and will be submitted to the USACE once complete. Planting and restoration of the riparian area will occur in the spring of 2014. Monitoring will commence once the required planting has been completed.

Special Condition 2:

All temporary stream construction entrances have been removed. Final site restoration and re-seeding will occur in the spring of 2014.

Special Condition 3

The waterway has been completely restored to original contours. MCHC is currently in the process of issuing the required notices related to construction completion to the appropriate regulatory authorities.



Pennsylvania Fish & Boat Commission

Division of Environmental Services

450 Robinson Lane
Bellefonte, PA 16823
Phone: 814-359-5133
Fax: 814-359-5175

April 2, 2014

Low Impact Hydropower Institute
c/o Michael Sale, Executive Director
704 Potters Falls Road
Wartburg, TN 37886

Re: Low Impact Hydropower Institute (LIHI) Certification for the Mahoning Creek Hydroelectric Company, LLC Mahoning Creek Hydroelectric Project, Mahoning Creek Dam, Armstrong County, PA (FERC Project No. P-12555-000)

Dear Mr. Sale:

The Pennsylvania Fish and Boat Commission (PFBC) has reviewed subject project information on the LIHI website and discussed the project with the Corps of Engineers – Pittsburgh District and Enduring Hydro representatives. Based on our review, we believe the Mahoning Creek Hydroelectric Company, LLC (“MCHC”) Mahoning Creek Dam hydroelectric project meets the LIHI’s standards of a low impact hydro facility. We have provided some comments below based on LIHI’s December 2013 questionnaire to substantiate this position.

A. Flows

The U.S. Army Corps of Engineers authored the Adaptive Management Plan submitted as part of the LIHI application. The plan directly addresses flow with a three tiered seasonal flow through the bypassed stilling basin, which contains a fish community. Flow is managed by the Corps for its District management objectives, which include supporting water quality. PFBC supports the Adaptive Management Plan. MCHC does not dictate the release schedule and has agreed to comply with the Adaptive Management Plan by signing an Operational Memorandum of Agreement with the Corps on December 16, 2013, which requires compliance with the Adaptive Management Plan. The PFBC agrees that operation of the dam results in flows that are appropriately protective of habitat and aquatic life in bypassed reaches and further downstream. Operation is consistent with Commonwealth of Pennsylvania Fishing and Boating Regulations, Title 58. Pennsylvania Code §57.23, which states:

Operators of dams and hydropower installations shall maintain adequate continuous stream flows over the dam to protect fisheries resources and habitat located between the toe of the dam and the tailrace of the hydrounits. The habitat which is necessary for any portion of the life cycle of existing or potential fisheries must receive adequate flow to maintain such habitat in usable condition.

B. Water Quality

The Adaptive Management Plan sets water quality limits for dissolved oxygen, total dissolved gasses and temperature. PFBC agrees with the Corps determination, and MCHC has committed to operating the hydropower project to ensure that existing water quality is maintained. Since existing Mahoning Creek water quality has exceeded Pennsylvania Water Quality Standards, compliance with the Adaptive Management Plan was critical for PFBC to concur that water quality is properly addressed.

Our Mission:

www.fish.state.pa.us

To protect, conserve and enhance the Commonwealth’s aquatic resources and provide fishing and boating opportunities.

Mr. Michael Sale
April 2, 2014
Page 2

Operation is consistent with Commonwealth of Pennsylvania Fishing and Boating Regulations, Title 58. Pennsylvania Code §57.24, which states:

Water quality must not be adversely affected by the hydrodevelopment.

C. Fish Passage and Protection

Anadromous and catadromous fish have not been present in recent history in the area of the Mahoning Creek Dam. Due to poor water quality over the last 150 years, fish populations have been disjunct in the Mahoning Creek basin. Although a fish passage facility would improve connectivity of the fish community, PFBC has not formally requested fish passage. Therefore, we conclude that fish passage and protection measures have been met.

D. Watershed Protection

Lands surrounding this project are managed by the Corps of Engineers – Pittsburgh District. There is a forested buffer around the lake, over which MCHC has no control over.

E. Threatened and Endangered Species Protection

PFBC is aware of no state or federally threatened or endangered aquatic species affected by this project.

F. Cultural Resource Protection

Our agency has no jurisdiction over cultural resources and therefore offers no comment.

G. Recreation

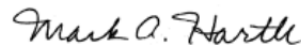
MCHC has agreed to provide a handicapped accessible fishing pier on the north bank of the stilling basin and has provided a conceptual design, which is acceptable. Construction is scheduled for completion by August 2014. Based on comments from the PFBC, MCHC has agreed to improve the existing informal angler access path along Corps of Engineers property for approximately 100 to 150 meters downstream of the steps at the parking area to provide safer travel for able bodies anglers. MCHC has agreed to comply with all PFBC recommendations for recreation.

H. Facilities Recommended for Removal

Our agency is not aware of any recommendation to remove this dam or associated facilities.

Thank you for considering our comments. I may be reached at (814) 359-5133 or mhartle@pa.gov if you have any questions.

Sincerely,



Mark A. Hartle, Chief
Aquatic Resources Section
Division of Environmental Services

c: LIHI – Tara Moberg
PFBC – R. Lorson
USACOE – Pittsburgh District – Rose Reilly
Enduring Hydro, LLC – David Fox

-----Original Message-----

From: Reilly, Rosemary J LRP
[mailto:Rosemary.J.Reilly@usace.army.mil]
Sent: Thursday, February 06, 2014 10:26 AM
To: Jeffrey Cueto
Cc: Benedict, Jeffrey M LRP
Subject: RE: [EXTERNAL] Mahoning (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Jeff,

More clarity from our Water Managers: To "maintain a minimum flow" means that they would maintain that flow or higher, never below. We rarely need to go that low.

Rose

-----Original Message-----

From: Reilly, Rosemary J LRP
Sent: Thursday, February 06, 2014 10:23 AM
To: 'Jeffrey Cueto'
Cc: Benedict, Jeffrey M LRP
Subject: RE: [EXTERNAL] Mahoning (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Jeff,

Our Water Managers use both observed and computed inflow data. COMP stands for computed. The computed inflow is based on reservoir storage & therefore includes evaporation and other tributary contributions. If evaporation is greater than the inflow, the computed value is negative.

You are correct about the paragraph below. My mistake. However, and regardless of what is in the Water Control Manual (it is out of date) according to our Water Managers, they rarely release only 30 cfs. Attached is a summary of outflow distribution at Mahoning Dam with and without hydropower generation is attached FYI.

Rose

From: Jeffrey Cueto [mailto:ompompanoo@aol.com]
Sent: Thursday, February 06, 2014 8:59 AM
To: 'Reilly, Rosemary J LRP'
Subject: Mahoning

Rose – If I could get a response this week, I'd very much appreciate it. Regarding my first question, there are two inflow columns in the data spreadsheet, and it's not clear how they are derived.

Thanks.

Jeff

From: Jeffrey Cueto [mailto:ompompanoo@aol.com]
Sent: Monday, February 03, 2014 10:37 AM
To: 'Reilly, Rosemary J LRP'
Subject: RE: [EXTERNAL] Mahoning Creek Hydroelectric Project (UNCLASSIFIED)

Thanks, Rose. A few quick questions:

1. What is "COMP. FLOW-RES. IN" in the spreadsheet?
2. How are reservoir inflows estimated? Quite a few inflow values are extremely low for such a large watershed.
3. You say that the reservoir is regulated to 30 cfs only during flood events, but the text you provided suggests that the intent is to release 30 cfs to raise the reservoir back up to summer levels in May. (The highlighted text in the first paragraph.)

Jeff

From: Reilly, Rosemary J LRP [mailto:Rosemary.J.Reilly@usace.army.mil]
Sent: Monday, February 03, 2014 8:44 AM
To: Jeffrey Cueto
Cc: Benedict, Jeffrey M LRP
Subject: RE: [EXTERNAL] Mahoning Creek Hydroelectric Project (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Jeff, (view in rich text format)

See attached Mahoning Creek Lake flow and pool elevation data. Note that we reduced flow for a few hours in May 2012 and May 2013 as you observed for periodic inspections of our dam, not to maintain the pool elevation. However, and as I mentioned, the only time we regulate for 30 cfs is during flood events. The minimum flow is almost always higher than the inflow, so is definitely "appropriately protective". What the IHA shows is that low flows are too high, but modification back to natural conditions would impact flood control. A few paragraphs from our water control manual for Mahoning Creek Lake follow FYI.

We also have no problem making small flow adjustments at Mahoning Dam, though it's hard to measure exactly when the outflow is below 50 cfs.

We are well aware that the bypass flow in the MOA is not appropriate for Mahoning Creek. I recommend that you read our comments on the license application. Neither FERC nor the resource agencies supported our recommendation for an appropriate seasonal bypass flows based on actual operations at Mahoning Dam. That is why we required that the stilling basin (bypass reach) be monitored real-time throughout the duration of the license, and reserve the right to modify conditions of the MOA if negative impacts are observed.

Rose

Mahoning Creek Reservoir Regulation Manual, November 1974

“The normal reservoir inflow for May is about 700 c.f.s. The 5,040 acre feet of storage necessary to raise the pool to elevation 1098 during this month will require an average excess of inflow over outflow of 81 c.f.s. The lowest mean inflow of record for May was 218 c.f.s. The probability of raising the pool to elevation 1098 by the end of May is thus virtually 100 percent. The normal minimum flow of 30 c.f.s. will be maintained in Mahoning Creek below the dam during the impoundment period.”

“For the period from June through the first week in September; the pool will fluctuate between elevations 1098 and 1101 during normal flow; with an average elevation of about 1099. No change in the present flow release schedule will be necessary; as the inflow will be passed to hold the pool within the three-foot range except during periods of excessive runoff. The difference in storage between elevations 1098 and 1101 is approximately the same as that between elevations 1075 and 1080.”

The Minor Rise schedule is designed to regulate flow and storage during those periods when moderate rainfall or snowmelt result in minor flood waves which do not attain bankfull proportions along the river system. Operations for minor rises are generally made for two conditions. The most common condition is that occurring with low inflow and outflow prior to a river rise. Operations under this condition are usually made after the end of rainfall or at such a time as maximum inflow or downstream stages are estimated to result in conditions of less than critical magnitude. The second condition occurs when high outflows are being released from previous flood runoff storage. Immediate slide gate operation to minimum scheduled openings shall be made when basin rainfall becomes appreciable.

Higher outflow shall be resumed when an accurate knowledge of rainfall and runoff is determined. These operations will generally result in an outflow hydrograph of similar proportions to the inflow graph delayed by about one day's storage.

The Flood schedule covers those periods when runoff from rainfall and/or snowmelt is sufficient to cause main river or tributary flow to exceed bankfull capacity. Such conditions may occur after a period of low flow, but they occur more often after minor rises have

contributed to stream flows. If, at the time of storm inception, reservoir outflow is within the limits of the normal range, no change in the outflow rates is necessary until later conditions warrant. If outflow is appreciable an initial reduction in outflow to the normal for the storage period shall be made immediately. Reduction below the normal shall be subsequently made if forecasts of reservoir inflow and downstream flood stages indicate optimum reductions could be effected by additional storage. With ordinary flood conditions, when runoff storage is not predicted to exceed reservoir full level the crest gates, which are normally 2.5 feet open, shall be closed before elevation 1135 is reached. When runoff is sufficient to exceed reservoir full elevation 1162 and surcharge storage may result, some or all of the crest gates shall be used to afford a greater passing flow throughout the flood and provide surcharge storage capacity. After the flood has crested, release from storage shall be coordinated with stream flow in the down-river channels so that increased discharge from the reservoir will arrive down-river after critical stages have passed and a recurrence of damaging stages will not be caused. These releases must be coordinated with those from the other flood control reservoirs of the upper Ohio River basin.

Release from storage shall continue at the maximum allowable rate either until excess storage is depleted or until recurrence of critical meteorologic or river conditions would warrant a return to the flood storage operation. With extraordinary floods, when the passing flow required by the crest gates to prevent overtopping will exceed the bankfull stream capacity below the dam, maximum openings of the gates should be attained prior to or shortly after the reservoir pool reaches the fixed spillway crest. No change shall be made in gate settings after the maximum pool elevation is reached until the outflow recedes to bankfull capacity.

From: Jeffrey Cueto [<mailto:ompompanoo@aol.com>]
Sent: Sunday, February 02, 2014 4:29 PM
To: Reilly, Rosemary J LRP
Subject: RE: [EXTERNAL] Mahoning Creek Hydroelectric Project (UNCLASSIFIED)

Rose – Thanks for taking the time to chat with me last Friday about this project. As I understand it, the Corps dams in your district do not currently have any specific protocols in place to provide conservation flows for downstream habitat protection. You mentioned that the Corps has been working in partnership with the Nature Conservancy to identify and incorporate environmental flows into the management of its dams. IHA (Indicators of Hydrologic Alteration) modeling is being used. You stated that flows can essentially be shut down during flood and maintenance operations. You offered to provide additional information on flow releases from Mahoning Creek Dam based on the operation manual. Please let me know whether I am remembering our conversation accurately. I look forward to your response.

Regards,
Jeff

From: Jeffrey Cueto [<mailto:ompompanoo@aol.com>]
Sent: Monday, January 13, 2014 5:42 PM
To: 'Reilly, Rosemary J LRP'
Subject: RE: [EXTERNAL] Mahoning Creek Hydroelectric Project (UNCLASSIFIED)

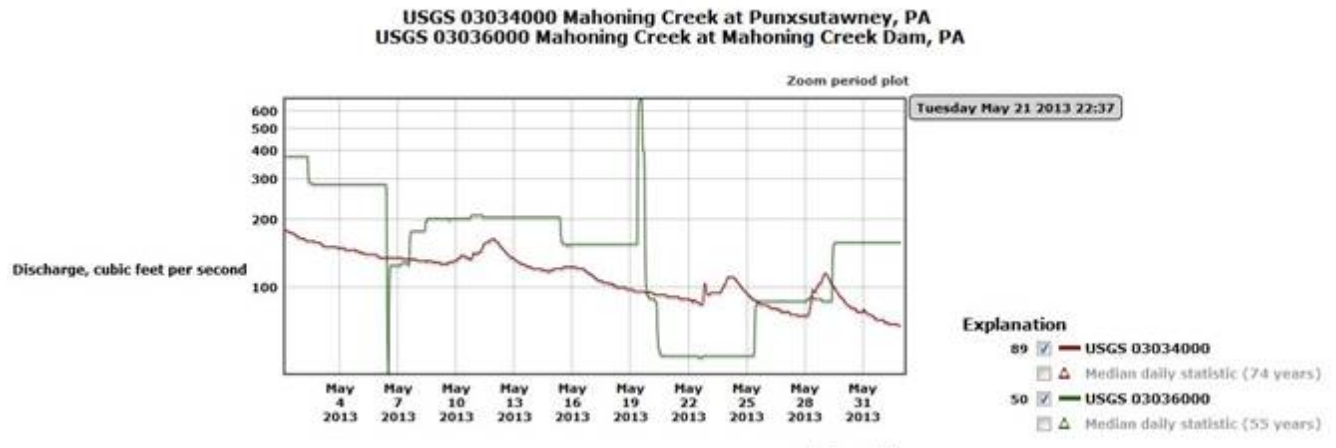
Rose – Thank you very much for your comprehensive reply. I am fairly familiar with the AMP and the related water quality concerns. It looks like that aspect of the hydroelectric project is being addressed very thoroughly through the ongoing water quality monitoring and the Corps/licensee MOA. I'm a bit more focused right now on the impact of artificial flow management on below-tailrace aquatic habitat. Normally, FERC addresses this in the licensing process, but this case is different due to the Corps ownership and the fact that the licensee is not determining the flow releases from the dam.

I formerly worked for the Vermont Agency of Natural Resources managing the Agency's participation in the FERC process and its water quality certification program. We also partnered with the Corps on adapting their management of dams to comply with water quality standards, including the flow management aspect of operations. Some dams could only make fairly coarse flow adjustments due to the gate sizes. That doesn't appear to be the case at Mahoning Creek since there is a ring jet valve, which can release flows up to 400 cfs as I understand it.

LIHI flow criteria are described as follows, "The Flows Criterion is designed to ensure that the river has healthy flows for fish, wildlife and water quality, including seasonal flow fluctuations where appropriate. For instream flows, a certified facility must comply with recent resource agency recommendations for flows. If there were no qualifying resource agency recommendations, the applicant can meet one of two alternative standards: (1) meet the flow levels required using the Aquatic Base Flow methodology or the "good" habitat flow level under the Montana-Tennant methodology; or (2) present a letter from a resource agency prepared for the application confirming the flows at the facility are adequately protective of fish, wildlife, and water quality."

The bypass flows in the MOA do not meet the first criterion (Aquatic Base Flow methodology or Montana method flows). For the dam's drainage area (340 s.m.), those standards would be roughly a conservation of 170 cfs. Consequently, I am going to have to consult with the resource agencies (the Fish and Wildlife Service and the state fisheries agency) to determine whether, in their opinion, the flow regime is appropriately protective. I expect this will primarily relate to the creek downstream of the tailrace, as the bypassed reach is pool habitat.

So I was trying to get a better idea of how the Corps manages releases and whether part of the decision making process involves providing minimum flows and/or ramping to prevent dewatering of habitat and other impacts. I did look at some of the USGS gage data for the upstream and downstream gages on Mahoning Creek. The upstream gage has a drainage area that is roughly half of the downstream gage's drainage area. Following is a plot comparing flows. Assuming the gages are accurate, the releases at the Corps dam appear to be less than "optimal" at times. Perhaps the reservoir was being refilled at the time.



So I'd appreciate it if you could elaborate a bit more on how releases are determined and whether there are any protocols in place to protect physical habitat for fish and other aquatic biota, both during normal operations and during flood control operations. When I get a better understanding of the flow management, then I can consult with the resource agencies to determine whether they consider conditions "appropriately protective."

Thanks again,
Jeff

From: Reilly, Rosemary J LRP [<mailto:Rosemary.J.Reilly@usace.army.mil>]
Sent: Monday, January 13, 2014 4:44 PM
To: Jeffrey Cueto
Cc: Benedict, Jeffrey M LRP
Subject: RE: [EXTERNAL] Mahoning Creek Hydroelectric Project (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Jeffery,

The District basically operates Mahoning Dam as a run of river project, where the outflow equals the inflow except during high flow events when water is stored for downstream flood control (cutting off the high peaks of the hydrograph).

While this downstream flow schedule is not being affected by add-on hydropower generation at Mahoning Dam, environmental impacts were expected.

For example, habitat in the stilling basin and that river reach just downstream of the stilling basin were directly impacted. Most of the flow that formerly passed through the gates in the Dam and into the stilling basin is now being diverted through the hydropower plant. This reduces the frequency of high water events and increases hydraulic retention times in the stilling basin, potentially impacting aquatic life and water quality. Also, much of the high quality in-stream habitat located at the toe of the stilling basin weir was excavated for

construction of the hydropower facility and flow velocities and direction were modified.

In addition, since Mahoning Dam has only bottom gates, the use of the existing plugged penstock openings in the Dam for a retrofit hydropower conversion raised the intake elevation by 30 to 40 ft (from 1015/1021/1025 to 1054 ft NAVD88). The low intake elevations of the outlets are important structural features from the perspective of water quality because they influence thermal and chemical stratification patterns in the reservoir, which in turn affect the quality of water being released. Therefore, the proposed hydropower project will influence reservoir stratification patterns and lake and downstream water quality.

To reduce these expected water quality and aquatic life impacts, the District and the hydropower developer implemented an Adaptive Management Plan. The Plan does not require a "conservation flow" per say. Rather, the District agreed to the Licensee's recommended baseline minimum turbine 60/40/30 cfs bypass flow rates, realizing it would likely have a negative impact on water quality since Dam discharges were reduced dramatically, as long as all of the water quality and aquatic life conditions and criteria described in the Adaptive Management Plan are being met. District nondegradation water quality criteria were required, which are based on historical "worst case" conditions at Mahoning Lake and are stricter than State criteria. Mitigation of habitat and aquatic life impacts are more challenging, but if trends towards degradation are documented or unexpected problems or issues develop, the District reserves the right to modify this Plan.

An excerpt from the District's Adaptive Management Plan, describing nondegradation water quality criteria and bypass flow requirements, follows.

Please let me know if you have any questions,

Rose

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Water Quality, Stilling basin (MCHC monitor)

- Minimum Dissolved Oxygen (DO) 7.0 mg/l
- Monthly or bimonthly, maximum Water Temperature (WT), not to exceed PA Trout Stocked Fishery Criteria⁴ except in mid-August and early September when water temperatures will not exceed 80 Degrees F (26.7 Degrees C).

Water Quality, Mahoning Dam Outflow, Mahoning Creek directly downstream of the hydropower outfall (MCHC monitor)

- Minimum DO 7.0 mg/l
- Maximum Percent Total Dissolved Gas Saturation (%TDG Sat) 103% when the DO is 7.0 mg/l or lower
- Monthly or bimonthly, maximum WT, not to exceed PA Trout Stocked Fishery Criteria, except in mid-August and early September when water temperatures will not exceed 8 Degrees F (26.7 Degrees C).

Water Quality Monitor, Mahoning Dam Outflow, Mahoning Creek at the McCrea Furnace Bridge (existing Corps monitor)

Will be utilized to evaluate the effectiveness of DO, WT and %TDG Sat water quality criteria for the upstream WQ monitors.

- If the DO level drops below 7.0 mg/l more than 1% of the time during the summer/fall season, then the DO criterion for the hydropower tailrace outfall will be raised.
- If the WT rises above 80 Degrees F more than 1% of the time during the summer/fall season, then the WT criteria for the hydropower tailrace outfall or the lake will be lowered.
- If the %TDG Sat level rises above 103% when DO levels are 7.0 mg/l or lower for more than 1% of the time during the summer fall season, then the %TDG saturation criterion for the hydropower tailrace outfall will be lowered.

Water Quality, Lake (MCHC monitor - to be installed).

- Minimum DO 3.6 mg/l at a depth of 24 feet at Summer Pool elevation (1098 ft NAVD)
- Maximum water temperature 80 Degrees F (26.7 Degrees C) at a depth of 24 feet (1074 ft NAVD). Monthly / bimonthly criteria.

Bypass Flow.

The baseline minimum bypass flow rate will be 60 cfs from June 15 through September 15; 40 cfs from November 1 through March 31; and 30 cfs between April 1 through June 14 and September 16 through October 31, as long as all water quality conditions and criteria described above are satisfied and the inflow to Mahoning Lake is equal to or greater than these bypass flow rates.

Aquatic life and habitat.

Water quality, aquatic life, and habitat will be monitored by the District and the PFBC throughout the duration of the license. There is concern that the existing coolwater and trout fisheries could be impacted with the proposed 80 Degrees F maximum water temperature criteria since the frequency of days or hours where water temperatures exceed critical thermal thresholds for key cool and coldwater species. If trends towards the degradation of aquatic resources are noted then monitoring needs, nondegradation criteria, and mitigation will be revisited.

-----Original Message-----

From: Jeffrey Cueto [<mailto:ompompanoo@aol.com>]

Sent: Thursday, January 09, 2014 3:51 PM

To: Reilly, Rosemary J LRP; Benedict, Jeffrey M LRP

Subject: [EXTERNAL] Mahoning Creek Hydroelectric Project

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