LOW IMPACT HYDROPOWER INSTITUTE

DRAFT RECERTIFICATION APPLICATION

for

MAHONING CREEK HYDROELECTRIC PROJECT

LIHI CERTIFICATE #114

FERC PROJECT NO. 12555

Submitted by:

MAHONING CREEK HYDROELECTRIC COMPANY, LLC

Prepared by:

CUBE HYDRO PARTNERS, LLC

May 2019

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Part 1. Introduction

This is the Draft Recertification Application for the Mahoning Creek Hydroelectric Project (Project) whose Low Impact Hydropower Institute (LIHI) Certificate #114 expired on November 14, 2018. LIHI extended the certification term for the Project to May 31, ~~2018~~ by letter dated November 12, 2018 and granted a second extension to September 30, 2019 by letter dated May 31, 2019. Cube Hydro Partners, LLC (Cube Hydro) prepared this application package on behalf of the Project owner, its affiliate, the Mahoning Creek Hydroelectric Company, LLC (MCHC).

Part 2. Facility Description

The Mahoning Creek Dam was authorized by Congress through the Flood Control Acts of 1936 and 1938. The dam is located on the Mahoning Creek in Armstrong County, Pennsylvania 23 miles upstream from the confluence with the Allegheny River. It is one of 16 flood control projects in the U.S. Army Corps of Engineers (USACE) Pittsburgh District that provide flood protection to the lower Allegheny River Valley and the upper Ohio River. The dam's primary authorized purpose is flood control. Additional uses include recreation, downstream low-flow augmentation, downstream water quality and conservation of fish and wildlife resources.

Construction of the Mahoning Creek Dam and reservoir began in 1939 and was completed in 1941. During construction, two conduits were built into the south abutment 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), impounding a 5-mile-long, 280-acre reservoir with a normal pool elevation of 1,077 feet mean sea level (MSL); and a 192-foot-wide, 950-foot-long stilling basin regulated by a 180-foot-long flat-crested stilling basin weir and located downstream of the dam.

On March 4, 2011, the Federal Energy Regulatory Commission (FERC) issued an order granting an original license to construct, operate and maintain the proposed 6.0 MW Mahoning Creek Hydroelectric Project No. 12555 (Mahoning Creek) to the Mahoning Creek Hydroelectric Company, LLC. The FERC license was issued for a period of 50 years with an expiration date of February 28, 2061. Construction of Mahoning Creek began in January 2013 and was completed in December 2013.

The Mahoning Creek Hydroelectric Project includes:

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

Table 1. Facility Description Information for the Mahoning Creek Project (LIHI #114).

Item	*Information Requested*	*Response (include references to further details)*
Name of the Facility	Facility name (use FERC project name if possible)	Mahoning Creek Hydroelectric Project (FERC No. 12555)
Location	River name (USGS proper name)	Mahoning Creek
	Watershed name (select region, click on the area of interest until the 8-digit HUC number appears. Then identify watershed name and HUC-8 number from the map at: https://water.usgs.gov/wsc/map_index.html)	HUC 05010006 – Middle Allegheny - Redbank
	Nearest town(s), county(ies), and state(s) to dam	New Bethlehem, Armstrong County, Pennsylvania
	River mile of dam	23 miles upstream from the confluence with the Allegheny River
	Geographic latitude of dam	40°55'18.67"N
	Geographic longitude of dam	79°16'40.14"W
Facility Owner	Application contact names (Complete the Contact Form also):	David Fox
	Facility owner company and authorized owner representative name. **For recertifications: If ownership has changed since last certification, provide the date of the change.**	Mahoning Creek Hydroelectric Company, LLC (owner / operator)
	FERC licensee company name (if different from owner)	NA
Regulatory Status	FERC Project Number (e.g., P-xxxxx), issuance and expiration dates, or date of exemption	FERC Project No. 12555; Issuance Date: March 4, 2011; Expiration Date: February 28, 2061
	FERC license type (major, minor, exemption) or special classification (e.g., "qualified conduit", “non-jurisdictional”)	Original License (Major Project)
	Water Quality Certificate identifier, issuance date, and issuing agency name. Include information on amendments.	Issuing Agency: Pennsylvania Department of Environmental Protection (PA DEP) Water Quality Certificate Identifier: Water Obstruction and Encroachment Permit Issued on February 19, 2013 Permit No. E03-451 Permit No. E03-451 was amended by the PA DEP via letter dated 9/26/17 (Attachment 1),

		authorizing the following modifications to the USACE Water Quality and Aquatic Life Adaptive Management Plan: 1. Remove monthly/bi-monthly reservoir temperature standard. 2. Remove stilling basin monthly/bi-monthly temperature standard. 3. Modify downstream temperature standard to be the greater of the existing monthly/bi-monthly temperature standard or the stilling basin temperature (representative of dam discharge temperatures) plus 1 degree Fahrenheit. 4. Utilize 30-minute rolling averages instead of instantaneous readings to determine compliance with all water quality standards.
	Hyperlinks to key electronic records on FERC e-library website or other publicly accessible data repositories.	See Appendix A – Supporting Documents
	Date of initial operation (past or future for operational applications)	December 26, 2013
	Total name-plate capacity (MW) **For recertifications: Indicate if installed capacity has changed since last certification**	6 MW Installed capacity has not changed since last certification.
	Average annual generation (MWh) and period of record used **For recertifications: Indicate if average annual generation has changed since last certification**	18,500 MWh. Period of record is 2013 to 2019. The Project was first certified during the initial year of operation and average annual generation was based on very limited data.
Powerhouse	Mode of operation (run-of-river, peaking, pulsing, seasonal storage, diversion, etc.) **For recertifications: Indicate if mode of operation has changed since last certification**	The Project is operated in a run-of-release mode. All flows are scheduled by the USACE and the Project is allocated a portion of total discharge up to the maximum turbine capacity. Mode of operation has not changed since last certification.
	Number, type, and size of turbines, including maximum and minimum hydraulic capacity of each unit	2-MW Francis Turbine (150 CFS to 300 CFS) 4-MW Francis Turbine (200 CFS to 600 CFS)
	Trashrack clear spacing (inches), for each trashrack	1-inch spacing
	Dates and types of major equipment upgrades	No major equipment upgrades
	Dates, purpose, and type of any recent operational changes	No significant operational changes

Dam or Diversion	Plans, authorization, and regulatory activities for any facility upgrades or license or exemption amendments	None
	Date of original construction and description and dates of subsequent dam or diversion structure modifications	1941
	Dam or diversion structure height including separately, the height of any flashboards, inflatable dams, etc.	162-foot-high Dam
	Spillway elevation and hydraulic capacity	1,134.44 feet msl 103,000 CFS
	Tailwater elevation (provide normal range if available)	1009.6 ft msl
	Length and type of all penstocks and water conveyance structures between reservoir and powerhouse	A buried 1,090-foot-long, 120-inch-diameter penstock on the left (south) bank, bifurcating into two 110-foot-long, 96-inch-diameter penstocks
	Dates and types of major infrastructure changes	None
	Designated facility purposes (e.g., power, navigation, flood control, water supply, etc.)	Primary authorized purpose is flood control. Secondary purposes include recreation, downstream low-flow augmentation, downstream water quality and conservation of fish and wildlife resources.
	Source water	Mahoning Creek Reservoir
	Receiving water and location of discharge	Mahoning Creek
Impoundment and Watershed	Authorized maximum and minimum water surface elevations **For recertifications: Indicate if these values have changed since last certification**	Reservoir is operated by USACE – see normal operating range below.
	Normal operating elevations and normal fluctuation range **For recertifications: Indicate if these values have changed since last certification**	Summer recreation pool elevation: 1097.14 ft msl Minimum pool elevation: 1,074.14 ft msl These values have not changed.
	Gross storage volume and surface area at full pool **For recertifications: Indicate if these values have changed since last certification**	Reservoir volume: 94,000 acre-feet Normal area (summer pool): 280 acres These values have not changed.
	Usable storage volume and surface area **For recertifications: Indicate if these values have changed since last certification**	NA. Hydroelectric Project is operated in run-of-release mode.

Hydrologic Setting	Describe requirements related to impoundment inflow, outflow, up/down ramping and refill rate restrictions.	NA. Hydroelectric Project is operated in run-of-release mode.
	Upstream dam(s) by name, ownership and river mile. If FERC licensed or exempt, please provide FERC Project number of these dams. Indicate which upstream dams have downstream fish passage.	No other dams on Mahoning Creek.
	Downstream dams by name, ownership, river mile and FERC number if FERC licensed or exempt. Indicated which downstream dams have upstream fish passage.	No other dams on Mahoning Creek. However, Mahoning Creek flows into the Allegheny River, which has a series of Locks and Dams downstream of the confluence of the two waterways (see maps). Allegheny River Lock and Dam No. 8 (FERC Project No. 3021) is the first downstream dam, operated by the USACE, and is located approximately 25 miles from the Mahoning Creek dam, at River Mile 52.6. The P-3021 license does not require upstream fish passage.
	Operating agreements with upstream or downstream reservoirs that affect water availability and facility operation	None
	Area of land (acres) and area of water (acres) inside FERC project boundary or under facility control.	Land included within Project Boundary is 9.88 acres. There is no significant area of water.
	Average annual flow at the dam, and period of record used	Approximate Average Annual Flow at Dam: 654 CFS Source: USGS Gage 03036000 Period of Record Used: 2013 – 2018
	Average monthly flows and period of record used	Approximate Average Monthly Flows: • January – 775 CFS • February – 996 CFS • March – 940 CFS • April – 941 CFS • May – 518 CFS • June – 677 CFS • July – 618 CFS • August – 320 CFS • September – 416 CFS • October – 353 CFS • November – 491 CFS • December – 755 CFS Source: USGS Gage 03036000 Period of Record Used: 2013 – 2018
	Location and name of closest stream gauging stations above and below the facility	• USGS 03035500 Mahoning Creek Reservoir at Mahoning Creek Dam, PA

		• USGS 03036000 Mahoning Creek at Mahoning Creek Dam, PA
	Watershed area at the dam (in square miles). Identify if this value is prorated and provide the basis for proration.	340 square mile drainage area
	Number of zones of effect	Three (3)
	Upstream and downstream locations by river miles	See "Delimiting structures or features" below in coordination with above-referenced dam location.
	Type of waterbody (river, impoundment, by-passed reach, etc.)	ZOE 1 – Impoundment ZOE 2 – Bypassed Reach ZOE 3 – Downstream Reach
Designated Zones of Effect	Delimiting structures or features	ZOE 2 & 3 include a ~200 ft. buffer from the river's edge on the left descending bank. See Appendix B for additional visual representation. • ZOE 1 – From the Project dam to approximately 1000 feet upstream from the dam. • ZOE 2 - From the Project dam past the stilling basin to where the bypassed reach waters join the Project outflow, approximately 1,150 feet downstream from the dam. • ZOE 3 – From where the bypassed reach waters join the Project outflow to approximately 2,250 feet downstream, where the Mahoning Creek narrows, near the "Camp Run Railroad Car Bridge" (see Figure 1 in Appendix B)
	Designated uses by state water quality agency	Pennsylvania DEP Chapter 93 Water Quality Standards Designated Use: Warm Water Fishes (WWF)

Part 3. Standards Matrices and Supporting Information

Table 2. Mahoning Creek – Standards Matrices for All Zones of Effect

LIHI Criterion		*Zone 1 Standards Impoundment*					*Zone 2 Standards Bypassed Reach*					*Zone 3 Standards Downstream Reach*				
		1	*2*	*3*	*4*	*Plus*	*1*	*2*	*3*	*4*	*Plus*	*1*	*2*	*3*	*4*	*Plus*
A	Ecological Flow Regimes	X						X				X				
B	Water Quality		X			X		X			X		X			X
C	Upstream Fish Passage	X					X					X				
D	Downstream Fish Passage and Protection		X				X					X				
E	Shoreline and Watershed Protection	X						X					X			
F	Threatened & Endangered Species Protection	X					X					X				
G	Cultural and Historic Resources Protection		X			X		X			X		X			X
H	Recreational Resources	X						X				X				

3.1 Criterion A – Ecological Flow Regimes

Instructions for Selected Standards:

Ecological Flow Regimes		*Instructions*
Zone	**Standard**	
Zone 1 **Zone 3**	**1**	Not Applicable / De Minimis Effect: • Confirm the location of the powerhouse relative to other dam/diversion structures to establish that there are no bypassed reaches at the facility. • If Run-of-River operation, provide details on how flows, water levels, and operation are monitored to ensure such an operational mode is maintained. • In a conduit project, identify the water source and discharge points for the conduit system within which the hydropower plant is located. • For impoundment zones only, explain how fish and wildlife habitat within the zone is evaluated and managed – ***NOTE:*** this is required information, but it will not be used to determine whether the Ecological Flows criterion has been satisfied. All impoundment zones can apply Criterion A-1 to pass this criterion.
Zone 2	**2**	Agency Recommendation (see Appendix A for definitions): • Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally stringent). • Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is or is not part of a Settlement Agreement. • Explain how the recommendation relates to agency management goals and objectives for fish and wildlife. • Explain how the recommendation provides fish and wildlife protection, mitigation and enhancement (including in-stream flows, ramping and peaking rate conditions, and seasonal and episodic instream flow variations).

Criterion A (Ecological Flow Regimes) – Supporting Information:

Article 401 of the Project FERC license requires continuing the run-of-release operation using flows scheduled by the USACE.

Article 307 of the license 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 Operational 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 offline or when releases are outside the hydraulic capacity of the facility.

The Corps currently operates the dam in a modified run-of-river mode to augment flow during dry periods to maintain downstream water quality and as water supply for domestic, industrial, and recreational uses.

3.1.1 Criterion A - Zone 1 (Impoundment)

The impoundment is managed to meet USACE elevation targets. Flow releases are scheduled by the USACE and the hydroelectric facility has no affect.

3.1.2 Criterion A - Zone 2 (Bypassed Reach)

Pursuant to Article 401 of the Mahoning Creek FERC License, Project discharges are scheduled and controlled by the Corps. USACE minimum flow releases to the bypassed reach are specified in the Mahoning Creek Water Quality and Aquatic Life Adaptive Management Plan (AMP). The AMP was developed by the USACE in conjunction with MCHC and the PADEP (i.e. agency recommendation).

The MCHC AMP requires minimum discharges to the bypassed reach as follows:

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

In addition to minimum flow requirements, the AMP requires that MCHC monitor and maintain certain WQ Parameters (dissolved oxygen and temperature) in the bypassed reach to ensure that hydroelectric operations do not significantly impact water quality and aquatic life. If WQ parameters are detected outside of ranges prescribed in the AMP, bypass flows must be increased until WQ parameters return to prescribed ranges.

3.1.3 Criterion A - Zone 3 (Downstream Reach)

Pursuant to Article 401 of the Mahoning Creek FERC License, Project discharges are scheduled and controlled by the Corps.

The USACE's water management protocols have not changed since the addition of the hydroelectric Project. As a result, the hydroelectric Project has no effect on the flows in the downstream reach.

3.2 Criterion B – Water Quality

Instructions for Selected Standards:

Water Quality		*Instructions*
Zone	**Standard**	
Zone 1 **Zone 2** **Zone 3**	**2**	Agency Recommendation: • If facility is located on a Water Quality Limited river reach, provide an agency letter stating that the facility is not a cause of such limitation. • Provide a copy of the most recent Water Quality Certificate, including the date of issuance. • Identify any other agency recommendations related to water quality and explain their scientific or technical basis. • Describe all compliance activities related to the water quality related agency recommendations for the facility, including on-going monitoring, and how those are integrated into facility operations.
All Zones	**PLUS**	Bonus Activities: • Describe any advance technologies that have been deployed at the facility to enhance ambient water quality and how its performance is being monitored. • If adaptive management is being applied, describe the management objectives, the monitoring program pursuant to evaluating performance against those objectives, and the management actions that will be taken in response to monitoring results.

Criterion B – Supporting Information:

MCHC seeks to qualify under Standard 2 (Agency Recommendation) for Criterion B – Water Quality, as the Project manages water quality resources in full compliance with Agency Recommendations.

The water quality of Mahoning Creek Lake and its tailwaters has consistently been found to be excellent and to exceed applicable Pennsylvania chapter 93 water quality standards. This is documented by the Mahoning Creek Lake Reservoir Limnology, Aquatic Life and Water Quality Report (USACE, 1993) and the Water Quality Report (AHS, 2007) and is confirmed by water quality data collected continuously since 2007 by the USGS (gage number 03036000).

In addition, the body of water associated with the Project is not listed as impaired, as confirmed in the Draft 2018 Pennsylvania Integrated Water Quality Monitoring and Assessment Report, which satisfies the requirements of section 303(d) and 305(b) of the Clean Water Act, via the Draft Integrated Report Mapping Application. The applicable Assessment ID 12787's Aquatic Life Use status is listed as "attaining".

Water quality impacts are controlled by the USACE Water Quality and Aquatic Life Adaptive Management Plan (AMP). Implementation of the AMP is required by Article 402 of the Project's FERC license and Special Condition F of the water quality certificate: PA DEP Water Obstruction and Encroachment (Permit No. E03-451). The AMP was developed in consultation with USACE Water Quality and fish biologists, the PADEP and the PAFBC. The AMP incorporates numerous Resource Agency recommendations and documents the scientific basis for those recommendations.

The AMP defines water quality requirements for dissolved oxygen (DO), temperature, and total dissolved gas (TDG). Requirements are based on worst case pre-hydropower conditions and the USACE's principal of non-degradation. The AMP also proscribes actions that must be taken in the event of a deviation from the standards. If WQ parameters are detected outside of ranges prescribed in the AMP, bypass flows are increased, and/or flows through the turbine reduced, until WQ parameters return to the prescribed ranges.

In 2017, MCHC worked with the USACE, PADEP and PAFBC to make minor modifications to the AMP. The modifications were based on a review of operational and WQ data from the initial years of Project operations and were designed to allow additional hydropower generation without any additional degradation of the water quality resource. The changes are as follows:

- Remove monthly/bi-monthly reservoir temperature standard.
- Remove stilling basin monthly/bi-monthly temperature standard.
- Modify downstream temperature standard to be the greater of the existing monthly/bi-monthly temperature standard or the stilling basin temperature (representative of dam discharge temperatures) plus 1-degree Fahrenheit.
- Utilize 30-minute rolling averages instead of instantaneous readings to determine compliance with all water quality standards.

The Project is operated in full compliance with the AMP and operations have resulted in no significant impact on water quality resources.

3.2.1 Criterion B - Zone 1 (Impoundment)

In accordance with the AMP, MCHC operates a real-time, continuous water quality (WQ) monitor located in the lake above the dam near the intake structure. The sensors are installed at a depth of 24 feet below the normal full summer pool elevation (1098 ft NAVD).

3.2.2 Criterion B - Zone 2 (Bypassed Reach)

In accordance with the AMP, MCHC operates a real-time, continuous water quality (WQ) monitor located at the dam stilling basin.

3.2.3 Criterion B - Zone 3 (Downstream Reach)

In accordance with the AMP, MCHC operates a real-time, continuous water quality (WQ) monitor located just downstream of the hydropower outflow.

Furthermore, the facility utilizes water quality readings from the McCrea Furnace Bridge USGS monitoring station (gage #03036000), located approximately 0.5 miles downstream of the hydropower outflow to monitor the effectiveness of the WQ limits and management protocols specified in the AMP.

3.2.4 Criterion B - PLUS

As discussed above, WQ impacts are controlled through implementation of the AMP. The objective of the AMP is to ensure degradation of water quality and aquatic habitat does not occur as a result of hydropower operations. The AMP requires that WQ be monitoring at three locations and specifies specific actions that must be taken if the Project deviates from any standard contained in the AMP.

3.3 Criterion C – Upstream Fish Passage

Instructions for Selected Standards:

Upstream Fish Passage		*Instructions*
Zone	**Standard**	
Zone 1 **Zone 2** **Zone 3**	**1**	Not Applicable / De Minimis Effect: • Explain why the facility does not impose a barrier to upstream fish passage in the designated zone. • Document available fish distribution data and the lack of migratory fish species in the vicinity. • If migratory fish species have been extirpated from the area, explain why the facility is or was not the cause of this.

Criterion C – Supporting Information:

Fish studies conducted by the U.S. Army Corps of Engineers (the Corps) and the Pennsylvania Fish & Boat Commission (PAFBC) have documented the presence of 48 different fish species in the Project area. In the summer of 2007, MCHC conducted fish surveys in the Project area and found a total of 39 fish species, all of which were included in the list of 48 species identified by the Corps and PAFBC studies. None of the observed species were listed as state or federally threatened or endangered, and all commonly occurred in the Ohio River watershed. In addition, there are no historic records of Catadromous or Anadromous fish movement through the Project area.

There are no upstream fishway prescriptions for the Project, or reservations of authority to prescribe passage, in the Project license, as there are no historic records of the presence of migratory fish species at the Project.

3.3.1 Criterion C - Zone 1 (Impoundment)

The impoundment zone does not impose a barrier to upstream fish passage as it is located above the dam. Additionally, there are no anadromous or catadromous fish present in the area of the Mahoning Creek Dam and no fishway prescriptions in the Project license. Therefore, the Project meets the Not Applicable/De Minimis Effect, Standard 1 criteria.

3.3.2 Criterion C - Zone 2 (Bypassed Reach)

There are no anadromous or catadromous fish present in the area of the Mahoning Creek Dam and no fishway prescriptions in the Project license. Therefore, the Project does not pose a barrier to upstream fish passage and meets the Not Applicable/De Minimis Effect, Standard 1 criteria.

3.3.3 Criterion C - Zone 3 (Downstream Reach)

There are no anadromous or catadromous fish present in the area of the Mahoning Creek Dam and no migratory or riverine fishway prescriptions in the Project license. Therefore, the Project does not pose a barrier to upstream fish passage and meets the Not Applicable/De Minimis Effect, Standard 1 criteria.

3.4 Criterion D – Downstream Fish Passage and Protection

Instructions for Selected Standards:

Downstream Fish Passage & Protection		*Instructions*
Zone	**Standard**	
Zone 2 **Zone 3**	**1**	Not Applicable / De Minimis Effect: • Explain why the facility does not impose a barrier to downstream fish passage in the designated zone, considering both physical obstruction and increased mortality relative to natural downstream movement (e.g., entrainment into hydropower turbines). • For riverine fish populations that are known to move downstream, explain why the facility does not contribute adversely to the sustainability of these populations or to their access to habitat necessary for successful completion of their life cycles. • Document available fish distribution data and the lack of migratory fish species in the vicinity. • If migratory fish species have been extirpated from the area, explain why the facility is or was not the cause of this.
Zone 1	**2**	Agency Recommendation: • Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one;identify and explain which is most environmentally stringent). • Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is part of a Settlement Agreement or not. • Describe any provisions for fish passage monitoring or effectiveness determinations that are part of the agency recommendation, and how these are being implemented.

Criterion D – Supporting Information:

Fish studies conducted by the U.S. Army Corps of Engineers (the Corps) and the Pennsylvania Fish & Boat Commission (PAFBC) have documented the presence of 48 different fish species in the Project area. In the summer of 2007, MCHC conducted fish surveys in the Project area and found a total of 39 fish species, all of which were included in the list of 48 species identified by the Corps and PAFBC studies. None of the observed species were listed as state or federally threatened or endangered, and all commonly occurred in the Ohio River watershed.

Furthermore, there are no historic records of Catadromous or Anadromous fish movement through the Project area.

There are no fishway prescriptions for the Project, or reservations of authority to prescribe passage, in the Project license.

Additionally, 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. Staff further 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 fish community in the reservoir. To ensure that the intake structure is designed appropriately to protect fisheries resources, Article 403 of the Project license 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 plan was filed with FERC. The FERC Order Approving Intake Structure Design Plan Pursuant to Article 403 was issued July 15, 2014.

3.4.1 Criterion D - Zone 1 (Impoundment)

There are no anadromous or catadromous fish present in the area of the Mahoning Creek Dam and no fishway prescriptions, or reservations of authority to prescribe passage, in the Project license.

FERC staff concluded in the Supplemental EA that the intake structure design, as required by FERC License Article 403, would limit entrainment and adequately protect the fish community in the reservoir. FERC staff also concluded in the Supplemental EA that passage survival of fish entrained in the Project turbines would likely exceed 90%.

The Intake Structure Design Plan illustrates how the intake structure is designed to include trashracks with 1-inch clear bar spacing and limit the average approach velocity to a speed no greater than 1 foot per second to prevent fish entrainment. The Plan also discusses how the depth of the trashrack would limit its interaction with resident fish in the reservoir.

3.4.2 Criterion D - Zone 2 (Bypassed Reach)

There are no anadromous or catadromous fish present in the area of the Mahoning Creek Dam and no fishway prescriptions, or reservations of authority to prescribe passage, in the Project license.

3.4.3 Criterion D - Zone 3 (Downstream Reach)

The downstream reach zone does not impose a barrier to downstream fish passage as it is located below the powerhouse.

3.5 Criterion E – Shoreline and Watershed Protection

Instructions for Selected Standards:

Shoreline & Watershed Protection		*Instructions*
Zone	**Standard**	
Zone 1	**1**	Not Applicable / De Minimis Effect: • If there are no lands with significant ecological value associated with the facility, document and justify this (e.g., describe the land use and land cover within the project boundary). • Document that there have been no Shoreline Management Plans or similar protection requirements for the facility.
Zone 2 **Zone 3**	**2**	Agency Recommendation: • Provide copies or links to any agency recommendations or management plans that are in effect related to protection, mitigation, or enhancement of shoreline surrounding the facility (e.g., Shoreline Management Plans). • Provide documentation that indicates the facility is in full compliance with any agency recommendations or management plans that are in effect.

Criterion E – Supporting Information:

The Project boundary contains 9.88 total acres of land. 1.80 Acres is owned and managed by the USACE Pittsburgh District. 8.08 acres is private.

The primary identified effects on Shoreline and Watershed Protection were related to construction activities, as opposed to ongoing effects resulting from operation.

Article 404 of the Project FERC license requires a Wetland Protection Plan that includes avoidance and protection measures for wetlands located near Project construction activities. A Natural Resource and Wetland Study (Hull and Associates, 2007) was conducted by the Licensee in support of Project licensing, which identified three wetlands located outside of the construction areas that would be potentially affected by construction activities. The Wetland Protection Plan, approved by FERC Order on December 7, 2012, requires various erosion control and restoration measures.

Mitigation and riparian area replanting was conducted starting in the fall of 2014. The Licensee filed its Mitigation/Riparian Replanting Area Monitoring Plan with FERC on May 22, 2015, which includes measures for adaptive management, and is required by special condition 1 of the CWA Section 404 Permit issued by the USACE on March 11, 2013 (USACCE Permit No. 2009-2175) and the Wetland Protection Plan, developed in accordance with FERC License Article 404.

Additionally, Article 302 of the Project FERC license requires the licensee to submit a Soil Erosion and Sediment Control Plan, which was completed and describes the measures that will be implemented to prevent erosion and other shoreline impacts.

3.5.1 Criterion E - Zone 1 (Impoundment)

There is a forested buffer around the lake, which is managed by the USACE and which MCHC has no control over. The USACE also controls reservoir discharge and elevation levels, thus MCHC has no impact on shoreline and watershed protection in this ZOE.

3.5.2 Criterion E - Zone 2 (Bypassed Reach)

MCHC follows agency recommendations for this ZOE. The mitigation measures required by the Wetland Protection Plan, detailed above, are applicable to Zone 2, as this zone includes areas affected by construction activities. For example, additional permanent protection measures for wetlands and waterways required by and identified in the Wetland Protection Plan includes preservation of wooded areas along the entire length of the Project "from Mahoning Dam to the end of the access road to the west", which includes Zone 2, the Bypassed Reach.

3.5.3 Criterion E - Zone 3 (Downstream Reach)

MCHC follows agency recommendations for this ZOE. The mitigation measures required by the Wetland Protection Plan, detailed above, are applicable to Zone 3, as this zone includes areas affected by construction activities. For example, additional permanent protection measures for wetlands and waterways required by and identified in the Wetland Protection Plan includes preservation of wooded areas along the entire length of the Project "from Mahoning Dam to the end of the access road to the west", which includes Zone 3, the Downstream Reach.

3.6 Criterion F – Threatened and Endangered Species

Instructions for Selected Standards:

Threatened and Endangered Species		*Instructions*
Zone	**Standard**	
All Zones	**1**	Not Applicable / De Minimis Effect: • Document that there are no listed species in the facility area or affected riverine zones downstream of the facility. • If listed species are known to have existed in the facility area in the past but are not currently present, explain why the facility was not the cause of the extirpation of such species. • If the facility is making significant efforts to reintroduce an extirpated species, describe the actions that are being taken.

Criterion F – Supporting Information:

Section 7(a)(2) of the Endangered Species Act of 1973 requires federal agencies to ensure their actions are not likely to jeopardize the continued existence of federally listed threatened and endangered species, or result in the destruction or adverse modification of their designated critical habitat.

Although there is potential Indiana bat non-hibernation habitat located at the Project, it is located across the creek from the Project site. In the Environmental Assessment, filed with FERC on March 23, 2010, staff concluded that the Project is not likely to adversely affect the Indiana bat. The U.S. Fish and Wildlife Service (FWS) concurred with this finding by letter filed May 10, 2010.

As part of the licensing and permitting process, MCHC evaluated the potential for the Project to negatively impact threatened and endangered species, completing a natural resource and wetland study 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. Additionally, 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.

Finally, PFBC indicated in a letter dated April 2, 2014 to LIHI that it is unaware of any listed species affected by the Project.

3.6.1 Criterion F - Zone 1 (Impoundment)

Per the Project's Environment Assessment, natural resource and wetland study, freshwater mussel and fish survey, and PFBC letter dated April 2, 2014, there are not any listed species affected by the Project.

3.6.2 Criterion F - Zone 2 (Bypassed Reach)

Per the Project's Environment Assessment, natural resource and wetland study, freshwater mussel and fish survey, and PFBC letter dated April 2, 2014, there are not any listed species affected by the Project.

3.6.3 Criterion F - Zone 3 (Downstream Reach)

Per the Project's Environment Assessment, natural resource and wetland study, freshwater mussel and fish survey, and PFBC letter dated April 2, 2014, there are not any listed species affected by the Project.

3.7 Criterion G – Cultural and Historic Resource Protection

Instructions for Selected Standards:

Cultural and Historic Resource Protection		*Instructions*
Zone	**Standard**	
All Zones	**2**	Approved Plan: • Provide documentation of all approved state, provincial, federal, and recognized tribal plans for the protection, enhancement, and mitigation of impacts to cultural and historic resources affected by the facility. • Document that the facility is in compliance with all such plans.
All Zones	**PLUS**	Bonus Activities: • Document any substantial commitment that the facility has made to restoring one or more significant cultural or historical resource in the vicinity, beyond what is required in existing plans such as a Historic Resources Management Plan. • Document any significant new educational opportunity about cultural or historical resources in the area that the Facility has created, including contractual obligations that guarantee that this opportunity will exist for the duration of the LIHI certification.

Criterion G – Supporting Information:

The Project license Article 406 requires the Applicant to implement a Programmatic Agreement (PA) executed in 2010 between FERC and the State Historic Preservation Officer (SHPO). The PA requires the licensee to develop a Historic Properties Management Plan (HPMP) that provides for consideration, management, and protection of both known and newly discovered historic properties during construction, operation and maintenance of the Project. The HPMP was approved by FERC order dated January 7, 2013.

The Project's HPMP 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.

The HPMP further requires the licensee to file an annual report with the FERC and the SHPO on every anniversary of the date of the license issuance that summarizes ground-disturbing activities performed in accordance with the HPMP. MCHC filed its 2018 HPMP Annual Report on March 6, 2019 indicating that no ground-disturbing activities that would be subject to the HPMP were conducted by the licensee in 2018.

3.7.1 Criterion G - Zone 1 (Impoundment)

The Project has no identified potential effects on historic properties, as confirmed by the 2007 Phase I archaeological survey, and is in compliance with all considerations for management and protection of any newly discovered historic properties per MCHC's 2018 HPMP Annual Report.

3.7.2 Criterion G - Zone 2 (Bypassed Reach)

The Project has no identified potential effects on historic properties, as confirmed by the 2007 Phase I archaeological survey, and is in compliance with all considerations for management and protection of any newly discovered historic properties per MCHC's 2018 HPMP Annual Report.

3.7.3 Criterion G - Zone 3 (Downstream Reach)

The Project has no identified potential effects on historic properties, as confirmed by the 2007 Phase I archaeological survey, and is in compliance with all considerations for management and protection of any newly discovered historic properties per MCHC's 2018 HPMP Annual Report.

3.7.4 Criterion G - PLUS

MCHC is an operating subsidiary of Cube Hydro. Since construction of Mahoning Creek in 2013, Cube Hydro has conducted annually a paid Summer Internship Program (SIP). The program was born out of Cube Hydro's partnership with Pennsylvania State University, the offtaker of 100% of the electricity, capacity and Renewable Energy Certificates (RECs) produced at Mahoning Creek. Since then, Cube Hydro has expanded SIP to students from universities across the United States.

With the average age of the energy worker exceeding 50 years, the Cube Hydro team acknowledges the impact a cross-disciplinary program can have, not only for the universities we partner with, but also for the growth and sustainability of the hydropower industry itself.

SIP is a unique partnership that demonstrates Cube Hydro's commitment to sustainability and hands-on learning experiences. Through SIP, Cube Hydro provides real-world experiences that cover topics such as energy project management, cultural and historic resource compliance, finance, environmental monitoring, sensors and controls of water flow to optimize electrical generation, energy economics, environmental policy and law, and sustainability.

Additionally, Cube Hydro provides opportunities for tours of the Mahoning Creek Hydroelectric Project for Penn State University students (and others) as a means of connecting communities to their local sources of power, demonstrating the value of hydroelectricity, and showcasing the utilization of this unique natural resource.

Student Tour of Mahoning Creek Project During Construction

Andrew Longenecker (left) – VP, Business Development & Asset Optimization, Participating in Mahoning Creek Project Student Tour

3.8 Criterion H – Recreational Resources

Instructions for Selected Standards:

Recreational Resources		*Instructions*
Zone	**Standard**	
Zone 1 **Zone 3**	1	Not Applicable / De Minimis Effect: • Document that the facility does not occupy lands or waters to which public access can be granted and that the facility does not otherwise impact recreational opportunities in the facility area.
Zone 2	2	Agency Recommendation: • Document any comprehensive resource agency recommendations and enforceable recreation plan that is in place for recreational access or accommodations. • Document that the facility is in compliance with all such recommendations and plans.

Criterion H – Supporting Information:

The Project is in full compliance with all recreation related requirements specified in the license and permits and does not negatively impact recreation in the Project area.

After conducting the 2008 Recreation Study Report, which identified the primary desired recreational improvements at the site, including handicap accessibility and a new accessible pier, MCHC proposed construction of an ADA compliant fishing pier on the north shoreline of the stilling basin. Article 405 of the Project license requires that the licensee develop and implement a Recreation and Aesthetics Plan (RAP). The RAP, which was approved by FERC in an order dated May 15, 2012, required MCHC to install an interpretive display and construct a fishing pier compliant with the Americans with Disabilities Act (ADA) guidelines for fishing piers. Construction of the fishing pier and installation of the interpretive display were completed on February 11, 2015.

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

3.8.1 Criterion H - Zone 1 (Impoundment)

The lands surrounding the Project are managed by the USACE and the Project does not otherwise impact recreational opportunities pertaining to the Impoundment ZOE.

3.8.2 Criterion H - Zone 2 (Bypassed Reach)

Per Article 405 of the Project license and the Recreation and Aesthetics Plan, MCHC constructed an ADA compliance fishing pier on the north shoreline of the stilling basin and an interpretive display.

3.8.3 Criterion H - Zone 3 (Downstream Reach)

The lands surrounding the Project are managed by the USACE or are privately owned and the Project does not otherwise impact recreational opportunities pertaining to the Downstream Reach ZOE.

Part 4. Contacts Form

FACILITY CONTACTS FORM

Project Owner / Operator:	
Name and Title	David Fox, Director
Company	Mahoning Creek Hydroelectric Company, LLC
Phone	(240) 482-2707
Email Address	dfox@cubehydro.com
Mailing Address	2 Bethesda Metro Center, Suite 1330, Bethesda, MD 20814
Consulting Firm / Agent for LIHI Program (if different from above):	
Name and Title	
Company	
Phone	
Email Address	
Mailing Address	
Compliance Contact (responsible for LIHI Program requirements):	
Name and Title	David Fox
Company	Cube Hydro Partners, LLC
Phone	(240) 482-2707
Email Address	dfox@cubehydro.com
Mailing Address	2 Bethesda Metro Center, Suite 1330, Bethesda, MD 20814
Party responsible for accounts payable:	
Name and Title	William Layden
Company	Cube Hydro Partners, LLC
Phone	(240) 482-2723
Email Address	wlayden@cubehydro.com
Mailing Address	2 Bethesda Metro Center, Suite 1330, Bethesda, MD 20814

Agency Contact (Check area of responsibility: Flows__, Water Quality __, **Fish/Wildlife Resources** X, Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __):	
Agency Name	United States Fish and Wildlife Service
Name and Title	richard McCorkle – Fisheries Biologist
Phone	(814) 234-4090 x231
Email address	richard_mccorkle@fws.gov
Mailing Address	Pennsylvania Field Office, 315 South Allen Street, Suite 322, State College, PA 16801

Agency Contact (Check area of responsibility: Flows__, Water Quality __, **Fish/Wildlife Resources** X, Watersheds __, **T/E Spp.** X, Cultural/Historic Resources __, Recreation __):	
Agency Name	United States Fish and Wildlife Service
Name and Title	Robert Anderson – Fish & Wildlife Biologist, Endangered Species Program
Phone	(814) 234-4090 x223
Email address	Robert_M_Anderson@fws.gov

Mailing Address	Pennsylvania Field Office, 315 South Allen Street, Suite 322, State College, PA 16801

Agency Contact (Check area of responsibility: Flows__, **Water Quality X**, Fish/Wildlife Resources __, Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __):	
Agency Name	Pennsylvania Department of Protection: Waterways and Wetlands Program
Name and Title	Karl Gross
Phone	(814) 332-6945
Email address	kgross@state.pa.us
Mailing Address	Northwest Regional Office, 230 Chestnut Street, Meadville, PA 16335

Agency Contact (Check area of responsibility: Flows__, Water Quality __, **Fish/Wildlife X** Resources __, Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __):	
Agency Name	Pennsylvania Fish and Boat Commission: Division of Environmental Services
Name and Title	Heather Smiles – Chief, Division of Environmental Services
Phone	(814) 359-5194
Email address	hsmiles@state.pa.us
Mailing Address	

Agency Contact (Check area of responsibility: Flows__, Water Quality __, Fish/Wildlife Resources __, Watersheds __, T/E Spp. __, **Cultural/Historic Resources X,** Recreation __):	
Agency Name	Pennsylvania Bureau for Historic Preservation
Name and Title	Douglas McLearen
Phone	(814) 359-5133
Email address	mdclearen@state.pa.us
Mailing Address	

Agency Contact (Check area of responsibility: Flows__, **Water Quality X, Fish/Wildlife X** Resources __, Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __):	
Agency Name	USACE Pittsburgh District
Name and Title	Rosemary Reilly Biologist
Phone	(412) 395-7357
Email address	rosemary.j.reilly@usace.army.mil
Mailing Address	Water Management, 1000 Liberty Avenue, Pittsburgh, PA 15222

Agency Contact (Check area of responsibility: **All X** Flows__, Water Quality __, Fish/Wildlife Resources __, Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __):	
Agency Name	USACE Pittsburgh District
Name and Title	Sara H. Woida
Phone	(412) 395-7142
Email address	sara.hillegas.woida@usace.army.mil
Mailing Address	1000 Liberty Avenue, Pittsburgh, PA 15222

Part 5. Sworn Statement

SWORN STATEMENT

As an Authorized Representative of Mahoning Creek Hydroelectric Company, LLC, the Undersigned attests that the material presented in the application is true and complete.

The Undersigned acknowledges that the primary goal of the Low Impact Hydropower Institute's certification program is public benefit, and that the LIHI Governing Board and its agents are not responsible for financial or other private consequences of its certification decisions.

The Undersigned further acknowledges that if LIHI Certification of the applying facility is granted, the LIHI Certification Mark License Agreement must be executed prior to marketing the electricity product as LIHI Certified®.

The Undersigned further agrees to hold the Low Impact Hydropower Institute, the Governing Board and its agents harmless for any decision rendered on this or other applications, from any consequences of disclosing or publishing any submitted certification application materials to the public, or on any other action pursuant to the Low Impact Hydropower Institute's certification program.

Company Name: Cube Hydro Partners, LLC

Authorize Representative Name: David Fox

Title: Director, Environmental & Dam Safety Programs

Authorized Signature: 

Date: May 31, 2019

Appendices

Appendix A – Supporting Documents

- FERC Original Project License (FERC Project No. P-12555)
- PA DEP Water Obstruction and Encroachment Permit No. E03-451
    - PA DEP Letter Dated September 26, 2017 RE: Minor Amendment (Permit No. E03-451/AMP) – Attachment 1
- FERC Order Approving Operating Plan on September 6, 2013
- Operational Memorandum of Agreement (MOA) – Filed with FERC dated March 5, 2014
- Order Amending Water Quality Monitoring Plan, November 8, 2017
- Mahoning Creek Water Quality and Aquatic Life Adaptive Management Plan (AMP) 2012 – Part 1, Part 2 & Part 3
- Water Quality Report (AHS, 2007)
- FERC Supplemental EA (October 20, 2010)
- Intake Structure Design Plan Filed by letter dated October 19, 2012
    - Approved by FERC July 15, 2014
- Natural Resource and Wetland Study (Hull and Associates, 2007)
- FERC Order Approving Wetland Protection Plan – issued December 7, 2012
- Mitigation/Riparian Replanting Area Monitoring Plan, filed with FERC on May 22, 2015
- CWA Section 404 Permit issued by the USACE on March 11, 2013 (USACE Permit No. 2009-2175)
- Soil Erosion and Sediment Pollution Control Plan – Attachment 2
- Environmental Assessment (filed with FERC March 23, 2010)
    - FWS concurred with findings in Letter filed with FERC May 10, 2010
- Programmatic Agreement 2010
- Historic Properties Management Plant (HPMP), approved by FERC order dated January 7, 2013
    - 2018 HPMP Annual Report, filed on March 6, 2019
- 2007 Phase I Archaeological Survey
- 2008 Recreation Study Report
- Recreation and Aesthetics Plan (RAP) – approved by FERC order May 15, 2012
    - Minor Modifications to the RAP – August 12, 2014
- As-built record drawings of fishing pier (1 & 2) and letter filed March 19, 2015
    - Approved by FERC order - July 20, 2015
- Documentation of interpretive display (filed October 8, 2015)
- Rivers and Harbors Act Section 408 Permit
- Limited Power Permit
- PA Submerged Lands License Agreement
- Access Memorandum of Agreement
- NPDES Permit

Appendix B – Project Layout, Key Features and ZOEs

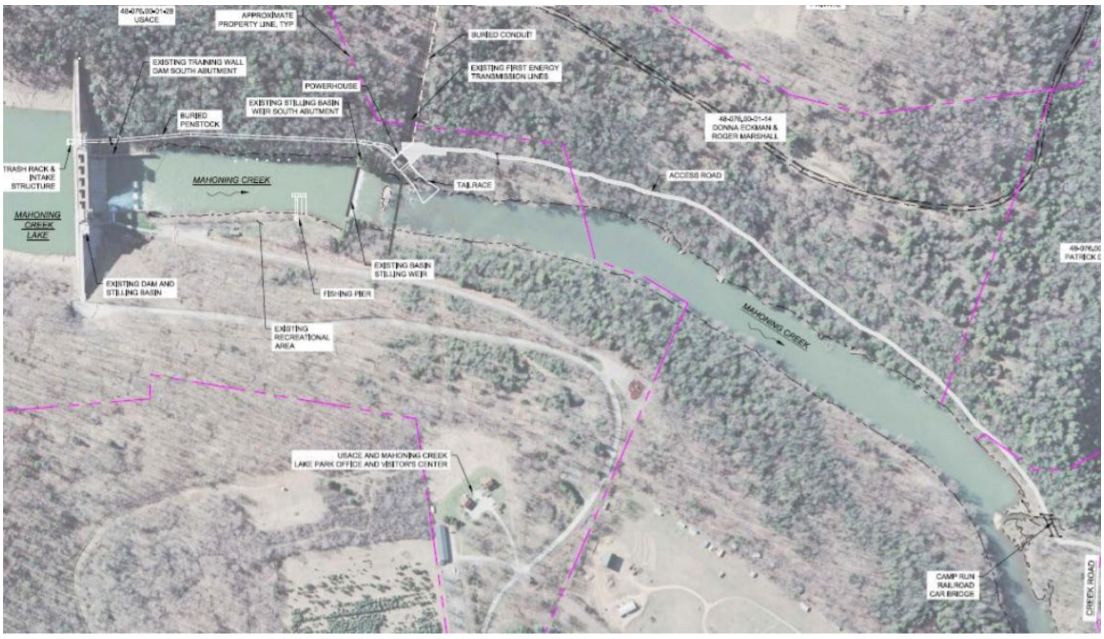

Figure 1. Aerial View Showing Project Layout and Key Features

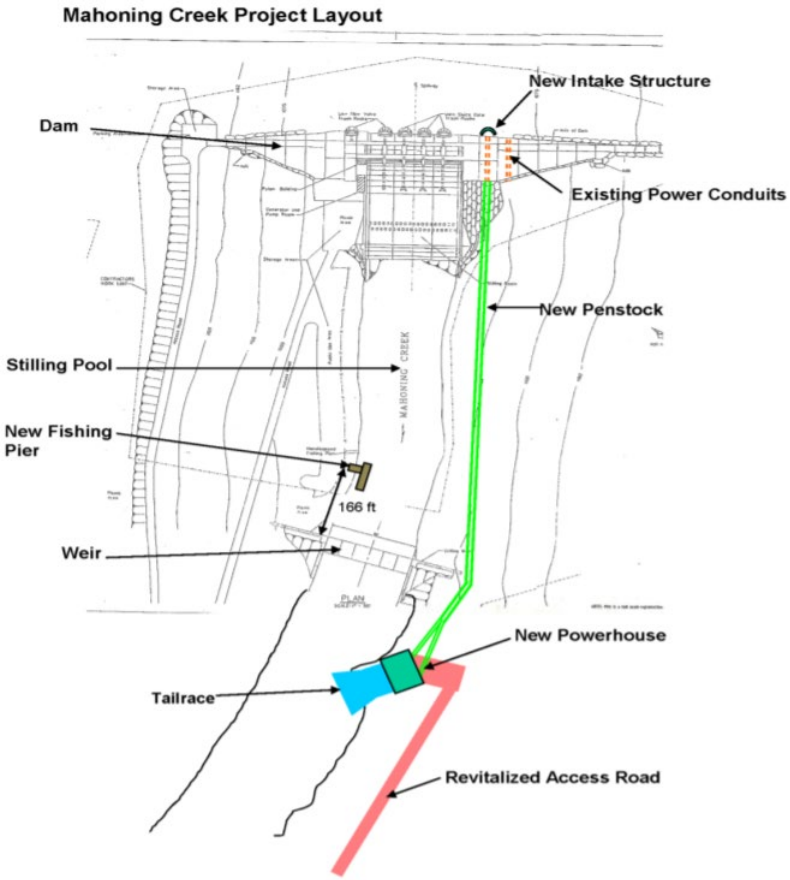

Figure 2. Diagram Showing Project Layout and Key Features

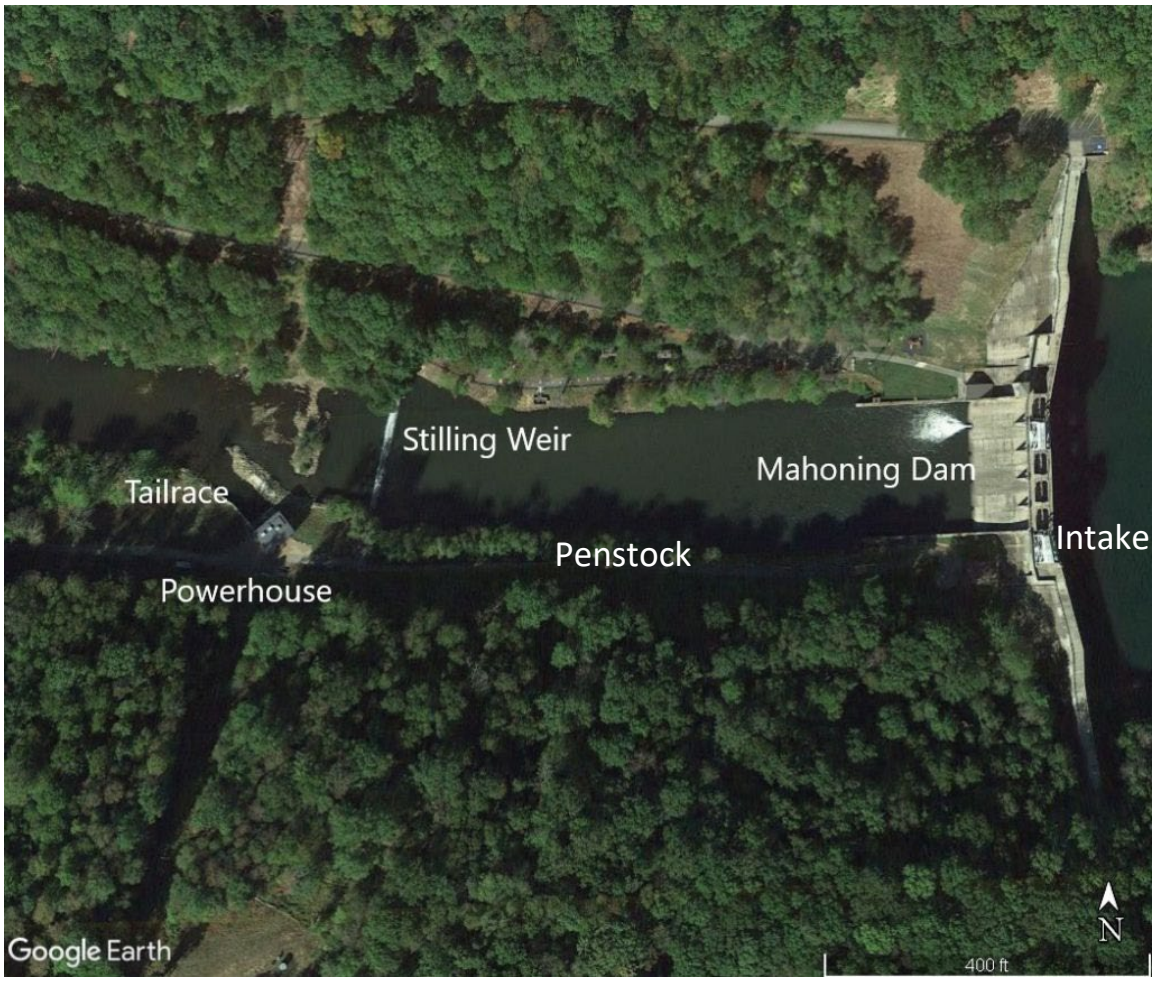

Figure 3. Google Earth Image Showing Project Layout and Key Features

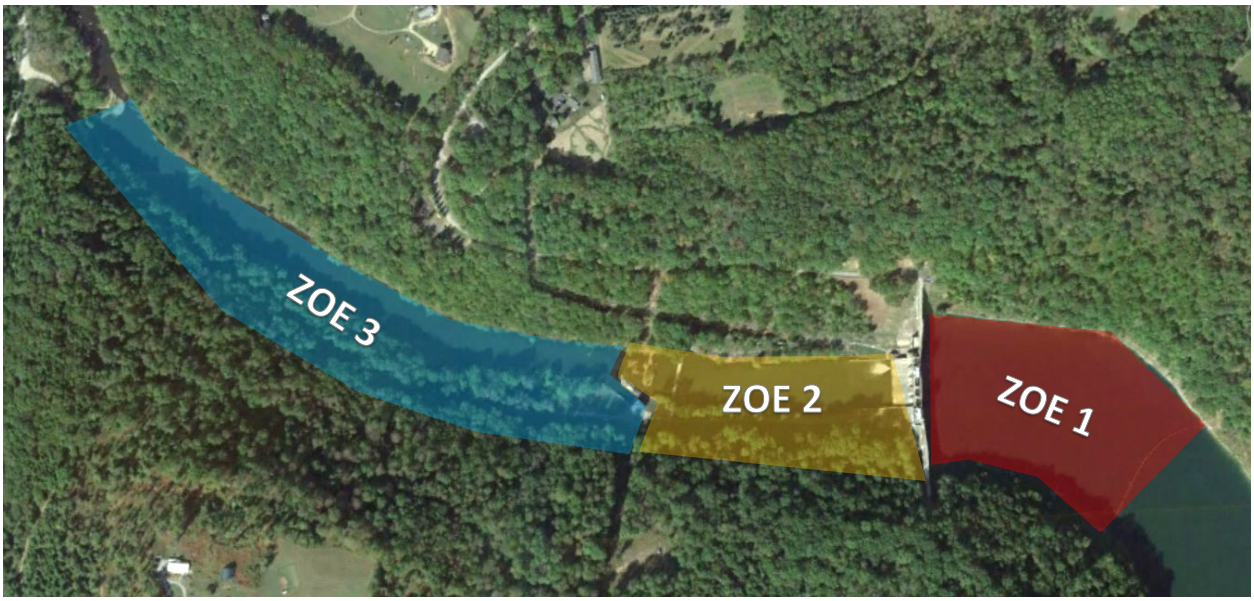

Figure 4. Zones of Effect, Including: Impoundment Zone (ZOE 1), Bypassed Reach (ZOE 2) and Downstream Reach (ZOE 3)

Appendix C – Maps and Project Photographs

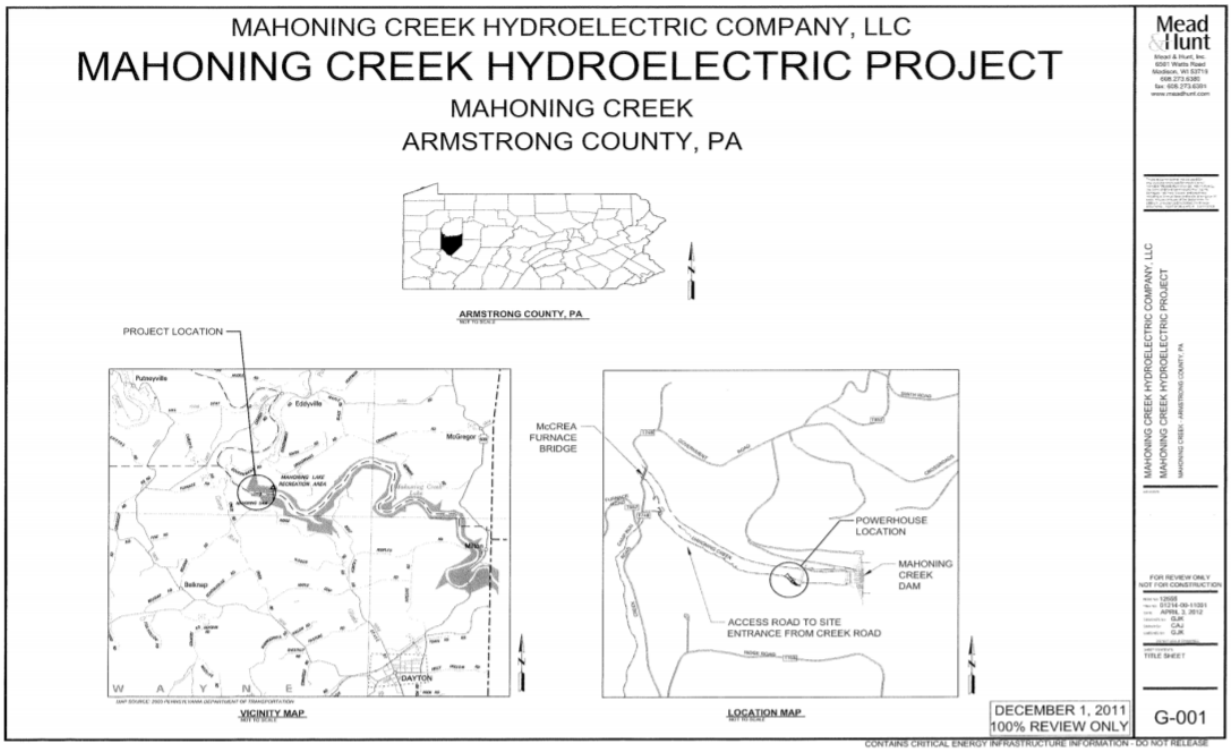

Figure 5. Project Location in Armstrong County, Along Mahoning Creek, and In Relation to Mahoning Creek Dam

Figure 6. Project Location (Google Earth)

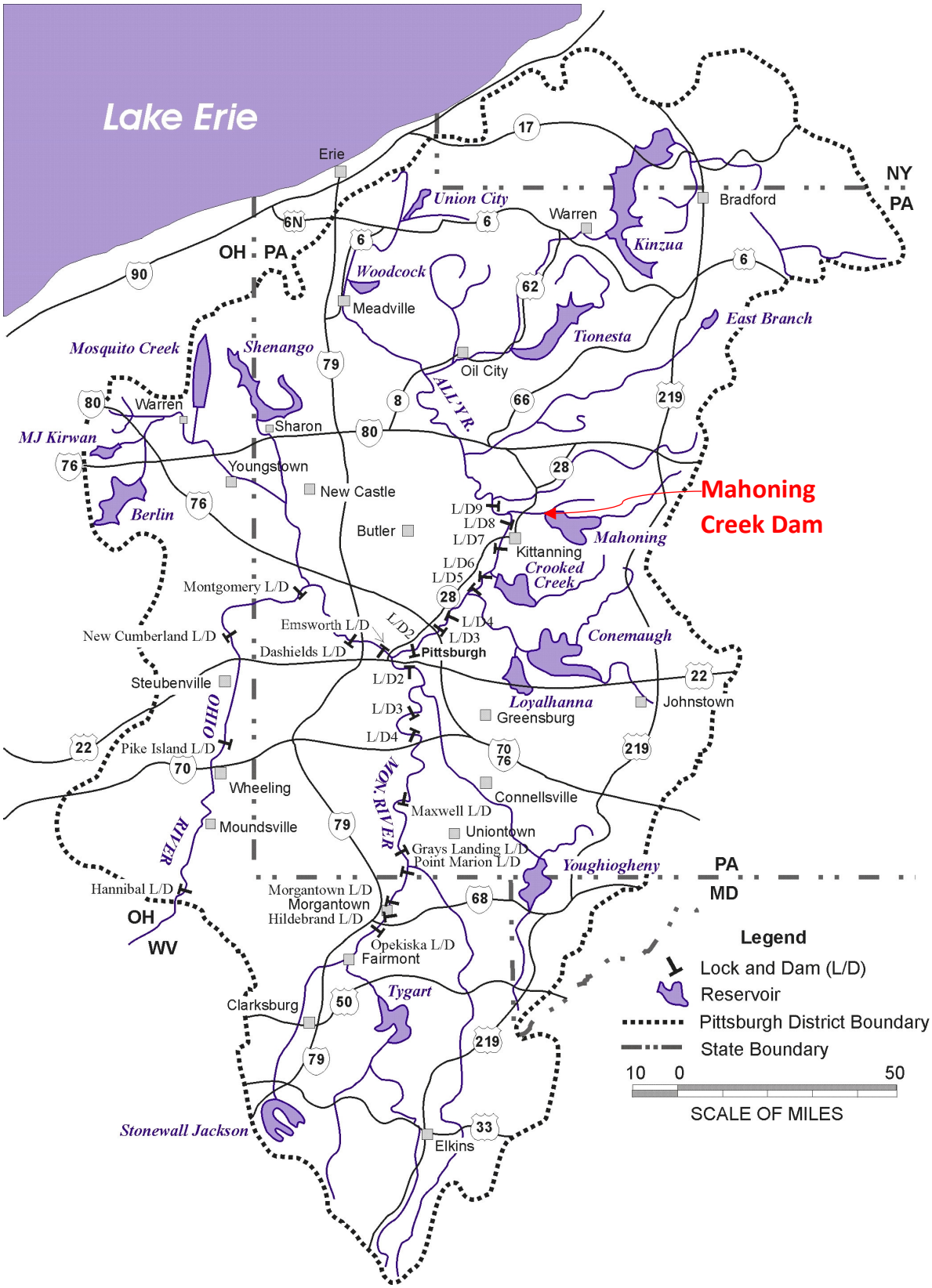

Figure 7. Location of Project Dam in Relation to Locks and Dams on Allegheny River

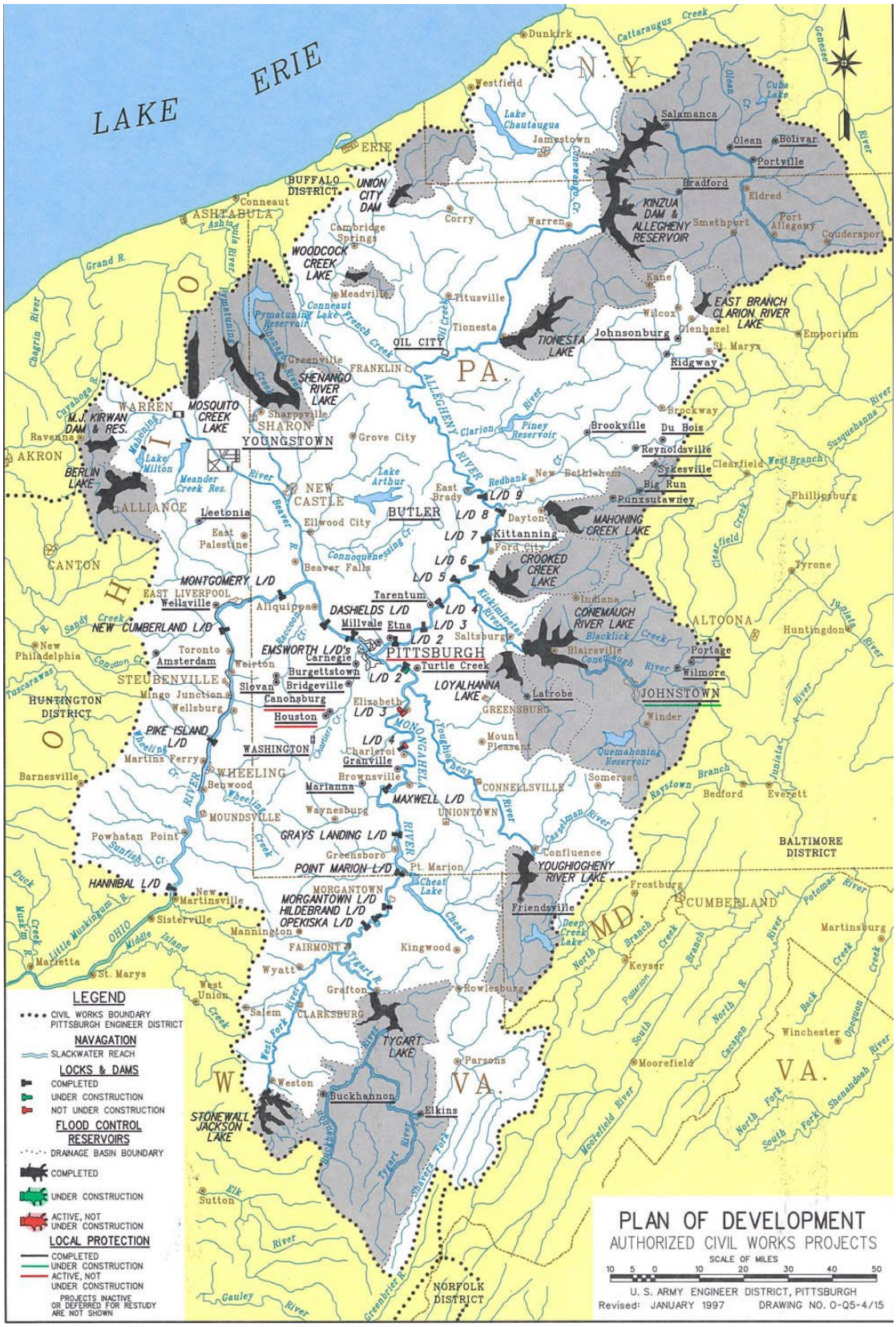

Figure 8. Pittsburgh District Map Showing Existing Flood Control Developments (Controlled Watersheds Shown in Gray)