LOW IMPACT HYDROPOWER INSTITUTE CERTIFICATION APPLICATION

WLLOW ISLAND LOCK AND DAM PROJECT

(FERC Project No. 6902)

Prepared for:

American Municipal Power, Inc.

Columbus, Ohio

Prepared by:

CUBE HYDRO PARTNERS

Bethesda, Maryland

www.cubehydropartners.com

April 2017

Table of Contents

List of Tables

List of Figures

1. Facility Description

September 27, 1989, the Federal Energy Regulatory Commission (FERC) issued a new license for a period of 50 years to the City of New Martinsville, West Virginia, to construct and operate the Willow Island Lock and Dam Project (Project), FERC Project No. 6902. On February 17, 2009, the FERC approved the transfer of the Project license to American Municipal Power-Ohio, Inc. (AMP-Ohio). While originally located in Ohio, in 2009, AMP-Ohio served communities in six states and Ohio was dropped from the name to better reflect the company's growing footprint.

The Project (Figures 1, 2, and 3) was fully operational in 2016 and is expected to generate approximately 239 gigawatt-hours annually. It is located at the U.S. Army Corps of Engineers' (USACE) Willow Island Locks and Dam at Ohio River Mile 161.7, the 7th Locks and Dam on the Ohio River downstream of Pittsburgh. The Huntington District of the USACE owns and operates the Locks and Dam. The Locks and Dam were completed by 1976 and include a non-navigable, high-lift, gated dam and two parallel locks.

Figure 1 Overview of Willow Island Lock and Dam Project

Willow Island Project
USACE Willow Island Dam
Project Approach Channel

Figure 2 Alternative View of Willow Island Lock and Dam Project

Facility Details

The Project is located on the south-east side of the Willow Island Dam abutment at the left descending bank. The hydropower plant includes a concrete powerhouse structure approximately 260 feet long by 140 feet wide, containing two horizontal-axis bulb-type turbine-generator units with a total installed capacity of approximately 35 MW; an approach channel; an approximately 700-foot-long by 200-foot-wide tailrace channel that will conduct the downstream discharge of the turbines back to the river at a point approximately 800 feet below the Willow Island Dam; a submerged navigation groin; a single-circuit, 138 kilovolt transmission line; a landside closure structure; a riverside closure structure and a J-wall on the right side of the approach channel; recreation facilities; and other appurtenant facilities.

Project Operation

The American Municipal Power, Inc. and the Huntington District of the USACE entered into a Memorandum of Operating Agreement (MOA) on November 20th, 2015. As directed by the USACE, and Article 401 of the Project License, the Project is operated by AMP in run-of-river mode for protection of navigation, water quality, and aquatic resources on the Ohio River.

The Huntington District of the USACE maintains the upper Willow Island pool between elevation 602 and 603 feet ORD. During low flows when the river is being regulated for protection of navigation and other Federal interests, all discharges for the Project are controlled by the USACE lockmaster. If the river flow exceeds approximately 142,000 cubic feet per second (cfs) or if the river flow is less than 6,000 cfs, the Project is shut down and all flows are passed through the USACE Dam. The Huntington District of the USACE maintains the upper Willow Island pool when discharging any flow through the Dam.

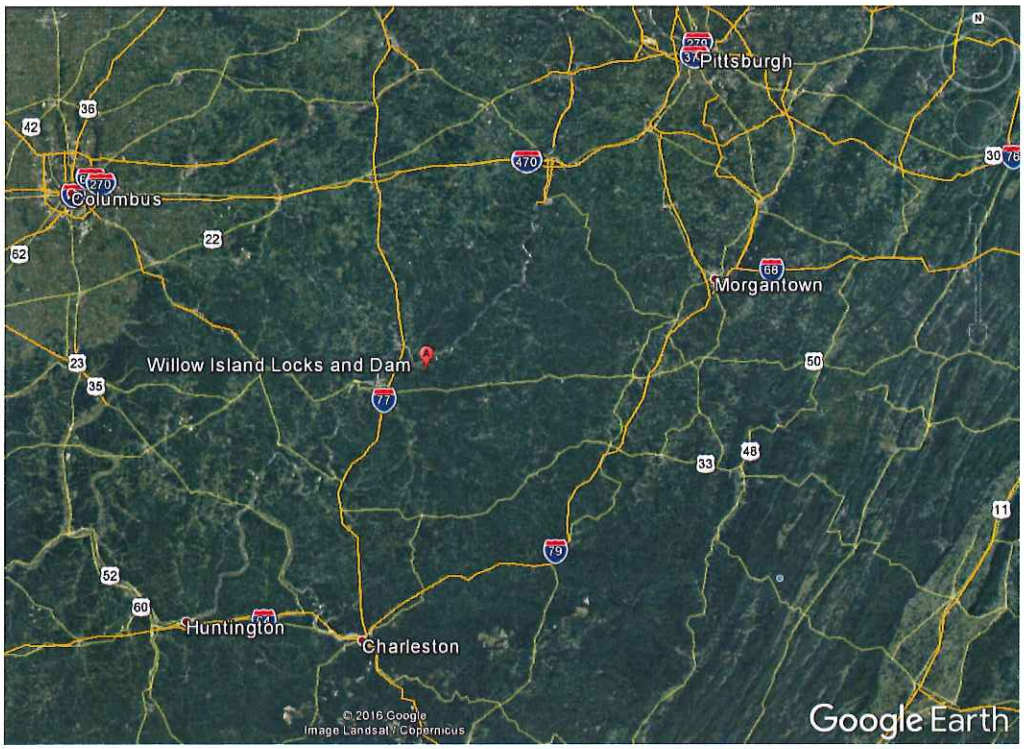


Figure 3 Geographic Overview of Willow Island Lock and Dam Project

Table 1 Facility Description Information for Willow Island Lock and Dam Project

Information Type	*Facility Description*
Name of the Facility:	• Willow Island Lock and Dam Project (Project) - FERC Project No. 6902
Location:	• Ohio River • Upper Ohio River Basin • Pleasants County, WV & Washington County, OH • Nearest Census-Designated Towns in WV: Waverly (zip code: 26184), Belmont (zip code: 26134), St. Marys (zip code: 26170) • Nearest Census-Designated Towns in OH: Reno* (zip code: 45773), Newport* (zip code: 45768), Marietta (zip code: 45750) • Nearest Unincorporated Communities: Willow Island, WV (zip code: 26170), Eureka, WV (zip code: 26170) * Note: Reno & Newport are also unincorporated but have a post office • The Project is located at river mile 161.7 • Geographic Latitude: 39.357597° • Geographic Longitude: -81.318317°
Facility Owner:	• American Municipal Power, Inc. (AMP or Licensee) • _____ 1111 Schrock Road, Suite 100 Columbus, Ohio 43229 Tel: 614.540.1111 • November 20th, 2015 MOA entered into between the Licensee and the Huntington District of the USACE. ❖ **AMP, Inc. MOA Submission to NYRO for Willow Island Project:** https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14057829
Regulatory Status:	• The Willow Island Lock and Dam Project, FERC Project Number 6902 (P-6902), received its original, conventional project, license from the FERC on September 29, 1989 for a period of 50 years (effective 9/01/1989; expiring 8/31/2039). The License was transferred to AMP-Ohio on February 17, 2009. AMP-Ohio later changed its name to AMP in 2009. ❖ **FERC Order Issuing New License:** https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13602294 ❖ **FERC Order Approving Transfer of License:** http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=11941248 ❖ **FERC Order Amending License & Approving Recreational Use Surveys:** https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10786060 • On February 24, 2009 the West Virginia Department of Environmental Protection – Division of Water and Waste Management issued a Water Quality Certificate (WQC) related to construction activities: WV WQC # 080018. ❖ **FERC Documentation of WQC Receipt in Construction Progress Report:** https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12041572
Characteristics of the Power Plant:	• For the Willow Island Lock and Dam Project, excavation and cofferdam construction started in June 2011 and powerhouse construction began in December 2012. The Project reached full commercial operation in February

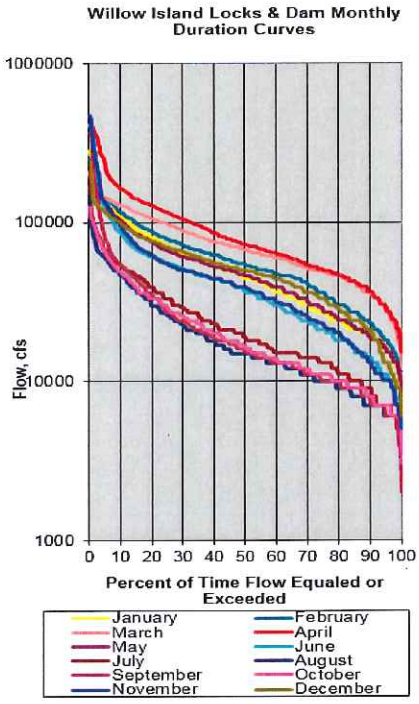
<table>
<tr><th>Information Type</th><th>Facility Description</th></tr>
<tr><td></td><td>
2016. The commercial operation date (COD) of Unit 1 was January 4, 2016 and the COD of Unit 2 was February 4, 2016.
• The Project has a total name-plate capacity of 35 megawatts (MW).
• The Project's expected average annual generation is 239,000 megawatt hours (MWh). The total MWh generated since commissioning is 237,555 MWh:
<table>
<tr><th colspan="3">Gross MWh Since Commissioning</th></tr>
<tr><td></td><td>Willow Island U1 (MWh)</td><td>Willow Island U2 (MWh)</td></tr>
<tr><td>Jan</td><td>11,947</td><td>12,342</td></tr>
<tr><td>Feb</td><td>8,441</td><td>8,350</td></tr>
<tr><td>Mar</td><td>11,807</td><td>12,439</td></tr>
<tr><td>Apr</td><td>11,924</td><td>12,922</td></tr>
<tr><td>May</td><td>12,534</td><td>13,108</td></tr>
<tr><td>Jun</td><td>9,612</td><td>10,748</td></tr>
<tr><td>Jul</td><td>6,261</td><td>6,564</td></tr>
<tr><td>Aug</td><td>5,372</td><td>8,188</td></tr>
<tr><td>Sep</td><td>2,677</td><td>7,561</td></tr>
<tr><td>Oct</td><td>7,624</td><td>10,741</td></tr>
<tr><td>Nov</td><td>10,502</td><td>11,091</td></tr>
<tr><td>Dec</td><td>12,350</td><td>12,451</td></tr>
<tr><td>Unit Total:</td><td>111,051</td><td>126,505</td></tr>
<tr><td>Annual Total:</td><td colspan="2">237,555 MWh</td></tr>
</table>
• The Project has two, horizontal-axis bulb-type turbine-generator units with an approximate FERC licensed capacity of 17.5 MW each. The minimum hydraulic capacity of each unit is 4,000 cfs, while the maximum hydraulic capacity of each unit is 35,000 cfs.
• The Project operates as a run-of-river (ROR) facility for protection of navigation, water quality, and aquatic resources in the Ohio River.
</td></tr>
<tr><td>Characteristics of the Dam or Diversion:</td><td>
• The USACE owned and operated Willow Island Locks and Dam, located at river mile 161.7, had both completed construction by 1976. The primary purpose of the Locks and Dam is for navigation.
• The dam is a non-navigable, high-lift, gated dam, top length 1,128' including 111-foot fixed weir with 84-foot open crest. Eight tainter type gates, clear span 110' between piers, damming height 26' above sills, clearance above maximum high water when fully raised approximately 5'.
• Of an estimated 1,750 acres in the dam project, approximately 92.8 acres fee required for the lock site, 32.1 acres fee at the abutment site, 13.3 acres fee for recreation site, .06 acre feet at radio site and flowage easements or other lesser interests over the remaining area.
• The Project has no penstocks, only an approach channel approximately 200 feet long.
</td></tr>
<tr><td>Characteristics of Reservoir and Watershed:</td><td>
• Normal upper pool elevation is 602.0' MSL, upper pool length 35.3 miles to Hannibal Dam, normal upper pool surface area 6,400 acres, normal lower pool elevation 582.0' MSL, (upper pool of Belleville Dam) normal lift 20.0'.
</td></tr>
</table>

<table>
<tr><th>Information Type</th><th>Facility Description</th></tr>
<tr><td></td><td>

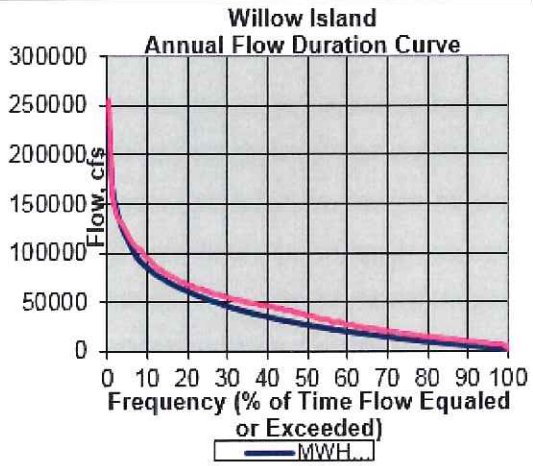
The drainage area at the Willow Island dam is between 26,934 and 26,950 square miles (sq. mi.) (based on Flood Insurance Studies for Pleasants and Wood County West Virginia and USGS records for gages on the Ohio River at Marietta (35590) less the Muskingum River (8000 +/-) less the Little Muskingum River (300 +/-) less a couple of other minor streams).
The Willow Island Locks and Dam is located at river mile (RM) 161.7.
The upstream dams include the Hannibal Locks and Dam (RM 126.4), Pike Island Locks and Dam (RM 84.2), and New Cumberland Locks and Dam (RM 54.3), each owned and operated by the Pittsburgh District of the USACE.
The downstream dams include the Belleville Locks and Dam (RM 203.9), Racine Locks and Dam (RM 237.5), and Robert C. Byrd Locks and Dam (RM 279.2), each owned and operated by the Huntington District of the USACE.
AMP holds the license for five projects on the Ohio River: Belleville Hydropower Project (FERC Project No. 6939), Cannelton Hydropower Project (FERC Project No. 10228), Meldahl Hydropower Project (FERC Project No. 12667), Smithland Hydropower Project (FERC Project No. 6641), and Willow Island Hydropower Project (FERC Project No. 6902).
There are no operating agreements with upstream or downstream reservoirs. The Project does operate under a November 2015 MOA established with the Huntington District of the USACE.
The Project occupies 23.6 acres of federal land managed by the USACE. The Licensee has acquired easements on parcels owned by private parties.

</td></tr>
<tr><td>Hydrologic Setting:</td><td>

Average monthly flows at the Dam as measured at (USGS Gage No. 03111534, Ohio River at Martins Ferry, OH):

<table>
<tr><th colspan="2">Average Monthly Flows (cfs) 2016</th></tr>
<tr><td>Jan</td><td>41,624</td></tr>
<tr><td>Feb</td><td>40,255</td></tr>
<tr><td>Mar</td><td>49,051</td></tr>
<tr><td>Apr</td><td>45,059</td></tr>
<tr><td>May</td><td>48,590</td></tr>
<tr><td>Jun</td><td>30,650</td></tr>
<tr><td>Jul</td><td>18,016</td></tr>
<tr><td>Aug</td><td>19,855</td></tr>
<tr><td>Sep</td><td>15,927</td></tr>
<tr><td>Oct</td><td>30,551</td></tr>
<tr><td>Nov</td><td>30,551</td></tr>
<tr><td>Dec</td><td>45,445</td></tr>
</table>


</td></tr>
</table>

Information Type	*Facility Description*
	 • Relevant stream gauging stations above the facility include: USGS Gage No: 03114280 (Ohio River at Hannibal Lock and Dam (Lower), OH) and USGS Gage No. 03114306 (Ohio River Above Sardis, OH). • The relevant stream gauging station below the facility includes: USGS Gage No: 03150700 (Ohio River at Marietta, OH). • At the Willow Island Locks and Dam, the Ohio River has a drainage area of 26,900 square miles, as estimated by the USACE National Inventory of Dams (NID) 2016 database.
Designated Zones of Effect:	• There is one designated Zone of Effect (ZOE). The Project's ZOE is limited to the distance from the sidewall approach to the Willow Island powerhouse downstream approximately 10 miles to the confluence of the Muskingum River and the Ohio River main stem in Marietta, Ohio. • The waters within the ZOE are classified as Riverine by the U.S. Fish and Wildlife Service (USFWS) 2016 National Wetland Inventory. The description code is R2UBH: R = Riverine (system), 2 = Lower Perennial (subsystem), UB = Unconsolidated Bottom (class), and H = Permanently Flooded (water regime). • The designated uses/authorized purpose of the ZOE waters, according to the USACE, are: navigation, fish and wildlife, and recreation.
Additional Contact Information:	• Please see Section 4 for Project Contacts Forms.
Photographs of the Facility	• Please see Appendix A for photographs of key features of the facility, identification of the designated ZOE, and as-built project illustrations.

2. Standards Matrix

Facility Name: Willow Island Lock and Dam Project Zone of Effect: One Zone of Effect for the project consisting of the distance from the sidewall approach to the Willow Island powerhouse downstream approximately 10 miles to the confluence of the Muskingum River and the Ohio River main stem in Marietta, Ohio.

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

Note: Shading indicates that some standards are not available for some criteria.

3. Supporting Information

Ecological Flow Standard

Criterion	*Standard*	*Instructions*
A	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.

- The Project powerhouse is located directly adjacent (Figures 1 and 2) to the Willow Island Dam and does not have a bypassed reach.

- The Project is operated in Run-of-River mode per its FERC license requirement and MOA with the USACE. Because the USACE maintains the pool elevation to maintain a depth suitable for navigation, AMP does not have any ability or authority to operate in anything but run-of-river

mode. The USACE determines the total discharge flow from the dam and AMP uses a portion of that flow for generation. There is no storage capacity in the pools.

- Article 401 (pg. 16) of the Project license requires AMP to operate the Willow Island Lock and Dam Project as directed by the USACE and in an instantaneous run-of-river mode. FERC states in the Project license (pg. 3) that the Final Environmental Impact Statement (FEIS) found that operating the Project in a run-of-river mode would minimize the fluctuation of the upstream pool elevation, thus ensuring the protection of navigation, water quality, and aquatic resources in the Ohio River.
    - **Part 2 of 2 of the FEIS for Hydroelectric Development in the Upper Ohio River Basin:** https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=11768329

- The Project is operated according to its FERC license and MOA with the USACE. The MOA dictates the following specific operational details (beginning on pg. 2):

    - The USACE maintains the upper Willow Island pool between elevation 602 feet ORD and elevation 603 feet ORD.

    - AMP must operate the Project as a run-of-river plant. During low flow periods when the river is being regulated for protection of navigation, or other Federal Interests, all discharges for the Project are controlled by the Lockmaster, who issues specific discharge instructions.

    - When the Project is discharging, the operators of the Project regulate flows according to the direction of the Willow Island Locks and Dam Lockmaster such that the upper gauge readings stay between the limits of 13.2 and 11.8 (603.2 feet ORD or 601.8 feet ORD), depending on the total Ohio River flow.

    - If the river flows exceed approximately 142,000 cfs or if the river flow is less than 6,000 cfs, the Project shuts down and all flows are passed through the Dam. The USACE maintains the upper Willow Island pool when discharging any flow through the Dam. The Belleville pool may not be adversely affected by the operation of the Project.

- To ensure run-of-river operations, the Project complies with its Flow Monitoring Plan:

    - The USACE operates a sophisticated system of stream gauge and weather monitors, along with the USGS and the National Weather Service, to maintain operation of the Ohio River projects, including the Willow Island Lock and Dam Project in a run-of-river mode during both normal and flood conditions.

    - The Licensee will use the existing system, supplemented by accurate computation and powerhouse discharges, to monitor conformance with Articles 401 and 408.

    - The existing stream gauge system is based on water level recorders maintained by the Corps upstream and downstream of the dam and on recorded gate openings. This system will be used to compute flow through the dam and to determine conformance with the

minimum release requirement (Article 408). The Corps will continue to maintain and operate this system.

- The Licensee will provide accurate computation of powerhouse flows and coordinate with the USACE so that total flow at the locks and dam can be accurately determined and the Corps can operate in a run-of-river mode.

- The Licensee will monitor conformance with the minimum release requirement by monitoring and documenting the powerhouse discharges and the total river flows.

- The Corps will maintain and monitor conformance with the run-of-river requirement through spillway gate operations.

AMP's Flow Monitoring Plan was approved by the FERC on October 23, 2009.

- **Project Flow Monitoring Plan:** https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12138609
- **FERC Order Accepting Flow Monitoring Plan:** https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12182149

Water Quality Standard

Criterion	*Standard*	*Instructions*
B	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.

- The Project's most recent Water Quality Certificate (WQC) was issued by the West Virginia Department of Environmental Protection, Division of Water and Waste Management, on February 24, 2009 (WQC 080018). Previous 401 Certifications were dated February 10, 1994, July 27, 1990, and April 10, 1987. A link to the 2009 Project WQC can be found here.

- The USACE Draft Environmental Assessment states that aeration at the Willow Island Locks and Dam is not expected to change with the implementation of the proposed project and the Willow Island Locks and Dam is not important for maintaining DO for fish and other aquatic organisms as outlined in the FERC License and Article 408. In addition, according to Article 402 of the FERC License agreement, water quality will be monitored to maintain a DO concentration of no less than five milligrams per liter (mg/L) downstream throughout the Belleville pool of the Ohio River. State 401 Water Quality Certification, as required by the Clean Water Act, has been granted on February 24, 2009. A link to the USACE Draft Environmental Assessment can be found here.

- The Project license includes the following agency recommendations related to water quality:
  - The FEIS concluded that the submerged-gate dam at Willow Island Locks and Dam does not provide significantly more aeration than can be expected from operation of the hydropower project. Therefore, no spill flow is needed to meet the state standard for dissolved oxygen (DO) protection. Article 402 requires the Licensee to develop a water quality monitoring plan to ensure maintenance of a minimum DO concentration of no less than 5.0 milligrams per liter (mg/L) downstream throughout the Belleville Pool of the Ohio River.

- AMP developed its Water Quality Monitoring Plan in consultation with the Ohio River Valley Water Sanitation Commission (ORSANCO), the U.S. Fish and Wildlife Service (FWS), the Ohio Environmental Protection Agency (OEPA), the Ohio Department of Natural Resources (ODNR), the West Virginia Department of Natural Resources (WVDNR), and the USACE. FERC approved the Plan in April 1993 and amended it December that same year. On July 29, 2015, FERC modified and approved the Updated Water Quality Monitoring Plan, according to which the Licensee monitors real-time Dissolved Oxygen readings from May 1 to October 31, both upstream and downstream of the powerhouse, and provides access to this real-time information to the USACE and ORSANCO.

- The Water Quality Monitoring plan provides the Licensee with information necessary to make decisions regarding Project operation to protect the Ohio River aquatic resources.
  - **FERC Order Modifying and Approving Updated Water Quality Monitoring Plan:** https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13943108

- The 2016 Willow Island Dissolved Oxygen Report collected data between May 1, 2016 and October 31, 2016; during this period DO sensor readings stayed above or met operating guidelines, with the exception of a defective probe and upstream reading on August 8th.
  - **2016 Willow Island Dissolved Oxygen Report to FERC:** https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14454867

Upstream Fish Passage Standard

Criterion	*Standard*	*Instructions*
C	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.

- The Facility does not create a barrier to upstream passage as fish can pass both upstream and downstream through the lock chambers.

- The Morone Species (Potamodromous) is a migratory fish that occurs now or have occurred historically at the Facility.

- A list of all fish collected on the main stem of the Ohio River in the upstream and downstream pools of the Project from 2003 – 2015 can be found in Appendix B. This data is sourced from the Ohio River Valley Water Sanitation Commission's (ORSANCO) database.

Downstream Fish Passage and Protection Standard

Criterion	*Standard*	*Instructions*
D	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.

- The fixed weir connected to the power plant allows fish to pass over the weir structure in high flow periods, and as stated above, the two lock chambers allow fish to move both upstream and downstream. Additionally, the Project utilizes fish protection devices, such as its trashracks with 8.25-inch bar spacing.

- The Project FERC license does not include a downstream fish passage recommendation. However, in the License it states that:

  - The FEIS found that there could be a loss of swift tailwater aquatic habitat from zones below open gates in the gated dam during periods of moderately low flows when the river flow would pass mostly through the turbines, with a shift of such habitat to the turbine tailrace along the left bank. The FESI recommended a bypass flow from the powerhouse during periods when the project is shut down to stabilize downstream flows in these habitats. Article 408 therefore requires the Licensee to release a continuous minimum flow of 2,000 cubic feet per second to the project tailrace during periods of project shutdown as necessary for the maintenance of recreational fishing activities and protection of aquatic habitats in the project tailrace.

  November 2009, FERC modified and approved the Project's Minimum Flow Release Plan.

  - **FERC Order Modifying and Approving Minimum Flow Release Plan:** https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12200876

- License article 404 also requires the Licensee prepare and implement a plan to monitor any potential project-induced fish mortality, compensate the WV DNR and the OH DNR for fish losses occurring during the fish mortality monitoring study, and install fish protection devices, during the initial project construction phase, to minimize fish entrainment (ex. fish screens). The Fish Mortality Plan was approved in January 1997.

  - **FERC Order Modifying and Approving Fish Mortality Plan:** http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10770356

- A January 2017 AMP submittal to FERC requested that the requirements of Article 404 of the Project License, in particular the performance of a fish mortality study and possible provision of commentary mitigation, be deleted. Since the time of FERC's approval of the plan in 1997, FERC's policy regarding the need for entrainment studies and compensation, particularly for Ohio River area projects, has evolved. Specifically, the Court of Appeals in *City of New Martinsville v. FERC*, 103 F. 3d 567 (D.C. Cir. 1996), found that "entrainment mortality that has no appreciable impact on fish populations can hardly be characterized as 'losses' to the fishery." The Court in *New Martinsville also* ruled that there is no basis for the FERC to require compensation for game fish or non-game fish at the New Martinsville Project or at the Racine Project. In response to the Court's finding in *New Martinsville*, the FERC has subsequently deleted the requirement of compensation at Racine and New Martinsville (Hannibal Project), and at a number of other projects when requested to do so by the licensees. AMP's request to delete Article 404 was submitted in light of the similarities of the Willow Island Project with the other projects on the Ohio River and in close proximity to the Willow Island Project that have already had their fish mortality study requirements deleted. FERC's decision on AMP's request remains pending.
    - **Request Regarding Willow Island Hydro Project Article 404 Requirements**
      https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14468412

- A link to the ORSANCO's 2006 - A Biological Study of the Ohio River, The Willow Island Pool can be found here. The study assessment claims the Willow Island pool meets its aquatic life use designation.

- A list of all fish collected on the main stem of the Ohio River in the upstream and downstream pools of the Project from 2003 – 2015 can be found in Appendix B. The Morone Species (Potamodromous) is a migratory fish that occurs now or have occurred historically at the Facility.

- The USACE September 2010 Draft Environmental Assessment found that the Project's impact to the fish community is expected to be insignificant given the Licensee adherence to the sequential mitigation process as outlined and required by FERC license Articles 404 and 405. It also stated that there is no adverse effect to the fish community under the No Action Alternative.

Watershed and Shoreline Protection Standard

Criterion	*Standard*	*Instructions*
E	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.

- In the Project's FERC license, it states that the FEIS concluded that construction and operation of the project will not cause significant impact to wetlands and would not cause significant adverse impacts to wildlife and terrestrial resources.

- Article 416 of the FERC license requires the Licensee to prepare and file a plan to control erosion, dust, and slope disposal areas, and to minimize the quantity of sediment or other potential water pollutants resulting from construction and operation of the project.
    - **AMP Sediment and Erosion Control Plan for Willow Island Project:** https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=11679746

- Articles 413 and 417 of the Project license require the Licensee to file a plan to avoid or minimize disturbances to the quality of the existing visual resources of the project area resulting from construction and operation of the Project and a plan to revegetate all disturbed areas with plant species beneficial to wildlife and native to the Project area.
    - **Order Modifying and Approving Visual Resources and Revegetation Plans:** https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12250930
    - **AMP Submittal of Article 417 Revegetation 3 Month Report** https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14423199

Threatened and Endangered Species Standard

Criterion	*Standard*	*Instructions*
F	2	Finding of No Negative Effects: • Identify all listed species in the facility area based on current data from the appropriate state and federal natural resource management agencies. • Provide documentation of a finding of no negative effect of the facility on any listed species in the area from an appropriate natural resource management agency.

- The USACE September 2010 Draft Environmental Assessment (EA) consulted the USFWS for information concerning the presence of such species within the Project Area. It found that the Project is located within the known or historic range of the following endangered species: eastern cougar (Puma concolor couguar), Indiana bat (Myotis sodalis), the fanshell mussel (Cyprogenia stegaria), and the pink mucket pearly mussel (Lampsilis orbiculata). Candidate species included the sheepnose mussel (Plethobasus cyphyus). The snuffbox mussel (Epioblsma triuetra) is considered a species of special concern. The bald eagle (Haliaeetus leuocephyus) was delisted from the threatened and endangered species list, but remains protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668a-d).

    - The USACE determined in its EA that, based on the location and nature of the project and the absence of suitable habitat within the proposed impact, the Project would have no effect on the eastern cougar or the bald eagle.

    - Furthermore, it found that the licensee had conducted a mussel survey and provided a copy of the survey report and monitoring plan to the USACE and the USFWS. No federally listed threatened or endangered mussel species were collected during the survey. The USACE completed a review of this survey and monitoring plan and, in consultation with the USFWS, determined no adverse effects to the above listed mussel species would occur with implementation of the recommended plan. USFWS has concurred with this determination.

- The USACE EA also found that the applicant had conducted an Indiana bat habitat evaluation. The evaluation indicated potential summer roosting habitat exists along portions of the transmission line. Total potential Indiana bat habitat that would be removed for development of the transmission line was approximately 13.2 acres. The USACE determined that effects on potential bat habitat would be mitigated by winter tree clearing and therefore no adverse effect to the Indiana Bat would occur with the implementation of the recommended plan.

- AMP is working with the USFWS and the WVDNR to monitor listed mussel species to ensure no impacts of the Project on those species. AMP has an approved Mussel Monitoring Plan that is very extensive and detailed as to the methods, locations, and frequency of mussel monitoring required by the USFWS and WVDNR. The monitoring has been on-going, with the last survey completed in 2016. A link to the update on the 2016 mussel monitoring survey, provided by EA Engineering, Science, and Technology, Inc., PBC can be found here. At least two more surveys will be conducted in future years according to the monitoring schedule.

  - During the September 2016 survey work a total of 23 mussel species were collected in the survey reach below the Project.

  - During the survey, seven state-listed mussel species were collected. The federally endangered fanshell (*cyprogenia stegaria*), a state and federally protected mussel species, was also collected.

  - The fanshell specimen was collected along the right descending shoreline over one-mile downstream of the Project powerhouse discharge location. Based on the existing condition of the specimen and its current location the specimen is beyond the range of any potential project-related impact.

- The 2009 WQC states that the Ohio River is a High Quality Stream with an excellent warm water fishery. One species of freshwater mussel, the Sheepnose, *Plethobasus cyphus*, was recently collected along the right descending bank downstream of the Willow Island Locks, and is a candidate species under consideration for listing as an endangered species. Two mussel species, the Fanshell, *Cyprogenia stegaria*, and the Pink Mucket, *Lampsilis abrupta* are federally listed Endangered Species that have been collected in the Belleville Pool, but not in the immediate vicinity of the Willow Island tail waters.

- Additionally, in the Project's FERC license, it states that the FEIS identified the possible existence of one federally listed aquatic species downstream of the project: the freshwater Pink Mucket Pearly Mussel (*Lampsilis abrupta*). The FEIS concluded that the possible presence of habitat for the mussel downstream of Willow Island Locks and Dam warranted additional consultation with the FWS to avoid any impacts to this species. Article 411 of the Project license therefore requires the licensee to develop a monitoring plan for mussel beds in the downstream pool in order to protect the habitat of the mussel species during project operation.
  - **FERC Order Amending and Modifying Mussel Monitoring Plan:** https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=3460364

- A link to the ORSANCO's 2006 - A Biological Study of the Ohio River, The Willow Island Pool can be found here. In 2006, fish population data were collected from 15 randomly selected locations throughout the Willow Island pool, producing 47 species and 2 hybrid taxa, representing 10 different families. Three of the 47 species were listed in OH as either threatened or of special concern, including: River redhorse (*Moxostoma carinatum*), River darter (*Percina shumardi*), and Channel darter (*Percina copelandi*). WV does not generate such state listings for species.

- The Ohio Department of Natural Resources Division of Wildlife's most current list of state listed wildlife species can be found here. According to the Ohio's Listed Species document, the following fish species found in the Willow Island upstream pool, the downstream Belleville pool, or both pools, as identified in Appendix B, considered to be endangered, threatened, or species of concern in Ohio are: Ohio lamprey, Spotted gar, Channel darter, River darter, Tippecanoe darter, Muskellunge, River redhorse, Eastern sand darter, and Blue catfish.

Cultural and Historic Resources Standard

Criterion	***Standard***	***Instructions***
G	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.

- The Project's FERC license states that:
  - The West Virginia Department of Culture and History determined that the project should have no effect upon known archaeological and historical resources.
  - Article 414 of the FERC license also requires the licensee to consult with the West Virginia State Historic Preservation Officer (SHPO) and the USACE before starting any land-clearing or land-disturbing activities within the project boundary, other than those specifically authorized in the license. If the licensee discovers previously unidentified archaeological or historical properties during the course of constructing or developing project works or other facilities at the project, the licensee will stop all land-clearing and land-disturbing activities in the vicinity of the properties and consult with the SHPO and the Corps. If such archaeological or historical properties are discovered, the license is to, after consulting with the SHPO and Corps, file for Commission approval a CRMP prepared by a qualified cultural resources specialist.
- On January 4, 2011, AMP filed a Cultural Resources Management Plan (CRMP) for the Project pursuant to license article 414:
  - During cultural resource investigations, historic properties were identified. The properties were evaluated and identified in the CRMP. The CRMP details each discovered property, describes the potential effect on each discovered property, and proposes measures for avoiding or mitigating effects.

- The CRMP includes documentation of consultation and a signed Memorandum of Agreement, between the licensee and the Corps, effective on December 22, 2010, which will address and mitigate impacts on cultural resources as a result of construction of the Project pursuant to Section 106 of the National Historic Preservation Act.

- In August 11 and October 28, 2010 letters, respectively, the SHPO concurred with the stipulations in the draft Memorandum of Agreement and with the Corp's assessment that the proposed work would have no adverse effect on the historic integrity of the Willow Island Locks and Dam.

- The CRMP provides a concise plan for the preservation and management of known historic and cultural resources, and meets the requirements of article 414 of the license. Implementation of the CRMP ensures that archeological and historic properties are protected and was approved by FERC on February 10, 2011.
  - **FERC Order Approving Cultural Resources Management Plan:** https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12559638

Recreational Resources Standard

Criterion	*Standard*	*Instructions*
H	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.

- All recreation facilities have been completed per the Project's recreation plan.

- The FERC license for the Project states that the FEIS recommended that the licensee implement the following mitigative measures:

  1) Provide a recreation plan for providing fishing access during construction;
  2) Use hydraulic modeling to design all permanent and temporary in-river fishing access facilities;
  3) File a revised recreation plan which conforms to the standards outlined in the FEIS;
  4) Complete construction of all permanent recreational facilities prior to or concurrent with the date of start-up of project operation;
  5) Provide a plan for maintaining flow velocities in the vicinity of the tailrace fishing areas during times when the power plant is inoperative; and
  6) Monitor recreational use during project operation. Articles 407, 408, and 409 require the licensee to develop plans for protection and enhancement of Project recreation.

- On August 26, 2009, AMP filed a revised recreation plan for the Project. AMP filed a supplement to the plan on January 7, 2011. FERC Issued an Order Amending Recreation Plan on February 7, 2011. Correspondence on the Recreation Plan between the FERC and AMP continues into 2014.
  - **FERC Order Amending Recreation Plan:** https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12556094

- A 2014 FERC letter to AMP regarding the recreation plan for the Willow Island Lock and Dam designates the approved FERC Recreation Facilities at the Project (Table 2):
  - **FERC Letter to AMP RE Consultation with WV DNR Recreation Plan:** https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13460042

Table 2 Willow Island Project Recreational Facilities

Recreation Site Name	Recreation Facilities
Willow Island Dam Recreation Area	Tailrace fishing pier (universally accessible), three fish attractants, multi-level paved access routes, two parking lots (each with 20 spaces, 2 of which are handicap-accessible in each lot), restroom, downstream bank fishing pier, picnic area with shelter.

- The FERC Form 80 is due in 2021. As a result no related FERC filings have been made.
- The public is informed of relevant flow and reservoir levels via the NOAA or National Weather Service Websites, or by contacting the plant directly.

4. Contacts Forms

LIHI Facility Contacts Form

All applications for LIHI Certification must include complete contact information to be reviewed.

Project Name: Willow Island Lock and Dam Project **FERC Project No.** 6902 **LIHI Cert. No.** _____

Project Owner/Operator:

Name and Title Marc S. Gerken PE, President / CEO

Company: American Municipal Power, Inc.

Phone 614-540-1111

Email address jthompson@amppartners.org

Mailing Address 1111 Schrock Rd. Ste. 100, Columbus OH 43229

Consulting firm that manages LIHI program participation (if applicable):

Name and Title Andrew Longenecker, Director of Business Development

Company Cube Hydro Partners, LLC

Phone 240-482-2710

Email address alongenecker@cubehydro.com

Mailing Address Two Bethesda Metro Center, Suite 1330, Bethesda, MD 20814

Party responsible for compliance with LIHI program requirements:

Name and Title Jolene Thompson, Executive Vice President Member Services and External Affairs

Phone 614.540.1111

Email address jthompson@amppartners.org

Mailing Address 1111 Schrock Road, Suite 100, Columbus, OH 43229

Party responsible for accounts payable:

Name and Title Jolene Thompson, Executive Vice President Member Services and External Affairs

Phone 614.540.1111

Email address jthompson@amppartners.org

Mailing Address 1111 Schrock Road, Suite 100, Columbus, OH 43229

Jolene M. Thompson

Project Owner/Authorized Representative Signature

7/5/17

Date

FACILITY CONTACTS FORM

1. All applications for LIHI Certification must include complete contact information to be reviewed.

Project Owner:	
Name and Title	Marc S. Gerken PE, President / CEO
Company	American Municipal Power, Inc.
Phone	614-540-1111
Email Address	jthompson@amppartners.org
Mailing Address	1111 Schrock Road, Suite 100 Columbus OH 43229
Project Operator (if different from Owner):	
Name and Title	
Company	
Phone	
Email Address	
Mailing Address	
Consulting Firm / Agent for LIHI Program (if different from above):	
Name and Title	Andrew Longenecker, Director of Business Development
Company	Cube Hydro Partners, LLC
Phone	240-482-2710
Email Address	alongenecker@cubehydro.com
Mailing Address	Two Bethesda Metro Center, Suite 1330, Bethesda, MD 20814
Compliance Contact (responsible for LIHI Program requirements):	
Name and Title	Jolene Thompson, Executive Vice President Member Services and External Affairs
Company	American Municipal Power, Inc.
Phone	614.540.1111
Email Address	jthompson@amppartners.org
Mailing Address	1111 Schrock Road, Suite 100 Columbus, OH 43229
Party Responsible for Accounts Payable:	
Name and Title	Jolene Thompson, Executive Vice President Member Services and External Affairs
Company	American Municipal Power, Inc.
Phone	614.540.1111
Email Address	jthompson@amppartners.org
Mailing Address	1111 Schrock Road, Suite 100 Columbus, OH 43229

2. Applicant must identify the most current and relevant state, federal, provincial, and tribal resource agency contacts (copy and repeat the following table as needed).

Agency Contact (Check area of responsibility: Flows __, Water Quality __, Fish/Wildlife Resources __, Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __):	
Agency Name	**Ohio River Valley Water Sanitation Commission (ORSANCO)**
Name and Title	Ms. Stacey Cochran Environmental Specialist
Phone	513-231-7719, Ext. 124
Email Address	stacey@orsanco.org
Mailing Address	5735 Kellogg Avenue

	Cincinnati, OH 45230

Agency Contact (Check area of responsibility: Flows __, Water Quality __, Fish/Wildlife Resources __, Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __):	
Agency Name	**West Virginia Department of Environmental Protection (WVDEP)**
Name and Title	Mr. Scott Mandirola Deputy Secretary
Phone	304-926-0499, Ext. 1058 Fax: 304-926-0463
Email Address	Scott.G.Mandirola@Wv.Gov
Mailing Address	601 57th Street, SE Charleston, WV 25314

Agency Contact (Check area of responsibility: Flows __, Water Quality __, Fish/Wildlife Resources __, Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __):	
Agency Name	**The U.S. Fish and Wildlife Service (FWS)**
Name and Title	Liz Stout Biological Science Technician
Phone	304-636-6586, Ext. 15
Email Address	Elizabeth_Stout@fws.gov
Mailing Address	West Virginia Field Office U.S. Fish and Wildlife Service 694 Beverly Pike Elkins, WV 26241

Agency Contact (Check area of responsibility: Flows __, Water Quality __, Fish/Wildlife Resources __, Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __):	
Agency Name	**The Ohio Environmental Protection Agency (OEPA)**
Name and Title	Ms. Rose McLean 401 Coordinator
Phone	614-644-2148
Email Address	rose.mclean@epa.state.oh.us
Mailing Address	Ohio EPA Division of Surface Water 50 West Town Street Columbus, Ohio 43215

Agency Contact (Check area of responsibility: Flows __, Water Quality __, Fish/Wildlife Resources __, Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __):	
Agency Name	**The Ohio Department of Natural Resources (ODNR)**
Name and Title	James Zehringer Director
Phone	614-265-6565
Email Address	James.Zehringer@dnr.state.oh.us

Mailing Address	2045 Morse Road Columbus, Ohio 43229-6693

Agency Contact (Check area of responsibility: Flows __, Water Quality __, Fish/Wildlife Resources __, Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __):	
Agency Name	**The West Virginia Department of Natural Resources (WVDNR)**
Name and Title	Mr. Danny Bennett Coordination Biologist WVDNR-Wildlife Resources Section
Phone	304-825-6787, Ext. 416 Fax: 304-825-6270
Email Address	Danny.A.Bennett@wv.gov
Mailing Address	P.O. Box 99 1110 Railroad Street Farmington, WV 26571

Agency Contact (Check area of responsibility: Flows __, Water Quality __, Fish/Wildlife Resources __, Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __):	
Agency Name	**West Virginia Division of Culture and History**
Name and Title	Susan Pierce Director, Deputy State Historic Preservation Officer
Phone	304-558-0240, Ext. 158
Email Address	susan.m.pierce@wv.gov
Mailing Address	WV Division of Culture and History The Culture Center Capitol Complex 1900 Kanawha Boulevard East Charleston, WV 25305-0300

Agency Contact (Check area of responsibility: Flows __, Water Quality __, Fish/Wildlife Resources __, Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __):	
Agency Name	**U.S. Army Corps of Engineers, Huntington District**
Name and Title	Belinda M. Weikle, M.S.C.E., P.E. Hydraulic Engineer
Phone	304-399-5808 Fax: 304-399-5085
Email Address	Belinda.M.Weikle@usace.army.mil
Mailing Address	Water Resources Engineering Section 502 Eighth Street Huntington, WV 25701

SWORN STATEMENT

As an Authorized Representative of American Municipal Power, Inc., 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 certification of the applying facility is issued, the LIHI Certification Mark License Agreement must be executed prior to marketing the electricity product as LIHI Certified.

The undersigned Applicant 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: American Municipal Power, Inc.

Authorized Representative Name: Jolene Thompson

Title: Executive Vice President Member Services and External Affairs

Authorized Signature Jolene M. Thompson

State of Ohio

County of Franklin

On this, the 5 day of July, 2017, before me a notary public, the undersigned officer, personally appeared Jolene Thompson known to me (or satisfactorily proven) to be the person whose name is subscribed to the within instrument, and acknowledged that he executed the same for the purposes therein contained. In witness hereof, I hereunto set my hand and official seal.

Notary Public R Stout

ROSEMARY A. STOUT
NOTARY PUBLIC, STATE OF OHIO
My Commission Expires 8/22/2018

Appendix A

Project Photographs and Drawings

Aerial Photograph of the Facility:

Photo 1 December 2015 Aerial View of Facility

Photograph of Project's Designated Zone of Effect (ZOE):

Photo 2 Willow Island Designated Zone of Effect

Photographs of Key Facility Features:

Photo 3 November 2015 View of Project Powerhouse Upstream (Photo Courtesy of MWH)

Photo 4 December 2015 View of Tailrace with Generation

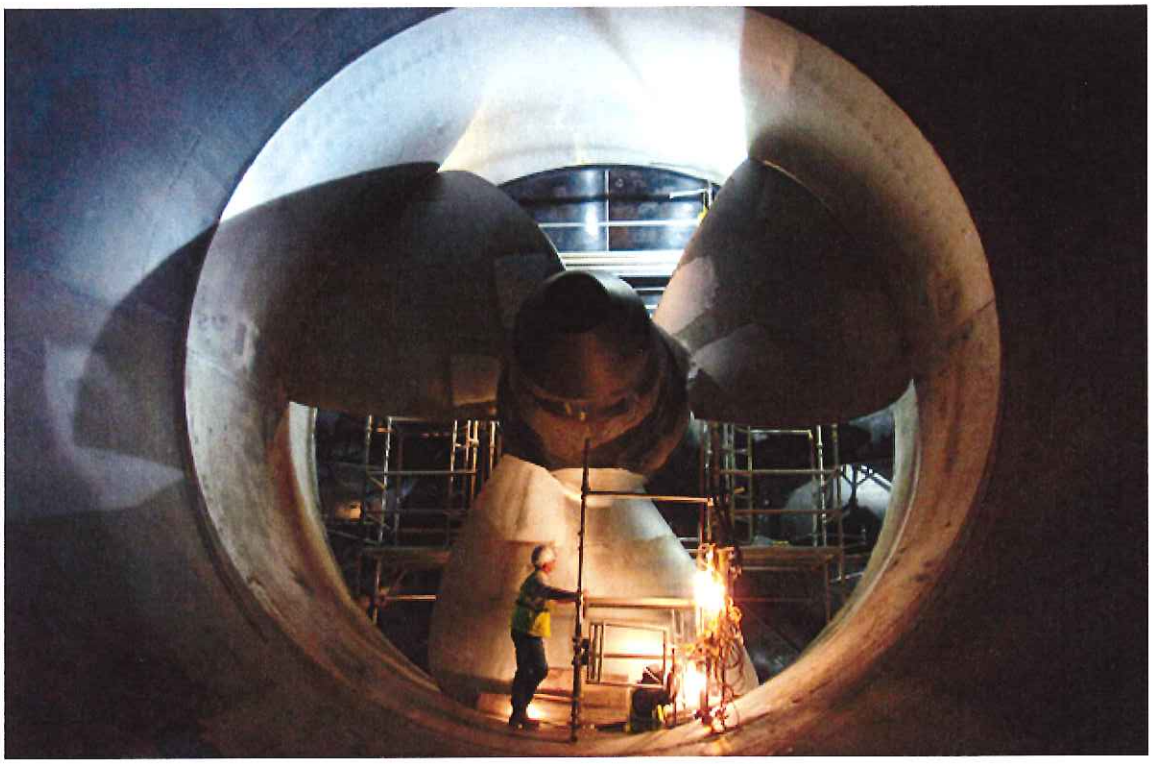


Photo 5 October 2015 View of Unit 2 Runner Blades (Photo Courtesy of MWH)

Photographs of Project Recreation Facilities:

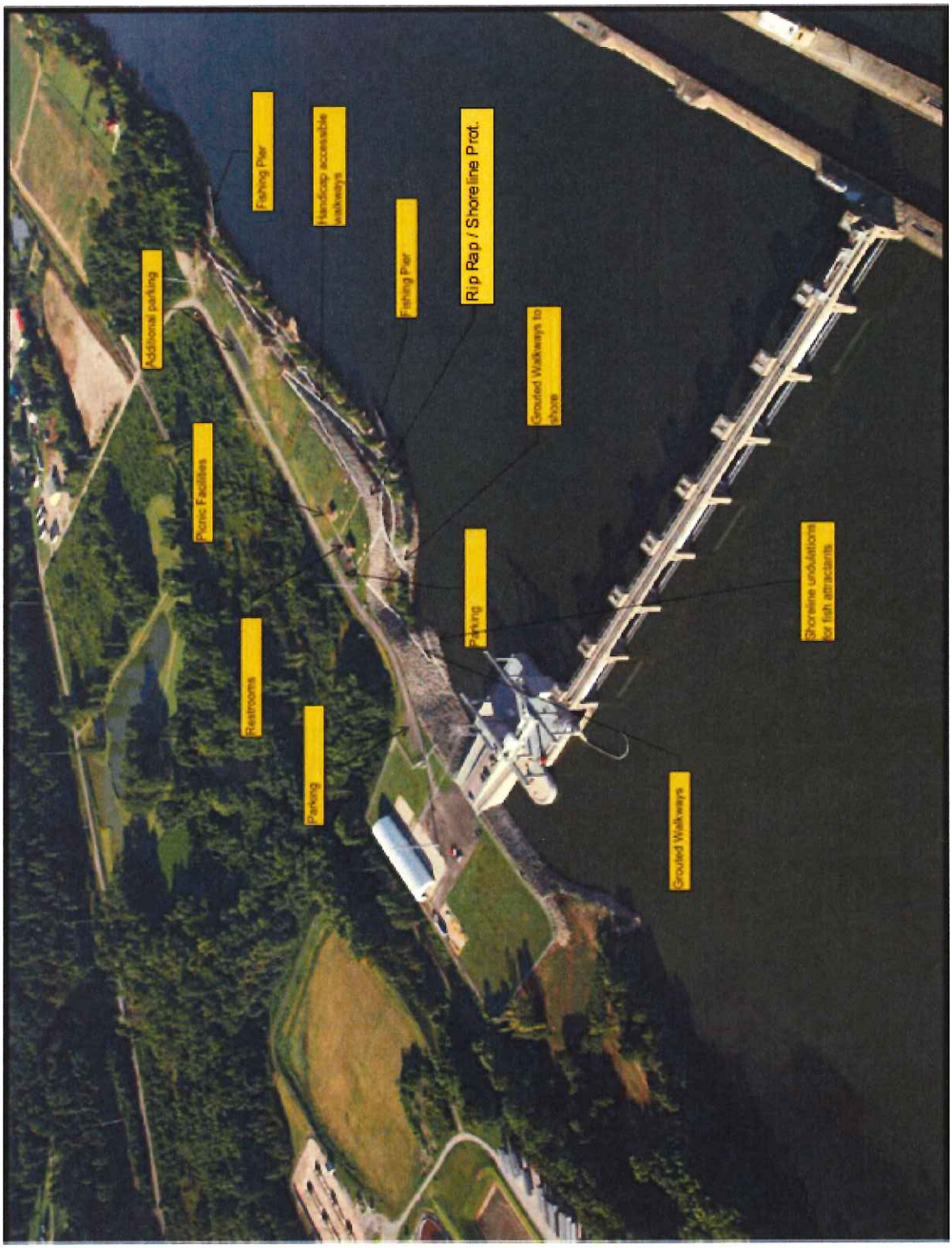


Photo 6 Photograph of As-Built Project Recreation Facilities

Photo 7 December 2015 View of the Fishing Pier Walking Path in the Recreation Area

Photo 8 November 2015 View of Recreation Area Sidewalks (Photo Courtesy of MWH)

Photo 9 January 2015 Status of the Fishing Pier

Photo 10 September 2015 View of Recreation Area Restrooms (Photo Courtesy of MWH)

Photographs of Shoreline Protection Measures:

Photo 11 October 2015 View of Upstream Riprap Placement

Photo 12 November 2015 Placing Riprap on Downstream Slope (Photo Courtesy of MWH)

Photographs of Facility from Inside the Powerhouse:

Photo 13 Inside View of Willow Island Facility Powerhouse

Photo 14 Inside View of Willow Island Facility Powerhouse

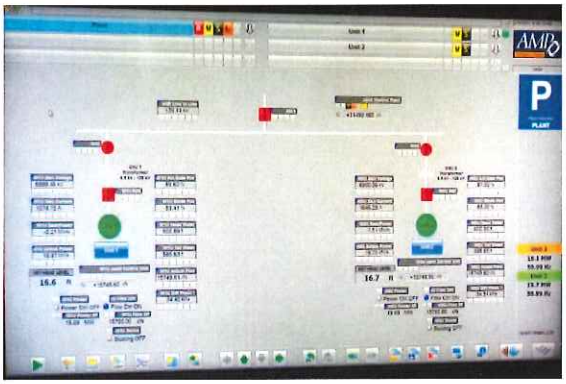


Photo 15 View of Screen within Willow Island Facility Powerhouse

Photo 16 Inside View of Willow Island Facility Powerhouse

Appendix B

Document Attachments

Fish Collected on the Mainstem of Ohio River in Upstream and Downstream Pools of AMP Locks and Dam Facilities from 2003 – 2015:

Latin Name	Common Name	Highly Mobile	Belleville L&D (RM 203.9)		Willow Islands L&D (RM 161.7)
			DS POOL (RM 237.5)	Belleville Pool	US POOL (RM 126.4)
Alosa chrysochloris	skipjack herring	X	X	X	X
Alosa pseudoharengus	alewife	X			
Ambloplites rupestris	rock bass		X	X	X
Ameiurus natalis	yellow bullhead		X		X
Ameiurus nebulosus	brown bullhead				
Amia calva	bowfin				
Ammocrypta pellucida	eastern sand darter			X	
Anguilla rostrata	American eel	X			
Aphrododerus sayanus	pirate perch				
Aplodinotus grunniens	freshwater drum		X	X	X
Campostoma anomalum	central stoneroller		X		X
Carassius auratus	goldfish			X	
Carpiodes carpio	river carpsucker		X	X	X
Carpiodes cyprinus	quillback		X	X	X
Carpiodes sp	Carpiodes sp		X	X	
Carpiodes velifer	highfin carpsucker		X	X	X
Cottus carolinae	banded sculpin				
Ctenopharyngodon idella	grass carp			X	
Cycleptus elongatus	blue sucker	X			
Cyprinella spiloptera	spotfin shiner		X	X	X
Cyprinella whipplei	steelcolor shiner		X		X
Cyprinidae sp	Cyprinidae sp				
Cyprinus carpio	common carp		X	X	X
Cyprinus carpio x Carassius auratus	carp x goldfish				
Dorosoma cepedianum	gizzard shad		X	X	X
Dorosoma petenense	threadfin shad				
Erimystax x-punctatus	gravel chub				
Esox masquinongy	muskellunge			X	X

Etheostoma asprigene	mud darter				
Etheostoma blennioides	greenside darter			X	X
Etheostoma caeruleum	rainbow darter		X	X	X
Etheostoma camurum	bluebreast darter		X		X
Etheostoma flabellare	fantail darter				X
Etheostoma nigrum	johnny darter		X		X
Etheostoma tippecanoe	Tippecanoe darter			X	X
Etheostoma variatum	variegate darter				X
Etheostoma zonale	banded darter			X	X
Fundulus diaphanus	banded killifish		X	X	X
Gambusia affinis	western mosquitofish		X		X
Hiodon alosoides	goldeye				
Hiodon tergisus	mooneye		X	X	X
Hybognathus hayi	cypress minnow				
Hybognathus nuchalis	mississippi silvery minnow				
Hypentelium nigricans	northern hog sucker		X	X	X
Hypophthalmichthys molitrix	silver carp	X			
Hypophthalmichthys nobilis	bighead carp	X			
Ichthyomyzon bdellium	Ohio lamprey	X		X	
Ichthyomyzon unicuspis	silver lamprey	X			
Ictalurus furcatus	blue catfish			X	
Ictalurus punctatus	channel catfish		X	X	X
Ictiobus bubalus	smallmouth buffalo		X	X	X
Ictiobus cyprinellus	bigmouth buffalo		X		
Ictiobus niger	black buffalo		X	X	X
Labidesthes sicculus	brook silverside		X		X
Lepisosteus oculatus	spotted gar			X	X
Lepisosteus osseus	longnose gar		X	X	X
Lepisosteus platostomus	shortnose gar				
Lepomis cyanellus	green sunfish		X	X	X
Lepomis gibbosus	pumpkinseed			X	X
Lepomis gulosus	warmouth		X		X
Lepomis humilis	orangespotted sunfish		X	X	X
Lepomis hybrid	Lepomis hybrid		X	X	X
Lepomis macrochirus	bluegill		X	X	X
Lepomis macrochirus x L. cyanellus	bluegill x green sunfish			X	
Lepomis macrochirus x L. gibbosus	bluegill x pumpkinseed				X

Lepomis macrochirus x L. megalotis	bluegill x longear sunfish				X
Lepomis megalotis	longear sunfish		X	X	X
Lepomis megalotis x L. cyanellus	longear x green sunfish		X		X
Lepomis microlophus	redear sunfish		X	X	X
Lepomis sp	Lepomis sp		X		X
Lethenteron appendix	American brook lamprey				
Luxilus chrysocephalus	striped shiner		X		X
Macrhybopsis hyostoma	shoal chub				
Macrhybopsis storeriana	silver chub		X	X	X
Menidia audens	Mississippi silverside				
Micropterus dolomieu	smallmouth bass		X	X	X
Micropterus punctulatus	spotted bass		X	X	X
Micropterus salmoides	largemouth bass		X	X	X
Micropterus sp	Micropterus sp		X		X
Minytrema melanops	spotted sucker		X	X	X
Morone americana	white perch		X	X	X
Morone chrysops	white bass		X	X	X
Morone mississippiensis	yellow bass				
Morone saxatilis	striped bass	X	X	X	X
Morone saxatilis x M. chrysops	hybrid striper	X	X	X	X
Morone sp	Morone sp		X	X	X
Moxostoma anisurum	silver redhorse		X	X	X
Moxostoma breviceps	smallmouth redhorse		X	X	X
Moxostoma carinatum	river redhorse		X	X	X
Moxostoma duquesnei	black redhorse		X	X	X
Moxostoma erythrurum	golden redhorse	X	X	X	X
Moxostoma macrolepidotum	shorthead redhorse				
Moxostoma macrolepidotum/ M. breviceps	shorthead/ smallmouth redhorse				
Moxostoma sp	Moxostoma sp			X	X
Mugil cephalus	striped mullet	X			
Nocomis micropogon	river chub				X
Notemigonus crysoleucas	golden shiner		X		
Notropis atherinoides	emerald shiner		X	X	X
Notropis blennius	river shiner		X	X	X
Notropis buccatus	silverjaw minnow			X	

Notropis buchanani	ghost shiner				X
Notropis hudsonius	spottail shiner		X	X	X
Notropis photogenis	silver shiner				
Notropis rubellus	rosyface shiner				
Notropis shumardi	silverband shiner				
Notropis sp	Notropis sp		X		
Notropis stramineus	sand shiner		X	X	X
Notropis wickliffi	channel shiner		X	X	X
Noturus flavus	stonecat				
Noturus nocturnus	freckled madtom				X
Perca flavescens	yellow perch		X	X	X
Percina caprodes	logperch		X	X	X
Percina copelandi	channel darter		X	X	X
Percina evides	gilt darter				
Percina maculata	blackside darter				
Percina phoxocephala	slenderhead darter		X	X	X
Percina sciera	dusky darter		X		
Percina shumardi	river darter		X	X	X
Percina sp	Percina sp				
Percopsis omiscomaycus	trout-perch		X	X	
Phenacobius mirabilis	suckermouth minnow				
Pimephales notatus	bluntnose minnow		X	X	X
Pimephales promelas	fathead minnow		X		
Pimephales vigilax	bullhead minnow		X	X	X
Polyodon spathula	paddlefish	X			
Pomoxis annularis	white crappie		X	X	X
Pomoxis nigromaculatus	black crappie		X	X	X
Pylodictis olivaris	flathead catfish		X	X	X
Sander canadensis	Sauger	X	X	X	X
Sander canadensis x S. vitreus	saugeye	X	X	X	X
Sander vitreus	walleye	X	X	X	X
Semotilus atromaculatus	creek chub				
Strongylura marina	Atlantic needlefish				