COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

WATER QUALITY CERTIFICATION FOR YORK HAVEN HYDROELECTRIC PROJECT AND RELATED MITIGATION

DEP File No.--EA 67-023: York Haven Power Company, LLC

FERC PROJECT NO. P-1888-030

York Haven Power Company Contacts:

David R. David
York Haven Power Company, LLC.
York Haven Hydro Station
P.O. Box 67
York Haven, Pennsylvania 17370

Dennis T. O'Donnell
Olympus Power, LLC
67 Park Place East
Morristown, New Jersey 07960

Dauphin, Lancaster and York Counties

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I. PROJECT DESCRIPTION

A. EA67-023 York Haven Power Company, LLC. York Haven Power Company contacts: David R. David, York Haven Power Company, LLC, York Haven Hydro Station ("YORK HAVEN" or "YHPC") P.O. Box 67, York Haven, Pennsylvania 17370 and Dennis T. O'Donnell, Olympus Power, LLC, 67 Park Place East, Morristown, New Jersey. YORK HAVEN Hydroelectric Project is located on the Susquehanna River in York, Dauphin, and Lancaster Counties, Pennsylvania. The project is operated as a run-of-river hydroelectric facility with a total plant capacity of 19.65 megawatts (MW) from its 20 turbines. The average annual generation of YORK HAVEN Project is 130,812 megawatt-hours (MWh).

B. Impacts to migration and movement of aquatic species will result from the continued operation of the facility. YHPC will mitigate the impact to aquatic species by constructing a nature-like fishway at or near the eastern end of the main dam apex in Londonderry Township, Dauphin County and abutment with the west shore of Three Mile Island ("TMI"). The fishway will facilitate movement of aquatic species over the dam and re-establish upstream/downstream river connectivity by creating a series of steps that will distribute the change in water surface and riverbed elevations caused by the dam over approximately 450 feet of the Susquehanna River. Maintenance of the fishway to its approved design configuration shall be conducted for the duration of the operation of YHPC as an electric generation facility.

II. PROVISIONS APPLICABLE TO ALL WATER QUALITY CERTIFICATION CONDITONS

A. Final Agency Action. Any action taken by the Pennsylvania Department of Environmental Protection ("DEP" or "PADEP") in response to any submission required or authorized under this certification or any action taken by DEP to require YORK HAVEN to undertake any action that affects YORK HAVEN's personal or property rights, privileges, immunities, duties, liabilities or obligations including, but not limited to, any action to approve, approve with conditions, disapprove, modify or establish operational or structural changes, plans, schedules, studies or monitoring programs shall constitute a "final agency action" and may be challenged in accordance with applicable law.

B. Operational modifications are a component of the adaptive management system to implement the approved plans, including the performance requirements of this certification. Operational modifications include modifications of seasonal and daily periods of operation of the fishways, dam and powerhouse, detailing how the plant shall be operated during fish passage season and throughout the year. These operational modifications may include:

- sequencing of turbine start-up and operation;
- procedures for estimating, monitoring and reporting flow management through the power house, in the tailrace, above, through and downstream of the nature-like fishway, and through the East Channel fishway as described in the Fishway Operating Procedures ("FOP");
- any other necessary provisions to implement elements of this certification for plant operation, to ensure attraction to and operation of the fishways or to meet other provisions of this certification and its procedures for monitoring and reporting on the

operation of each fish passage facility or other provisions of this certification or measure;

- procedures for annual fish passage facilities start-up and shut-down; and,
- procedures for use in case of emergencies and project outages significantly affecting fishway operations or other provisions of this certification.

C. Structural modifications are changes to project infrastructure, tailrace, fishways or other areas of the Susquehanna River pursuant to the provisions of this certification. No substantial alteration or addition not in conformity with the plans approved by the Federal Energy Regulatory Commission shall be made to any dam or other project works, constructed under the Federal Power Act without the prior approval or authorization of the Federal Energy Regulatory Commission.

D. Resources Agencies – Pennsylvania Department of Environmental Protection ("DEP" or "Department"), Pennsylvania Fish and Boat Commission ("PFBC"), Susquehanna River Basin Commission ("SRBC"), Maryland Department of Natural Resources ("MDDNR"), and the United States Fish and Wildlife USFWS ("USFWS").

E. General Requirements

1. The work authorized under this certification shall, at all times, be subject to oversight and inspection by representatives of DEP, and no changes in the maps, plans, profiles, and specifications as approved shall be made except with the written consent of DEP. DEP, however, reserves the right to require such changes or modifications in the maps, plans, profiles, and specifications as may be considered necessary to assure compliance with the Pennsylvania Clean Streams Law, Dam Safety and Encroachments Act and other appropriate requirements of state law. DEP further reserves the right to suspend or revoke this certification for failure to comply with appropriate requirements of state law, an administrative order of DEP or a term or condition of this certification.

2. YORK HAVEN shall notify DEP, in writing, of the proposed time for commencement of earth disturbance activity, under this certification at least 15 days prior to the commencement of the work.

3. YORK HAVEN shall prepare, implement and monitor the Erosion and Sedimentation Control Plan prepared in accordance with Chapter 102 so as to minimize erosion and prevent excessive sedimentation into the receiving watercourse or body of water.

4. All wetlands within the project area shall be accurately delineated and marked in the field prior to the start of construction activities and such field marking shall be maintained up to the time that earth disturbance activities are completed and the site has been stabilized. An acceptable means of field-identification is the use of an orange construction safety fence.

5. YORK HAVEN shall obtain either coverage under a general NPDES Permit or an individual NPDES Permit for Stormwater Discharges Associated with Construction Activity for earth disturbance activities requiring an NPDES permit, prior to conducting such earth disturbance activities.

6. Any additional information or revisions to any submittal required under this certification requested by the DEP in writing or any changes to implementation of any plans requested in writing by the DEP shall be submitted or completed within 15 business days of the request or such longer period of time approved by the DEP in writing.

F. Temporary stream crossings

1. All necessary causeway and/or cofferdams shall be constructed of rock, clean granular fill materials, or other materials meeting specifications approved by DEP reasonably free of fines, silts and other erodible material.

2. All temporary cofferdams shall be completely removed and the area restored and stabilized upon completion of the project in accordance with 25 Pa. Code Chapter 102 and the approved Erosion and Sedimentation Control Plan.

3. Roads shall cross all watercourses at a right angle to the stream, unless an alternative configuration is otherwise approved in writing by DEP.

4. A culvert, having as large a diameter as possible, must be provided to minimize placement of excessive fill and excavation of the streambanks. If the bank height prohibits a large diameter pipe culvert, the crossing could consist of a bridge. The minimum size diameter culvert to be used is 12 inches.

5. Road and causeway embankments shall consist of rock, clean granular fill materials, or other materials meeting specifications approved by DEP, reasonably free of fines and silt or other erodible material, to minimize stream channel sedimentation during placement, removal, and periods of overtopping. No construction materials or equipment shall be stockpiled or stored overnight on crossings or causeways.

6. Unless otherwise approved by DEP, approach roads to temporary road crossings shall utilize original grades. However, clean rock material or gravel to a depth of six inches above original grade shall be utilized for approaches as necessary.

7. Temporary road crossings shall be kept open and functioning at all times by maintaining the crossings free of debris and other obstructions.

8. Construction of the temporary roads and cofferdams at any public boat launching ramp along a waterway shall take place between September 15 and May 15.

G. Reasonable Assurance of Compliance – DEP supports issuance of a 46 year license by FERC for the project. Because of changes in the characteristics of the Susquehanna River that will occur by 2030 and because the FERC licenses for the Holtwood Hydroelectric

Facility and the Safe Harbor Hydroelectric Facility expire in 2030, this certification may be revised in 2030, as necessary, to establish requirements consistent with Section 401 of the Clean Water Act, 33 U.S.C Section 1341.

III. FISH PASSAGE

A. General Requirements

1. Fishway Operating Procedures ("FOP")

a. YORK HAVEN shall establish and maintain a FOP for the operation and maintenance of facilities related to migratory and resident fish passage, which shall be subject to review and approval by DEP and review and comment by the other Resource Agencies. The FOP will include, for each fishway, schedules for routine maintenance, procedures for routine operations (including: seasonal and daily periods of operation, dam and powerhouse operational measures) detailing with how the plant shall be operated during fish passage season including sequencing of turbine start-up and operation, debris management as well as any other necessary provisions for plant operation and related to attraction flow as a component of the fish passage system including the NLF provisions for the operation of the NLF, procedures for monitoring and reporting on the operation, and procedures for use in case of emergencies and Project outages significantly affecting fishway operations.

b. YORK HAVEN shall implement the FOP consistent with the approval by the DEP. YORK HAVEN shall provide written documentation to the Resource Agencies that all fishway operational

personnel have received training concerning the content of the approved FOP, which documentation shall be signed by the Project's operations manager.

c. Copies of the approved FOP and all modifications will be provided to the Resource Agencies.

d. By December 31 of each year, YORK HAVEN shall provide to the Resource Agencies an annual report detailing: (1) the implementation of the FOP, including any deviations from the FOP and a process to prevent or minimize those deviations in the future, or in the case of emergencies or Project outages, the steps taken by YORK HAVEN to minimize or mitigate adverse effects on fishway operation or fish passage measures; and (2) any proposed modifications to the FOP to further enhance its effectiveness in the future. YORK HAVEN shall meet with the Resource Agencies by January 31 of each year unless a different date is mutually agreed upon by YORK HAVEN and the Resource Agencies. Any required modifications to the FOP requested by DEP or the USFWS shall be submitted to the Resource Agencies within 30 days of receipt of such request for the modification unless a longer period is approved by DEP. The modifications to the FOP shall be implemented consistent with the approval of the DEP.

e. Except as otherwise specifically provided, for fish passage system enhancements and facilities that do not begin operation with the entry into operation of the Project under the new FERC license, 60 days prior to operation of the enhancements and/or facilities, YORK

HAVEN shall submit FOP provisions for any such new fish passage enhancements, facilities and measures to the Resource Agencies for review and approval by DEP and review and comment by the other Resource Agencies, and YORK HAVEN shall implement the FOP as approved by the DEP.

f. The FOP shall also include the procedures for resident fish passage.

2. Nature-Like Fishway Construction – YORK HAVEN will finance, design, permit and install a nature-like fishway facility ("NLF Facility") in the vicinity of the apex of the Main dam and Three Mile Island ("TMI") in accordance with the conditions set forth below.

a. Unless a different plan is approved by the DEP in writing, the NLF Facility shall be in substantial compliance with the design concept and criteria for the NLF Facility set forth in Appendix A and B hereto.

b. The NLF Facility shall be authorized, constructed and operated consistent with the following schedule unless the DEP approves a different schedule in writing. YORK HAVEN shall respond to all Resource Agency and FERC requests for additional information within 60 days from receipt of the request unless a different response time is approved by the DEP in writing.

i. By March 31, 2015, YHPC shall prepare and submit to the Resource Agencies a functional design of the NLF Facility, including hydrologic and hydraulic analyses, NLF configuration and dimensions, general arrangements drawings

with plan and profile views, and draft elements of applications for an ACOE Clean Water Act §404 Permit, a §401 Water Quality Certification, an Erosion and Sedimentation Control Plan and an NPDES Permit for Stormwater Discharge Associated with Construction Activities.

ii. By July 15, 2015, YORK HAVEN shall prepare and submit (a) a complete application to the ACOE for a Clean Water Act §404 Permit; (b) an application to DEP for a §401 Water Quality Certification; (c) an Erosion and Sedimentation Control Plan and application to DEP for an NPDES Permit for Stormwater Discharge Associated with Construction Activities; and (d) engineering designs and a request for construction approval from FERC.

iii. The process of issuing bid requests, evaluating bids, finalizing costs and completing procurement of construction contracts for the NLF Facility shall be completed within 150 days from issuance of all necessary governmental approvals for NLF Facility construction, including the Clean Water Act §404 permit, the related DEP water quality certification, the NPDES Permit for Stormwater Associated with Construction Activities, and the FERC approval for the NLF Facility.

iv. The NLF Facility shall be constructed and placed into operation within 3 full construction seasons after the date specified in ¶ iii above.

vi. Except as otherwise provided herein, other than facility and operations modifications to the NLF as provided in Sections III.B.1.d and e, YORK HAVEN shall not be required to design, construct or install any additional fish passage structure at the project prior to 2041.

c. YORK HAVEN shall implement the NLF operation and maintenance plan consistent with the approval of the DEP as part of the FOP.

B. American Shad Passage

1. Upstream Shad Passage

a. The period from completion of construction through the end of the first American shad upstream shad passage season following completion of the NLF Facility will be a "shake-down" period, during which YORK HAVEN shall conduct visual observations and make adjustments to the NLF Facility to address any unanticipated inhibitions or barriers that impede the NLF Facility's performance.

b. Starting in the second American shad upstream passage season following completion of the NLF Facility, YORK HAVEN shall commence telemetry studies to monitor the overall effectiveness of the NLF Facility, consistent with the following:

i. The telemetry studies will be conducted for at least two years, and potentially a third year if, after consultation with the Resource Agencies, it is determined to be necessary by YORK HAVEN or either the USFWS or PADEP in order to obtain observations over a range of high and low flows typical of

American shad passage seasons on the Susquehanna River. In general, the range defining typical high and low flows during the American shad upstream passage season would be anticipated to be as follows:

(1) Typical low flow range: 22,000 cfs to 35,300 cfs.

(2) Typical high flow range: 35,300 cfs to 55,600 cfs.

ii. The telemetry studies will be planned to be conducted during successive shad passage seasons, but may be performed on a non-successive basis under the following circumstances:

(1) YORK HAVEN may postpone conducting the telemetry studies, after consultation with the Resource Agencies and with the approval of the USFWS and DEP, in the event that extenuating circumstances (such as the unusual flows, construction at downstream dams or other conditions) are interfering or expected to interfere with upstream shad passage. The PADEP agrees that in the event that it becomes aware of circumstances that would warrant postponement of the telemetry studies, it will promptly notify YORK HAVEN, with the objective of providing notice to YORK HAVEN, to the extent practicable, as soon as possible prior to the anticipated start of the shad passage season.

(2) YORK HAVEN may postpone a successive season's telemetry study if YORK HAVEN determines, after consultation with the Resource Agencies and with the approval of USFWS and PADEP, that some physical adjustment to the NLF Facility is advisable based on the observations during the prior shad passage seasons, in which case YORK HAVEN shall implement the physical adjustments and perform the telemetry study during the American shad upstream passage season following implementation of the physical adjustment.

iii. The telemetry studies will utilize American shad tagged at the Safe Harbor Project, provided that access is granted by the owner of such Project or at such other location as required or approved by the PADEP in writing.

iv. The telemetry studies shall utilize radio telemetry, acoustic telemetry, or such other technologies as YORK HAVEN proposes and PADEP and the USFWS, after consultation with the other Resource Agencies, approve. The general parameters and protocols for such telemetry studies (number of fish, fish release sites, target areas for telemetry antennas) are described in Appendix C. At least 10 months prior to the start of the second Upstream American Shad Passage Season following completion of the NLF Facility, YORK HAVEN

shall prepare and submit to the Resource Agencies for review an NLF Facility Monitoring Plan (the "NLF Monitoring Plan") containing detailed protocols for the telemetry studies. YORK HAVEN shall confer with the Resource Agencies regarding the NLF Monitoring Plan, and shall provide for at least 90 days for PADEP and the USFWS to review and approve, and for the other Resource Agencies to review and comment on, the NLF Monitoring Plan.

c. Upstream American Shad Passage Target and Effectiveness Criteria:

i. The target established by the Resource Agencies is for at least 75% of the upstream migrating American shad passing the Safe Harbor Dam to pass upstream of the Project through the combination of the NLF Facility and the East Channel Fishway (the "Upstream Shad Passage Target"). The NLF Facility shall be designed and operated to be capable of achieving the Upstream Shad Passage Target, provided that adequate numbers of upstream migrating American shad reach the Project Area. YORK HAVEN shall not be deemed in violation of this condition if the Upstream Shad Passage Target is not achieved for reasons beyond the reasonable control of the Project. ("Project Area" is defined as the area upstream of a line drawn across the Susquehanna River from the downstream end of the powerhouse to the east bank of the river as depicted in Exhibit 1 to Appendix C hereto)

ii. The NLF Monitoring Plan is designed to investigate several issues: (i) whether the upriver migrating American shad passing the Safe Harbor Dam are reaching the Project Area; (ii) whether upriver migrating American Shad entering the Project Area are attracted to the downstream entrance of the NLF Facility; and (iii) whether there are barriers to American shad entering into and passing through the NLF Facility (e.g., velocity barriers or other constraints). Unless a different plan is approved by the DEP and the USFWS, the NLF Monitoring Plan shall be consistent with Appendix C, attached hereto.

iii. The NLF Facility will be deemed to be effective if: (1) in two consecutive years after installation or subsequent modification of the NLF Facility, (A) the Upstream Shad Passage Target, identified in paragraph B.1.c.i. above, is achieved or (B) 85% of the tagged American shad that enter the Project Area exit the combination of the NLF Facility and the East Channel Fishway (the "Project Area Passage Success Criterion").

iv. If the telemetry studies show that the Project Area Passage Success Criterion is achieved in two successive American shad upstream passage seasons which reflect a range of flows typical of shad passage seasons on the Susquehanna River, the Project Area Passage Success Criterion will be deemed

achieved and YORK HAVEN may terminate the telemetry studies.

v. If the telemetry studies show that the Project Area Passage Success Criterion is not achieved in two successive American shad upstream passage seasons, and such failure was not due to unusual or extenuating circumstances (such as unusual flow or temperature conditions), YORK HAVEN will undertake the actions set forth in Section B.1.d. below and then perform a telemetry study for at least two additional American shad upstream passage seasons to confirm achievement of the Project Area Passage Success Criterion.

d. YORK HAVEN shall, in consultation with the Resource Agencies, evaluate the fish movement data from the NLF Monitoring Plan to determine if there are barriers to timely passage of upstream migrating American shad within the Project Area. The Project area is the area from the downstream end of the powerhouse extending to the upstream exit of the NLF or East Channel Fishway, or such other area established by the DEP in writing after consultation with the Resource Agencies and York Haven. If such barriers to timely passage of upstream migrating American shad are identified within the Project Area, YORK HAVEN shall prepare and submit to the Resource Agencies a plan and schedule for those actions to address such conditions that are feasible, appropriate under the circumstances, reasonable and technically sound, provided that the

Project shall not be required to undertake the curtailment of electric generating operations. Such plan shall be subject to review and approval by PADEP and the USFWS and review and comment by the other Resource Agencies. Following approval by PADEP and the USFWS, YORK HAVEN shall implement the approved plan in accordance with the approved schedule.

e. If the Project Area Passage Success Criterion is not achieved, YORK HAVEN shall take the following measures, as appropriate and necessary, after consultation with the Resource Agencies:

i. Evaluate fishway hydraulics and access for velocity and shear stress barriers, recognizing that hydraulics of the NLF Facility will vary with river flow and flow through the NLF Facility.

ii. Adjust positions of rock weirs and attraction water discharge if necessary.

iii. Adjust timing of supplemental attraction flows.

iv. Install ultrasound to deter fish from an area (such as the Powerhouse or East Channel).

v. Reduce flows in the East Channel to reduce attraction of American shad to the East Channel.

vi. Adjust amount of supplemental attraction flows in the NLF Facility up to the Potential Increased Attraction Flow Value.

vii. Evaluate whether potential barriers exist in the channel downstream of the Main Dam hindering fish movement to the

entrance of the NLF Facility, and if reasonably necessary undertake feasible and cost-effective modifications to the channel to remove such barriers.

f. The upstream end of NLF Facility shall be designed to accommodate installation of Passive Integrated Transponder ("PIT") tag monitoring devices at such time as such PIT tag monitoring devices become available and feasible for reliably monitoring American shad exiting the NLF Facility. At such time as requested by PADEP or the USFWS, YORK HAVEN shall conduct a feasibility study to evaluate whether a PIT tag monitoring facility can be successfully installed and maintained near the upper end of the NLF Facility to reliably monitor American shad exiting the NLF Facility. YORK HAVEN shall install PIT tag readers, or such other monitoring technology as may be required by the PADEP, after consultation with the Resource Agencies, at the NLF Facility when such technology has become available, feasible, and technically sound for measuring American shad passage in the conditions of the NLF Facility as mutually agreed to, after consultation with the Resource Agencies. Upon installation of the PIT tag readers, YORK HAVEN shall implement a PIT tag monitoring plan, or other monitoring techniques approved by the DEP in consultation with the other Resource Agencies, on a schedule approved by the DEP.

g. If at the end of implementation of the measures described above, or such longer time as established by the DEP, the results indicate that

as measured as described above, less than 75% of the American shad that pass the Safe Harbor Dam pass through the Project and the Project Area Passage Success Criterion is not being achieved, within 6 months thereafter, YORK HAVEN shall propose a plan and schedule for mitigation, as defined in 25 Pa. Code Section 105.1 that is feasible, appropriate under the circumstances, reasonable and technically sound, provided that the Project shall not be required to undertake the curtailment of electric generating operations. This plan and schedule shall be submitted to the Resource Agencies for review and comment and to DEP for approval. YORK HAVEN shall implement the plan and schedule consistent with the approval of the DEP. In the event YORK HAVEN fails to submit the plan and schedule as required by this paragraph, the DEP, in consultation with the other Resource Agencies, may establish a plan and schedule and YORK HAVEN shall implement that plan and schedule consistent with the approval of the DEP.

2. Downstream Shad Passage of Post-Spawning Adult American Shad

a. YORK HAVEN shall provide for downstream passage of post-spawning adult American shad through maintenance of the existing Project and installation and operation of the NLF Facility, which shall achieve an 80% survival rate as demonstrated by implementation of the protocol set forth in Section b. below.

b. During the period of May 1 to June 30, if river flow exceeds the sum of Project Hydraulic Capacity, required flows through the NLF

Facility, required flows through the East Channel, and required flows (if any) over the Main Dam, YORK HAVEN will open and spill water via the Forebay Sluice Gate (~370 cfs) to the extent practicable for a period of one to two hours during the morning on weekdays, subject to Project personnel availability and access requirements for operations and maintenance purposes. Such spilling may be provided in connection with opening of the Forebay Sluice Gate for purposes of passing debris, it being understood by the Parties that during the passage of debris, it will not be feasible to utilize the chute structure.

c. If after operational modifications are implemented YORK HAVEN cannot achieve 80% survival of adult American shad, YORK HAVEN shall propose a plan and schedule for mitigation, as defined in 25 Pa. Code Section 105.1 that is feasible, appropriate under the circumstances, reasonable and technically sound, provided that the Project shall not be required to undertake the curtailment of electric generating operations This plan and schedule shall be submitted to the Resource Agencies within 6 months from the date the DEP determines that YORK HAVEN failed to achieve the 80% survival target. YORK HAVEN shall implement the plan and schedule consistent with the approval of the DEP. In the event YORK HAVEN fails to submit the plan and schedule as required by this paragraph, the DEP, in consultation with the other Resource Agencies, may establish a plan and schedule and YORK HAVEN

shall implement that plan and schedule consistent with the approval of the DEP.

3. Downstream Juvenile American Shad Passage

a. After issuance of the New License and until completion of the NLF Facility, YORK HAVEN shall implement the following protocol to facilitate downstream passage of juvenile American shad during the Downstream Juvenile American Shad Passage Period:

i. During the entire Downstream Juvenile American Shad Passage Period from October 1 until November 30, YORK HAVEN will operate the Project units in the following order of priority, depending upon available river flow: Unit 1-6 (Propeller units) may be operated without restriction up to available river flow; (2) Unit 14 (larger single Francis unit) may be operated if river flow exceeds capacity of Units 1- 6; (3) Units 7-13 and 15-30 (double Francis units) may be operated in ascending order if river flow exceeds capacity of Unit 1-6 and 14.

ii. During the entire Downstream Juvenile American Shad Passage Period, YORK HAVEN will open and spill water via the Forebay Sluice Gate (~ 370 cfs) between the hours of 5 pm to 11 pm Eastern Standard Time.

iii. If during the Downstream Juvenile American Shad Passage Period river flow exceeds the sum of Project Hydraulic Capacity, required flows through the East Channel, and

required flows (if any) over the Main Dam, YORK HAVEN will open and spill water via the Forebay Sluice Gate (~370 cfs) to the extent practicable for one to two hours during the morning, subject to Project access requirements for operations and maintenance purposes, in order to provide for downstream juvenile American shad passage.

b. After completion of the NLF Facility, unless a different protocol is approved by the USFWS and the PADEP, YORK HAVEN shall implement the following protocol to facilitate downstream passage of juvenile American shad during the Downstream Juvenile American Shad Passage Period:

i. During the entire Downstream Juvenile American Shad Passage Period, YORK HAVEN will operate the Project units in the following order of priority, depending upon available River flow: (1) Unit 1-6 may be operated without restriction up to available river flow; (2) Unit 14 may be operated if river flow exceeds capacity of Units 1-6; (3) Units 7-13 and 15-30 may be operated in ascending order if river flow exceeds capacity of Unit 1-6 and 14.

ii. During the entire Downstream Juvenile American Shad Passage Period, YORK HAVEN will open and spill water via the Forebay Sluice Gate (~ 370 cfs) between the hours of 5 pm to 11 pm EST.

iii. The NLF Facility will be operated to maintain a flow through the fishway of approximately 200 cfs.

iv. If during the Downstream Juvenile American Shad Passage Period river flow exceeds the sum of Project Hydraulic Capacity, required flows through the NLF Facility, required flows through the East Channel, and required flows (if any) over the Main Dam, YORK HAVEN will open and spill water via the Forebay Sluice Gate (~370 cfs) to the extent practicable for one to two hours during the morning, subject to Project access requirements for operations and maintenance purposes, in order to provide for downstream juvenile American shad passage.

c. The overall goal for juvenile American shad downstream passage is to achieve survival of 95% of juvenile American shad from above the Project powerhouse and dam to below the Project powerhouse and dam (the "Downstream Juvenile American Shad Passage Goal"). The effectiveness of downstream passage operations for juvenile American shad will be determined based upon (1) a route of passage analysis, and (2) confirmation that Forebay Sluice Gate provides for safe passage.

d. For purposes of the route of passage analysis, the DEP will assume that (1) juvenile American shad will pass through the NLF Facility, through the East Channel past the East Channel Dam, over the Main Dam, and into the head race in direct proportion to the amount of

flow via each such route; (2) any juvenile American shad passing through the NLF Facility, through the East Channel past the East Channel Dam, over the Main Dam, or through the Forebay Sluice Gate will survive; (3) juvenile American shad that do not pass through the NLF Facility, through the East Channel past the East Channel Dam, over the Main Dam, or through the Forebay Sluice Gate will pass through the turbines that are being operated in accordance with the priorities set forth above, and absent observations to the contrary, are allocated between the operating turbines in proportion to the flow through each turbine; and (4) the survival rate of juvenile American shad passing through individual turbines (based on previous balloon tag and blade strike analyses) are as stated in Appendix D. Based upon the foregoing assumptions and confirmation that Forebay Sluice Gate provides for safe passage as described in Section f. below, the juvenile American shad passage goal of 95% would be met if at least 60% of the tagged juvenile American shad released into the headrace exit via the Forebay Sluice Gate (that is, pass downstream of the Project headrace without passing through the turbines) (the "Headrace Shad Turbine Avoidance Target"). Unless a different method is approved by the USFWS and the DEP in writing, YORK HAVEN shall test the downstream passage efficiency of the operating protocols described above by a PIT tag monitoring study. YORK HAVEN shall, in consultation with the Resource Agencies, prepare a plan and schedule for the Headrace

Shad Turbine Avoidance Study for review and approval of the Resource Agencies, consistent with the design criteria set forth in Appendix F. The Project will be deemed to meet the Downstream Juvenile American Shad Passage Goal if (1) the Headrace Shad Turbine Avoidance Study shows that the Headrace Shad Turbine Avoidance Target is achieved and (2) YORK HAVEN complies with the provisions of Section III.B.3.e. below to establish conditions under which the Forebay Sluice Gate provides for safe passage of juvenile American shad.

e. Within four (4) years following License issuance and prior to performance of the downstream juvenile American shad studies referenced in Section III.B.3.d. above, YORK HAVEN shall prepare and submit to the Resource Agencies: (i) designs for a chute structure to convey flows beyond the roadway on the downstream side of the Cable Alley structure, meeting the design criteria set forth in Appendix E allowing juvenile and adult American shad to land unimpeded in the downstream pool; and (ii) removal of obstructions in or deepening of the downstream pool into which flows from the Forebay Sluice Gate land to provide an adequate depth of 1 foot for each 4 feet of drop into which juvenile or adult American shad may land. YORK HAVEN shall submit design plans for improvements and a proposed implementation schedule to the USFWS and PADEP for review and approval and to the other Resource Agencies for review and comment, and shall implement the proposed improvements in

accordance with the approved designs and schedule by the PADEP. Any such required improvements shall be completed coincident with completion of the NLF Facility, and in advance of commencement of the monitoring described in Section III.B.3.d. above.

f. If the effectiveness monitoring conducted pursuant to Section III.B.3.d. above shows that the Headrace Shad Turbine Avoidance Target is not achieved, unless the USFWS and the DEP approve alternative measures, YORK HAVEN shall implement the following sequence of adaptive measures in the next passage season:

   i. Open the NLF supplemental flow gate (800 cfs) during the same schedule as the Forebay Sluice Gate is opened.

   ii. Suspend operation of certain Francis turbine units during the hours of 5-11 pm EST when river flows are between 15,000 cfs and 22,000 cfs during the Downstream Juvenile American Shad Passage Period, up to a total generation loss of 1,000 Megawatt hours ("MWh").

   iii. Such other measures as may be agreed to by YORK HAVEN, the USFWS and DEP, after consultation with the other Resource Agencies.

g. Unless the DEP and the USFWS approve a different time in writing, within two years of implementing the adaptive measures referenced in Section 3.f. above, YORK HAVEN shall conduct a follow-up Headrace Shad Turbine Avoidance Study following the protocols referenced in Section III.B.3.d. above . If the follow-up Headrace

Shad Turbine Avoidance Study shows that Headrace Shad Turbine Avoidance Target is achieved, such adaptive measures shall continue to be implemented for the duration of the License.

h. If by January 1, 2028, (a) the Headrace Shad Turbine Avoidance Studies have not shown that Headrace Shad Turbine Avoidance Target is being achieved by adaptive measures implemented at the Project, and (b) based on all available information and after consultation with YORK HAVEN and the other Resource Agencies, the USFWS renders a final determination on the basis of the record reasonably finding that (i) YORK HAVEN has not demonstrated that the adaptive measures implemented at the Project are reasonably anticipated to meet the Downstream Juvenile American Shad Passage Goal, and (ii) additional measures that are reasonably required to achieve the Downstream Juvenile American Shad Passage Goal (the "Additional Measures Determination") then:

i. Within 12 months of the Additional Measures Determination, YORK HAVEN shall, in consultation with the Resource Agencies, prepare a design and schedule for implementation of additional structural and operational measures reasonably anticipated to meet the Downstream Juvenile American Shad Passage Goal that are feasible, appropriate under the circumstances, reasonable and technically sound. YORK HAVEN shall evaluate, among other options, options for a Fish Guidance System ("FGS") as described in the report

entitled *Evaluation of Fish Guidance Systems* (Draft April 2013), or other appropriate technology to achieve the Downstream juvenile American Shad Passage Goal. As part of the evaluation report, YORK HAVEN shall provide sufficient information to demonstrate the reasonable likelihood of the proposed option and measures to meet the Downstream Juvenile American Shad Passage Goal.

ii. Following approval of the design and schedule by the USFWS and DEP, after consultation with the other Resource Agencies, YORK HAVEN shall prepare and submit the applications for all required governmental approvals, including FERC approvals, and procure, install and implement the approved structural and/or operational measures in accordance with the approved schedule. Such approved measures shall be implemented by December 31, 2030 or such other date as agreed to by YORK HAVEN and the USFWS, after consultation with the other Resource Agencies, or as approved by FERC.

iii. If YORK HAVEN does not present a design and schedule for implementing additional structural and operational measures reasonably anticipated to meet the Downstream Juvenile American Shad Passage Goal that are feasible, appropriate under the circumstances, reasonable and technically sound, or based on all available information and after consultation with

YORK HAVEN and the Resource Agencies, the DEP does not approve YORK HAVEN's design and schedule for additional measures submitted pursuant to Section III.B.3.h. above, the DEP may prescribe such measures as the DEP determines are necessary for safe and effective passage of downstream migrating American shad and YORK HAVEN shall implement those measures within the schedule established by the DEP.

iv. Within one year after the implementation of the structural and operational measures implemented under Section III.B.3.h. above, YORK HAVEN shall perform a follow-up Headrace Shad Turbine Avoidance Study to evaluate the number of tagged juvenile American shad that exit the Forebay without exposure to the turbines.

C. Eel Passage

1. Upstream Eel Passage

YORK HAVEN shall provide for upstream passage of juvenile American eels through maintenance of the existing Project and installation of the NLF Facility. Based upon their present understanding of the behavior of juvenile American eels and the design of the NLF Facility, the USFWS expects that the existing design of the Project in conjunction with the installation of the NLF Facility will be adequate to provide for successful upstream passage of juvenile American eels past the Project, and no other measures are presently

believed to be necessary for such upstream passage of juvenile American eels.

2. Downstream Eel Passage

a. The overall goal for silver American eel passage shall be to achieve effective passage and survival of 85% of silver eels from above the Project dams and powerhouse to below the Project dams and powerhouse (the "Downstream Eel Passage Goal").

b. YORK HAVEN shall cooperate with the Resource Agencies and other interested parties in the conduct of (1) a Lower Susquehanna River Downstream Eel Study to evaluate the timing, magnitude, duration, annual variation and environmental conditions associated with active migration of silver eels from tributaries stocked with elvers, through the lower Susquehanna River to the Chesapeake Bay; and (2) a Site-Specific Route of Passage Study to evaluate the route of passage selected by migrating silver eels in the vicinity of the Project. The design criteria for the Lower Susquehanna River Downstream Eel Study and the Site-Specific Route of Passage Study are described in Appendix G.

c. At least 12 months prior to the anticipated date for completion of the NLF Facility, in consultation with the Resource Agencies, YORK HAVEN shall prepare a plan and schedule for conducting a discrete downstream passage effectiveness study ("Site-Specific Downstream Eel Study"), consisting of a Site Specific Route of Passage Study as described in Appendix G and an Eel Survival Study

as described in Appendix H. YORK HAVEN shall submit the Site-Specific Downstream Eel Study plan and proposed schedule to the Resource Agencies, for review and approval by the USFWS and PADEP and for review and approval. YORK HAVEN, in cooperation with the Resource Agencies, shall conduct the Site-Specific Route of Passage Study following completion of the NLF Facility in accordance with the approved plan and schedule, and YORK HAVEN shall conduct the Eel Survival Study in accordance with the approved plan and schedule.

d. If the results of the Site-Specific Downstream Eel Passage Study indicate that the then existing Project operating measures and protocols achieve the Downstream Eel Passage Goal, then YORK HAVEN shall continue to implement those protocols and measures.

e. If the results of the Site-Specific Downstream Eel Passage Study indicate that the Project's existing operating measures and protocols do not achieve the Downstream Eel Passage Goal, YORK HAVEN will prepare and submit to the Resource Agencies a plan and schedule for evaluating the feasibility and costs of potential physical and/or operational modifications to the Project to facilitate downstream eel passage (the Downstream Eel Improvements Study). The Downstream Eel Improvements Study plan and schedule shall be subject to review and approval by PADEP and the USFWS and review and comment by the other Resource Agencies. YORK HAVEN shall conduct the Downstream Eel Improvements Study in accordance with the

approved plan and schedule. The Downstream Eel Improvements Study will consider and evaluate whether any of the following adaptive measures to facilitate downstream eel passage, which may be implemented in a sequence or in combination, are feasible, appropriate under the circumstances, reasonable and technically sound and are reasonably expected to contribute toward achievement of the Downstream Eel Passage Goal:

i. Adjustment to NLF Facility operations.

ii. Installation of current inducers.

iii. Modifications to the juvenile American shad protection measure.

iv. Installation of a fish guidance system.

v. Replacement of turbine runner systems with units designed to have a lower mortality impact upon silver eels.

vi. Other measures mutually agreed to by YORK HAVEN, the USFWS and PADEP, after consultation with the other Resource Agencies.

f. If the Downstream Eel Improvements Study identifies physical or operational adaptive measures listed in Section III.C.2.e. above to facilitate downstream eel passage that are feasible, appropriate under the circumstances, reasonable and technically sound, YORK HAVEN shall prepare a plan and schedule for implementing such measures and an estimation as to the ability of such measures to achieve the Downstream Eel Passage Goal, and will submit the plan and schedule

to the Resources Agencies for review and approval by the USFWS and DEP and review and comment by the other Resource Agencies. Following approval of such plan and schedule, YORK HAVEN shall implement the measures described in the approved plan in accordance with the approval schedule.

g. Within 12 months following implementation of any such improvements, YORK HAVEN shall evaluate and provide a report to the Resource Agencies regarding the effectiveness of the measures in relation to achievement of the Downstream Eel Passage Goal.

h. If the adaptive measures implemented pursuant to the Downstream Eel Improvements Study do not result in achievement of the Downstream Eel Passage Goal, YORK HAVEN and the Resource Agencies shall on an annual basis consult as to potential additional studies or adaptive measures that are or may become feasible, appropriate under the circumstances, reasonable and technically sound, and reasonably expected to contribute toward achievement of the Downstream Eel Passage Goal.

D. Resident Fish Passage

1. General Requirements

a. The term "resident fish species" means those fish species that occur in that portion of Susquehanna River that includes YORK HAVEN Project area, excluding anadromous and catadromous fish species.

b. The term "East Channel" means the channel of the Susquehanna River that lies between Three Mile Island and the eastern shore of the Susquehanna River.

c. The term "East Channel Fish Passage System" means the existing fish passage facilities maintained by YORK HAVEN Project on the East Channel.

d. YORK HAVEN Project shall operate and maintain the East Channel Fish Passage System to allow passage of resident fish species each year from April 1 through the earlier of December 15 or until the average daily river temperature, measured at either the United States Geological Survey gage at Harrisburg or at the temperature sensor at YORK HAVEN Project is equal to or less than 40 degrees Fahrenheit for three consecutive days.

e. The East Channel Fish Passage System shall be operated as required by this certification and the FOP.

f. During the period that the East Channel Fish Passage System is in operation for the passage of fish, YORK HAVEN Project shall manage debris to maintain the functioning and operability of the East Channel Fish Passage System sufficient to allow and not significantly impede the passage of fish.

g. The provisions of this resident fish passage condition shall be included in the FOP for YORK HAVEN Project.

2. Prior to Operation of the NLF

a. After the American shad upstream passage season and during the resident fish passage period referenced above, YORK HAVEN shall operate the East Channel Fish Passage System to allow for passage of resident fish species and provide for corresponding flows in the East Channel as set forth in Section IV. below.

3. Subsequent to Completion of the NLF Facility

a. YORK HAVEN shall operate the NLF Facility as described in the FOP.

b. Except when the East Channel Fish Passage System must be closed for repairs and maintenance or except as otherwise approved by the PADEP in writing, YORK HAVEN shall leave the East Channel Fish Passage System open for passage of resident fish during the period April 1 through the end of the resident fish passage season (earlier of December 15 or until the average daily river temperature is $\leq$ 40 degrees Fahrenheit for three consecutive days).

IV. MINIMUM STREAM FLOW ("MSF")

A. Prior to Operation of the NLF

Unless alternative flows are approved by the DEP in writing, YORK HAVEN shall achieve the following.

1. Prior to completion and operation of the NLF Facility, Licensee shall operate the Project consistent with the following flow management criteria:

a. During the American Shad Upstream Passage Season, the Project shall be operated to provide:

i. An average daily minimum flow in East Channel below East Channel Dam of 2,000 cfs.

ii. Spill over Main Dam of equal to or greater than 4,000 cfs.

b. After American Shad Upstream Passage Season until end of resident fish passage season (earlier of December 15 or until the average daily river temperature is ≤ 40 degrees Fahrenheit for three consecutive days):

i. The Project shall be operated to provide a minimum stream flow in East Channel below East Channel Dam of 400 cfs.

ii. When river flows exceed hydraulic capacity of all available hydroelectric generating units, Licensee shall manage flows above the hydraulic capacity of available units in accordance with the following objectives:

a. To maintain the minimum flow in the East Channel of 400 cfs.

b. To maintain sufficient flow at the Main Dam to assure flow is released to the main channel in accordance with the existing FOP, except during times of maintenance work on the Main Dam when reservoir levels are lowered to permit such maintenance to occur safely.

c. To provide additional attraction flows to the East Channel Fish Passage System through operation of the wheel gates within their design capacity.

d. In the event that the flow is not sufficient to meet all such objectives 1-3 above, such objectives will be implemented in the order of precedence listed above.

c. The Project shall be operated to maintain the following minimum flows below the Project (the total of flows through the Powerhouse, over the Main Dam and East Channel Dam):

i. 1,000 cfs or inflow from upstream, whichever is less, at all times.

ii. An average daily minimum flow of 2,500 cfs or inflow from upstream, whichever is less.

iii. Whenever inflow from upstream is less than 3,000 cfs, the Project shall be operated on a run-of-river basis, adding or suspending operations at turbines to reflect, to the extent practicable, inflow from upstream and without adding or suspending turbine operations to deliberately drawdown or store water for purposes of generating electricity in particular time periods.

iv. Minimum flows may be temporarily modified if required by operating exigencies beyond the control of the YORK HAVEN.

B. After NLF Facility Completion.

Unless an alternative minimum stream flow is approved by the DEP, after completion and operation of the NLF Facility, Licensee shall operate the Project consistent with the following flow management criteria:

1. During the American Shad Upstream Passage Season, the Project shall be operated to provide:
    i. An average daily minimum flow in East Channel below East Channel Dam of a minimum of 267 cfs, understanding that as river flow increases above 21,000 cfs, flows over the East Channel Dam will occur in excess of the minimum of 267 cfs.
    ii. Flow through the NLF Facility (passage channel plus supplemental attraction flow channel) equal to at least 5% of river flow when river flows above the Project are between 5,000 and 150,000 cfs.
2. During the remainder of the year (other than the American Shad upstream passage season), the Project shall be operated to provide:
    i. An average daily minimum flow in East Channel below the East Channel Dam of 267 cfs.
    ii. The NLF Facility will be designed and operated to convey a minimum of 200 cfs when the river elevation is at the elevation of the Main Dam.
    iii. When river flows exceed the hydraulic capacity of all available hydroelectric generating units, YORK HAVEN shall manage flows above the hydraulic capacity of available units in accordance with the following objectives:
        a. To maintain a minimum flow in the East Channel of 267 cfs, understanding that as river flow increases above 21,000 cfs, flows over the East Channel Dam will occur in excess of the minimum of 267 cfs.

b. To maximize the remainder of flows above hydraulic capacity flowing over the Main Dam and through the NLF Facility. Within the limits of available flows in excess of the hydraulic capacity, except during the period of December 15 to the earlier of April 1 or the start of American Shad Upstream Passage Season, the supplemental attraction flow channel will be operated with the objective of maintaining a maximum attraction flow through the NLF Facility.

3. The Project shall be operated to maintain the following minimum flows below the Project (the total of flows through the Powerhouse, over the Main Dam and East Channel Dam):

i. 1,000 cfs or inflow from upstream, whichever is less, at all times.

ii. An average daily minimum flow of 2,500 cfs or inflow from upstream, whichever is less.

iii. Whenever inflow from upstream is less than 3,000 cfs, the Project shall be operated on a run-of-river basis, adding or suspending operations at turbines to reflect, to the extent practicable, inflow from upstream and without adding or suspending turbine operations to deliberately drawdown or store water for purposes of generating electricity in particular time periods.

i. Minimum flows may be temporarily modified if required by operating exigencies beyond the control of YORK HAVEN.

V. DEBRIS MANAGEMENT

A. Except as otherwise provided by the DEP in writing, YORK HAVEN shall (1) continue to implement its existing debris management program as described below; and (2) on or before January 15 of each calendar year, provide an annual contribution of $25,000 per year to the York County Conservation District or such other entity identified in writing by the DEP for the purposes of debris removal in the Lower Susquehanna River Watershed. The amount of the annual contribution shall be adjusted every ten years over the term of this certification. The amount of such adjustment shall be calculated to reflect the aggregate increase in the annual U.S. Department of Labor Consumer Price Index – (All Urban Consumers, All Items) over the ten year period. It is the understanding of the Parties that the York County Conservation District or such other identity identified by the DEP shall administer and utilize such funds for the sole purpose of debris removal in the Lower Susquehanna River Watershed.

B. Under the Project's debris management program, almost all of the debris arrives at the Project during high flow events when river flows far exceed the Project Hydraulic Capacity. Under such debris management program, much of that debris passes over the Main Dam and East Channel Dam, and debris that does not pass over the Main Dam or East Channel Dam accumulates in the forebay. Of the debris that enters the forebay, non-natural debris is removed from the accumulated debris in the forebay to the extent that safety considerations permit, and the remaining (primarily organic) debris material is sluiced downstream through the Forebay Sluice Gate in the masonry non-overflow "cable alley" wall located at the downstream end of the forebay. Prior to opening the Forebay Sluice Gate for debris passage, YORK HAVEN shall notify PPL's Brunner Island Station that debris is to be sluiced at least one-hour prior to debris sluicing, absent extraordinary or emergency circumstances.

Scott Williamson Date
Program Manager
Waterways and Wetlands Program
Department of Environmental Protection

APPENDIX A - DESIGN CRITERIA FOR NATURAL LIKE FISHWAY

The NLF Facility will be designed and constructed consistent with the following requirements:

1. The NLF Facility shall consist of an in-river nature-like fishway with its downstream terminus at or near the toe of the Main Dam at or near the apex between the Main Dam and TMI, reaching upstream from the Main Dam, with a varying width of approximately 300 feet, a thalweg channel width of approximately 65 feet, and a supplemental attraction flow channel on the TMI side of the NLF Facility, as described in Section 3.0 (Option 4 Conceptual Design) of YORK HAVEN Project Nature-Like Fishway Conceptual Design Report, submitted by YHPC to FERC on March 15, 2013 (the "NLF Conceptual Design Report"). Refer to the conceptual plans provided in Appendix B for additional detail on the design of the NLF Facility.

2. The fishway channel in combination with the supplemental attraction flow facility shall be designed to be capable of conveying during the Upstream American Shad Passage Season at least 5% of the River flow when River flows are between 5,000 and 150,000 cfs. Of this amount, the supplemental attraction flow channel and related control structures shall be designed to convey variable attraction flow volumes of up to 800 cfs (the "Planned Attraction Flow Maximum Value"), but with the capacity to be readily modified to convey, if needed, a variable flow volume of up to 1,000 cfs ("Potential Increased Attraction Flow Value").

3. The NLF shall include a supplemental attraction water facility (SAWF) that will be capable of providing additional flows within and/or near the entrance to the fish passage channel.

   a. The SAWF shall be located on the land side of the fish passage channel and have a maximum discharge capacity of 1,000 cfs (i.e., accommodating both the Planned Attraction Flow Maximum Value and the Potential Increased Attraction Flow Value) when the reservoir is at its normal headwater elevation of 277.2 ft.

   b. The upstream entrance to the SAWF shall be located approximately 75 ft upstream of the nearest constructed upstream exit from the fish passage channel to minimize the chance for fall back through the SAWF. The

upstream entrance to the SAWF shall contain a trash rack to impede debris passage into the SAWF.

c. An inlet gate structure of either the underflow or overflow type shall control and regulate flow to the SAWF, allowing some adjustment of flow volumes available for attraction flow purposes. The current plan is to install two inlet gates; however, the final number of gates will be subject to operational and economic considerations, but in no case shall the SAWF design discharge capacity be less than 1,000 cfs at normal pond level (and thus able to accommodate both the Planned Attraction Flow Maximum Value and the Potential Increased Attraction Flow Value).

d. Downstream of the inlet gates, flow in the SAWF will travel in a rectangular concrete channel approximately 25 to 30 feet wide and 6 to 8 feet deep. Water from the SAWF may be delivered along the length of the SAWF channel through a series of weirs fitted with stop logs discharging to different points within the fish passage channel, over a sharp-crested weir or weirs at the downstream end of the SAWF delivering water to the holding pool at the entrance to the fish passage channel, and/or to a combination of both of these delivery mechanisms.

e. The final design of the flow dispersal mechanisms shall (1) minimize the chance for delay to American shad entering the fish passage channel from the resting pool; and (2) prevent or minimize the entry of American shad into the SAWF though creation of a localized flow disturbance zone over the sharp-crested weir, creating an elevation difference between the SAWF water elevation and tailwater of at least 2 feet, and/or providing an exclusion rack between the weir and the resting pool. The final design of the SAWF shall also allow for flexibility in the delivery of the attraction water by adjusting flow directly into the fish passage channel or to the downstream end of the SAWF channel. The downstream end of the SAWF shall also provide for flexibility in the direction of flow delivery ranging from parallel to perpendicular to the

resting pool, allowing for varying the direction of a portion of the flow away from discharge directly into the resting pool.

4. The upstream end of the NLF Facility will be designed to accommodate installation of Passive Integrated Transponder ("PIT") tag monitoring devices at such time as such PIT tag monitoring devices become available and feasible for reliably monitoring American shad exiting the NLF Facility.

APPENDIX B - CONCEPTUAL DESIGN FOR NLF FACILITY

See attached

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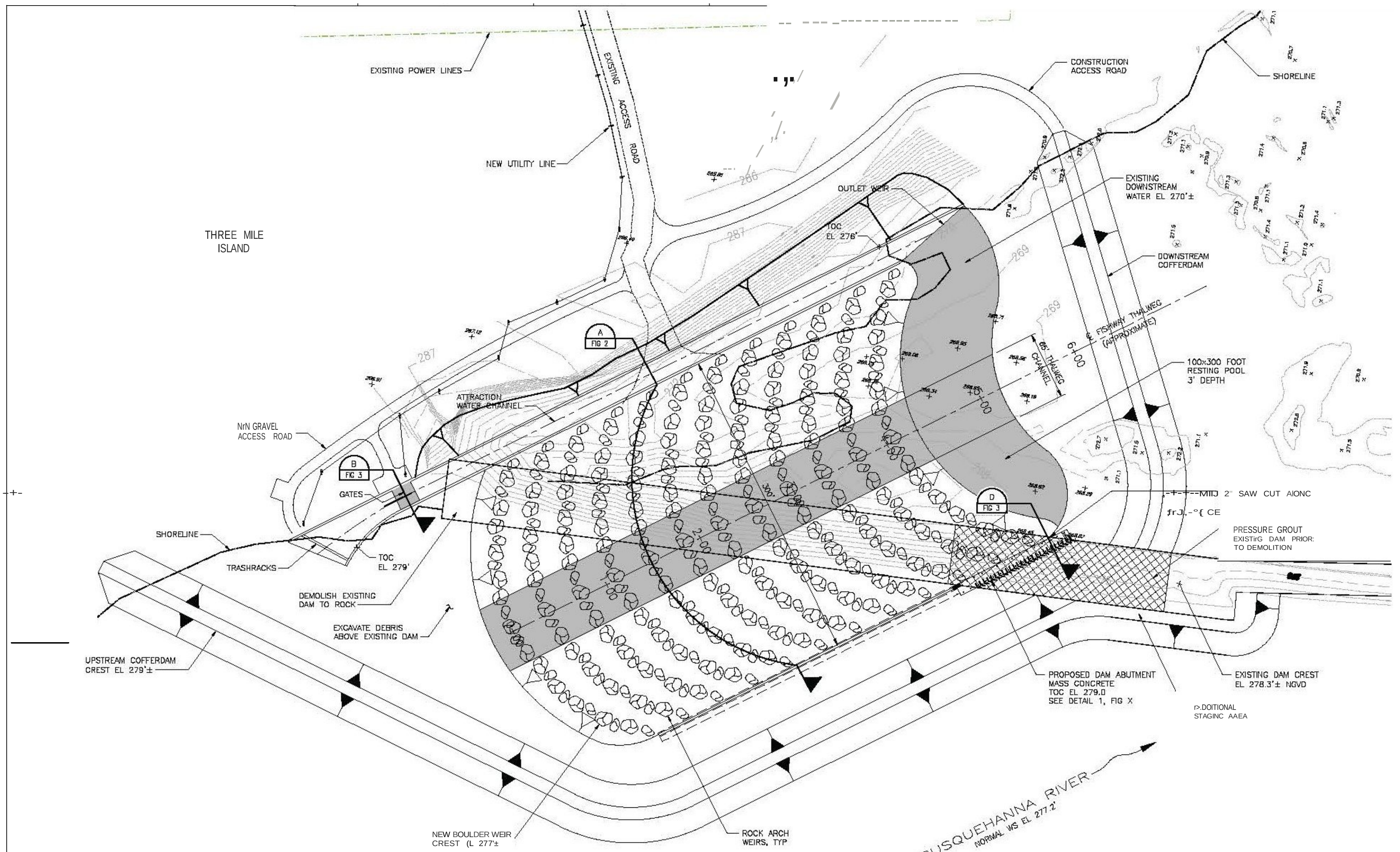

PRELIMINARY

REFERENCE COORDINATE METADATA
PROJECTION = PENNSYLVANIA STATE PLANE
UNITS = U.S. SURVEY FEET

NOTES:
1. ELEVATIONS TO BE FIELD VERIFIED BY FIELD SURVEY IN FINAL DESIGN.

40 0 80
SCALE: 1" = 40'

HR

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YORK HAVEN
WRDU.r.cnu; PROJECT
CGNCE1'111U..LAYOUT-c.Tmll'

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STEVE ARNOLD
OCT 2012
FIG 1

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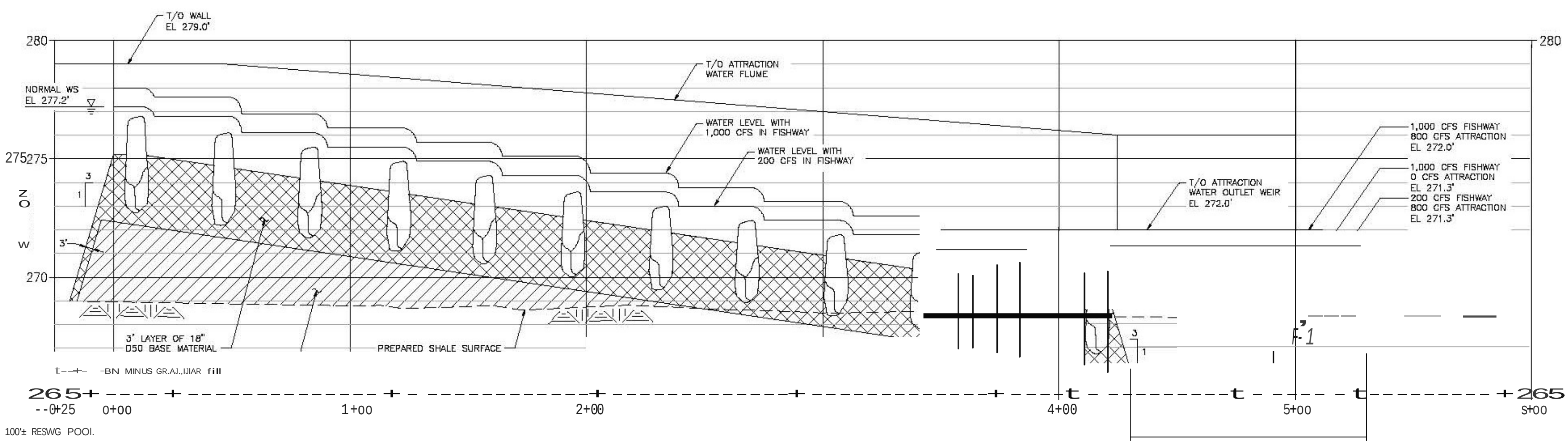


100'± RESWG POOl.

IN-RIVER CENTERLINE PROFILE

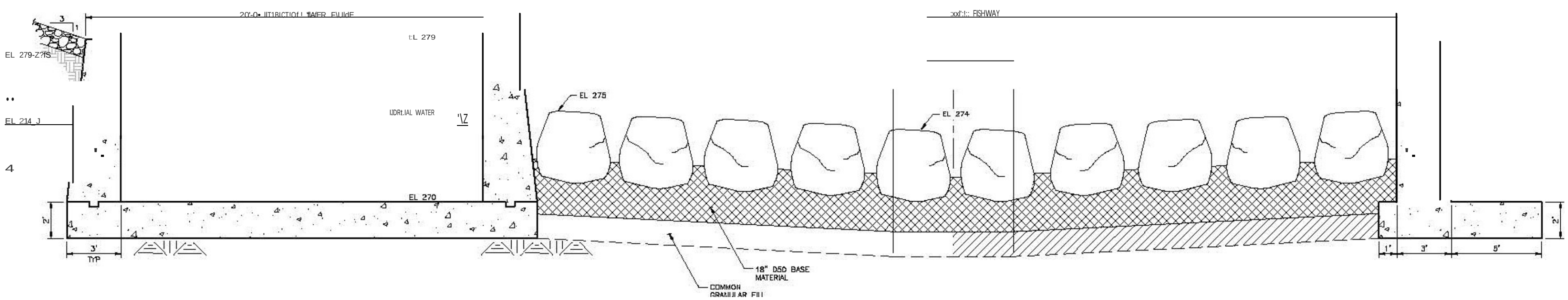
SCALE: 1 -2<l± HORIZ
1 -2':l: VERT

NOTE ROCK WEJ:? t.tATERAL AT EXACCERATED VERTICAL SCALE.

20 20 40

SCALE: 1N-20'!HORZ

SCALE: 1"=2'± VERT



FISHWAY ATIRACTION WATER
}CTION QJ

SCALE: 3/8"=1'-0"

PRELIMINARY

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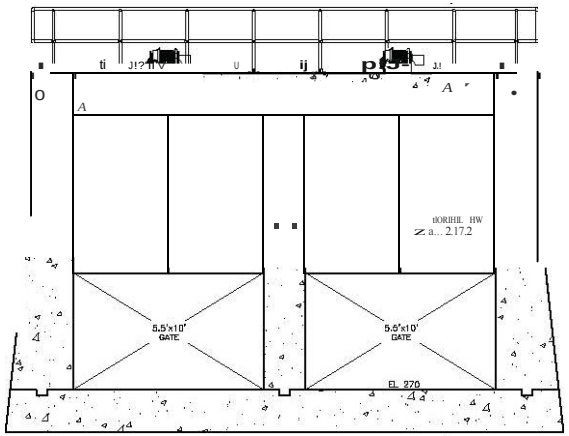
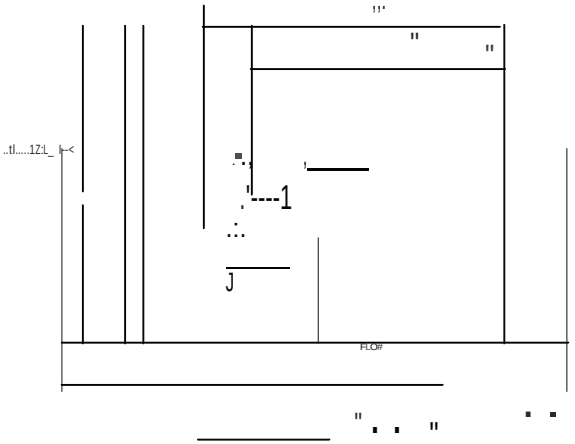
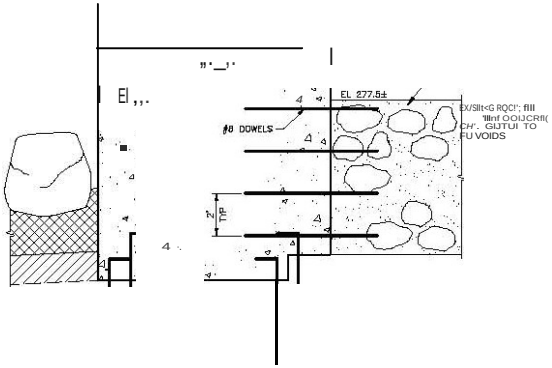
		FIG 2





GATE SECTION 6lrl



MASS _CONCRETE SECTION f'Y)i

PRELIMINARY

OSJAN2013

390-177611	—
STEVE ARNOLD	—
OCT 2012	FIG .3

APPENDIX C - DESIGN CRITERIA FOR NLF FACILITY MONITORING

Monitoring of NLF Facility effectiveness for upstream passage of American shad will be conducted consistent with the following general parameters and protocols:

1. INTRODUCTION

The Nature-Like Fishway (NLF) effectiveness study will be performed with telemetry tracking and monitoring techniques, building upon the site-specific experience and results of successful adult American shad tracking studies performed at YORK HAVEN in 2010 and 2012. American shad will be tagged at the Safe Harbor Dam fish lift required or approved by PADEP in writing, approximately 25 miles downstream and allowed to migrate upstream to YORK HAVEN Project on their own volition. Based on the results of the 2010 study, 70 percent of the shad tagged at Safe Harbor are expected to arrive at YORK HAVEN. Once at YORK HAVEN, a series of 10 monitoring station antennae will record tagged shad as they arrive at the Project, monitor their movements within the Project area, document the tagged shad that arrive at the NLF fishway entrance and document the tagged shad that exit the NLF fishway. Monitoring will also be performed below and above the East Channel Fishway to document tagged shad upstream passage via the East Channel. The study will be performed for at least two years following NLF construction.

2. STUDY GOALS

- Determine the proportion of American shad tagged at Safe Harbor arriving at YORK HAVEN Project.
- Of the tagged shad arriving at YORK HAVEN, determine the proportion arriving at the lower entrance of the new NLF.
- Of the tagged shad arriving at YORK HAVEN, determine the proportion exiting the NLF into YORK HAVEN impoundment.

- Of the tagged shad arriving at YORK HAVEN, determine the proportion that passes upstream via the East Channel Fishway.
- Evaluate movement patterns and travel times of tagged shad within YORK HAVEN Project area.

3. STUDY EQUIPMENT

Radio telemetry techniques, similar to those utilized for the 2010 and 2012 YORK HAVEN shad telemetry studies, are envisioned as the primary equipment for the fishway effectiveness studies. However, similar tracking technologies (e.g., acoustic telemetry) or new fish tracking technologies that are functionally equivalent (or superior) to and of comparable cost to radio telemetry techniques may be substituted upon consultation with the Resource Agencies and the approval of USFWS and PADEP.

4. FISH TAGGING

American shad will be tagged at the fish lift at Safe Harbor Dam (assuming owner approval) , unless an alternate location for the source of American shad is approved by PADEP in writing, similar to the 2010 American shad telemetry study. A target sample size of 150 American shad will be tagged for study. Assuming a drop-off rate similar to that observed in 2010 during volitional migration from Safe Harbor to YORK HAVEN (30%), this would result in a sample size of approximately 100 tagged shad arriving at YORK HAVEN. Two telemetry receivers will be installed at Safe Harbor during shad tagging operations; one at the fishway exit to confirm tagged shad have traveled through the fishway flume and entered into Lake Clarke, and a second in the Safe Harbor tailrace to detect any tagged shad that fall back downstream through Safe Harbor Dam. Efforts will be made to spread out tagging over the early, middle, and later portions of the shad run and to tag representative numbers of both male and female shad.

5. YORK HAVEN MONITORING

A network of 10 remote telemetry monitoring locations is proposed as illustrated in the attached Project area map. The location and purpose of each is described below:

1. Cross river monitoring at south end of powerhouse; documenting downstream Project study reach entry and exit
2. Tailrace monitoring; documenting tailrace presence, subdivided in to a) southern half and b) northern half of tailrace
3. Cross river monitoring just above the powerhouse; documenting movement upstream out of the tailrace or downstream into tailrace area
4. Cross river monitoring at upper end of headrace wall; documenting arrival/departure at the base of a steeper gradient channel reach
5. Cross mouth of East Channel; documenting arrival/departure at the lower end of the East Channel
6. TMI to Main Dam spillway; documenting arrival/departure to the Main Dam apex region at the upper extent of the steeper gradient channel reach
7. Across lower end of NLF; documenting tagged shad entry into NLF
8. Across upper end of NLF; documenting passage above YORK HAVEN Dam
9. Cross channel monitoring immediately below the East Channel Dam; documenting arrival at base of dam
10. Cross channel monitoring just above the East Channel Dam; documenting passage above the dam.

Monitoring will be performed from the day the first shad are tagged and released until the end of the upstream passage season. Manual ground-based tracking with a hand held receiver may also be conducted on an as-needed, discretionary basis, if it is deemed helpful to better define tagged shad locations or behavior within the Project area.

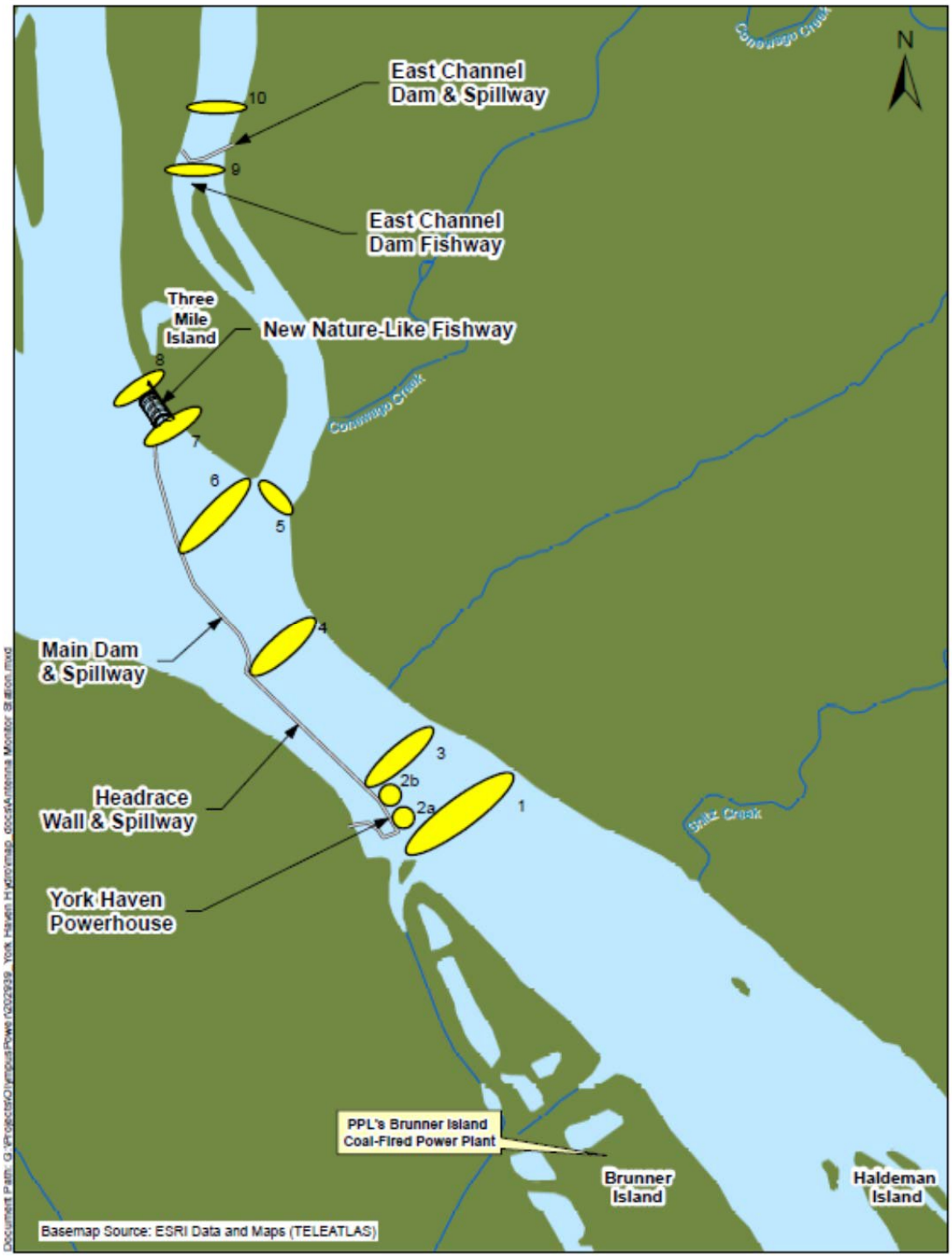
6. DATA MANAGEMENT AND ANALYSIS

Telemetry receiver data will be periodically downloaded and detection capabilities will be checked with a hand held transmitter on weekly intervals, and more frequently as appropriate during peak migration periods. Downloaded data files will be backed-up with duplicate files the same day. Upon completion of the field season data will be QC checked and processed for analysis.

7. REPORTING

A study summary report will be prepared and submitted for agency review within six (6) months following the completion of each year's monitoring program. Individual fish movement graphics, data summary graphics, and appropriate statistical treatment similar to the 2010 study supplemental data analysis, will be prepared and presented in the study report.

EXHIBIT 1 TO APPENDIX C



Turbine Type (Unit Nos.)	Survival Percentage *					
	Empirical Studies American Shad Juveniles			Turbine Blade Strike American Shad Juveniles		
	Mean	Min	Max	Mean	Min	Max
Kaplan (1-4)	**92.7%**	82.0%	100.0%	95.9%	91.6%	98.0%
Propeller (5)	-	-	-	**95.3%**	91.3%	97.4%
Propeller (6)	-	-	-	**96.5%**	93.5%	98.0%
Double-Francis (7-13 and 15-20)	**77.1%**	66.0%	88.0%	93.6%	92.4%	94.9%
Single Francis (14)	-	-	-	**92.5%**	90.9%	94.1%

* Mean values in **underlined bold** to be used in calculations of overall Project survival rates.

APPENDIX E - FOREBAY SLUICE GATE CHUTE DESIGN CRITERIA

The Forebay Sluice Gate Chute improvements shall be designed constructed consistent with the following requirements.

1. The Forebay Sluice Gate Chute shall be capable of maintaining a depth of water of at least 12 inches.
2. The landing pool below the downstream end of the Forebay Sluice Gate Chute shall have a depth of at least 1 foot for each 4 feet of drop, with a minimum of 4 feet of depth, in which adult or juvenile American shad may land.

APPENDIX F – HEADRACE JUVENILE AMERICAN SHAD TURBINE AVOIDANCE STUDY DESIGN

1. INTRODUCTION

The purpose of this study is to document the proportion of juvenile American shad arriving in YORK HAVEN powerhouse forebay that pass downstream via the Forebay Sluice Gate during the outmigration season. This information will be used in turn to evaluate whether or not the Project is achieving the desired overall juvenile American shad downstream survival goal of 95 percent. Modeling of juvenile American shad downstream passage has shown that the required sluice gate passage rate, to reach the overall Project survival goal of 95 percent, varies widely with river discharge and Project turbine operations. The worst case scenario is when no spill is occurring and all turbines are operating (17,000 cfs), plus the Nature-Like Fishway flow (200 cfs), East Channel minimum flow (200 cfs), and sluice gate flow (370 cfs), or approximately 18,000 cfs total river flow. Under this worst case condition 68 percent of shad in the fore bay must pass through the sluice gate to achieve the overall 95 percent survival goal. The required Forebay Sluice Gate passage rate to achieve the 95 percent goal declines at flows both above and below 18,000 cfs as illustrated in the summary table below of model results:

Estimated sluiceway bypass effectiveness metrics at various river flows of 6,000 to 30,000 cfs.

Total River Flow	30,000	27,000	24,000	21,000	18,000	15,000	12,000	9,000	6,000
Flow at Forebay	17,275	17,275	17,275	17,275	17,275	14,533	11,533	8,533	5,533
Total Project Survival	95%	95%	95%	95%	95%	95%	95%	95%	95%
Number of Total Shad Approaching the Project	100	100	100	100	100	100	100	100	100

Number of Shad Approaching the Forebay	58	64	72	82	96	97	96	95	92
Percent of Total Shad Passing	27	33	42	52	65	63	58	42	20
through the Sluiceway									
Percent of Forebay Shad Passing through the Sluiceway	47	52	58	63	68	66	60	44	22

Based on this analysis, an overall target of 60 percent of fore bay juvenile American shad passing through the sluice gate has been established to represent the overall conditions necessary to meet the 95 percent total survival goal under the variable river flows throughout the entire October through November downstream passage season.

2. STUDY GOAL

The study goal will be to determine the proportion of juvenile American shad confined to the fore bay that will pass through the fore bay sluicegate (avoiding turbine entrainment) under river flows and operations representative of the October through November downstream passage season.

3. STUDY EQUIPMENT

Due to their small size and fragile nature, out-migrating juvenile American shad are easily injured during handling, and are generally too small to be tagged with conventional telemetry transmitters. However, recent studies have had some success using abdominal implant PIT tags and new smaller radio transmitters (nano-tags) on juvenile American shad and river herring. Generally, the larger the fish the better the post tagging survival and therefore the use of juvenile American shad greater than 100 mm in length is recommended for tagging. Obtaining 100 mm juvenile American shad will likely require the assistance of PFBC to grow juvenile

American shad to this size in their shad hatchery facility or obtaining juvenile American shad from another hatchery, since only a small portion of the wild population reaches this size before outmigration. Fish used for the study will be tested for latent tagging mortality to establish a correction factor, which shall be discussed with the Resource Agencies during the performance of the study.

YHPC anticipates using abdominal implant PIT tags or possibly radio transmitter "nano-tags" or both. Telemetry equipment and methods are constantly improving, therefore new equipment that accomplishes the same study purpose and goals may be substituted, after consultation with the Resources Agencies, and approval by USFWS and PADEP.

4. STUDY METHODOLOGY

Sluice gate passage rates will be determined by releasing three groups of at least 100 tagged juvenile American shad into the powerhouse forebay and counting those that pass through the sluice gate on each of three separate (but not necessarily consecutive) days in the period of mid-October through mid-November. At least two days will be targeted to a period when river flows equal or exceed the hydraulic capacity of the Project (17,000 cfs) and the Project is operating normally. For purposes of this study, "operating normally" means that no more than two turbine units are temporarily out of operation for maintenance or other reasons. Monitoring for tagged shad passage will be performed with an antenna and receiver at the forebay sluice gate and monitoring will continue for at least two weeks after the release of test fish. Test shad will be released at a point far enough upstream of the headrace to avoid bias to their movements downstream.

5. DATA ANALYSIS

Since monitoring the 20 generating turbines for tagged juvenile American shad passage at YORK HAVEN Powerhouse is not practical with current tagging and detection technologies, shad that

are not detected passing through the sluice gate will be assumed, by default, to have been entrained through a turbine. This assumption creates the risk of overstating entrainment, as it would not account for potential predation by larger fish on test fish in the forebay, if any tagged fish swim upstream out of the forebay and pass downstream at other locations, or mortality due to handling and tagging. Some of this risk will be managed by keeping a number of control fish that are handled identically to the test fish captive for observation to provide for a handling mortality control estimation. If radio transmitter nano-tagging of some test fish is practical, tracking these fish may provide insight into upstream escape or predation sources of bias.

However, eliminating the study bias to overestimate entrainment is not possible with currently available methodologies and study results must be reviewed with this possibility in mind.

6. REPORT

A study report describing study methods and results will be prepared and submitted for Resource Agency review within 90 days following the completion of the field study.

APPENDIX G - DESIGN CRITERIA AND ELEMENTS OF THE LOWER SUSQUEHANNA RIVER DOWNSTREAM EEL STUDY AND SITE-SPECIFIC ROUTE- OF-PASSAGE STUDY

1. Lower Susquehanna River Downstream Eel Study

a. The Lower Susquehanna River Downstream Eel Study will consist of those elements developed by the USFWS, in consultation with YORK HAVEN and other Resource Agencies.

b. During the Lower Susquehanna River Downstream Eel Study, YORK HAVEN shall cooperate and participate by monitoring the tagged eels as they pass YORK HAVEN Project, gathering site specific data on timing and duration of silver eel migration at the Project over a period 2 or more years while the Lower Susquehanna River Downstream Eel Study is being conducted.

2. Site-Specific Downstream Eel Study

a. The Site-Specific Downstream Eel Study will consist of the following elements:

(1) The study will include a site-specific route-of-passage evaluation using radio telemetry, Didson monitoring, or other methods to evaluate the passage routes taken by silver eels migrating in the vicinity of the Project, specifically including passage via the East Channel, through the NLF Facility, over the Main Dam, down the headrace, through powerhouse turbines, and through the Forebay Sluice Gate. The Site Specific Route of Passage study will be conducted during the primary anticipated silver downstream eel passage period(s) as determined by the earlier Lower Susquehanna River Downstream Eel Study.

(2) A study of silver eel survival through the following representative Project turbines: Propeller (Units 1-6), Francis (Units 7-20). Testing shall be conducted in one representative turbine within each category via balloon tag tests or other methods approved by the Resource Agencies.

(3) An analysis based on the results of the route-of-passage and survival evaluations, as to anticipated overall downstream eel passage effectiveness at the Project.

3. Source of Silver Eels.

(a) An in-basin source of silver eel will be utilized for both the Lower Susquehanna River Downstream Eel Study and the Site-Specific Route-of-Passage Study.

(b) Current tributary stocking is conducted in Pine Creek ~165 mi upstream from YORK HAVEN Project and Buffalo Creek ~80 mi upstream from YORK HAVEN Project. These eels may be suitable for the Lower Susquehanna River Downstream Eel Study if a sufficient number of silver phase eels can be located, captured, and radio tagged.

(c) For purposes of Site-Specific Route-of-Passage Study and survival study, a local source of silver eels is needed (avoiding long transit times with higher potential for loss of tagged eels, and long distance transport of eels). For these purposes, the Resource Agencies will consider stocking of Swatara Creek and Conodoguinet Creek, major tributaries entering the Susquehanna River upstream of the Project. Such a stocking program, if commenced in 2014-15,

should result in a local supply of silver eels around the 2020 – 2025 timeframe, which would be an ideal source of silver eels for the site- specific route of passage study. The timing and performance of the Site-Specific Route- of-Passage Study is dependent upon the ability to collect and tag an adequate number of such silver eels.

4. Collection and Tagging of Silver Eels for Study.

(a) To facilitate consistency, the Parties contemplate that that the Resource Agencies will perform the collection and tagging of silver eels for studies, using similar tags and techniques; however, the USFWS cannot promise to do so.

(b) It is assumed that the Lower Susquehanna River Downstream Eel Study will utilize silver eels from Buffalo and/or Pine Creeks as these tributaries have been stocked with elvers since 2010 and will be the first available in-basin source of silver eels.

(c) The Site-Specific Route of Passage study would be performed in the year following NLF Facility completion, utilizing silver eels collected from Swatara Creek or Conodoguinet Creek.

(d) In both studies, the preference would be to collect actively outmigrating silver eels by fyke nets. Alternatively, electrofishing or other active sampling methods may be used to pursue eels. Radio tags would be surgically inserted in those eels that exhibit physical characteristics of silver outmigration (movement, size, color, eye size/darkness).

(e) All silver eels captured will be tagged with radio telemetry tags, and released at

a site agreed upon by YORK HAVEN, USFWS and PADEP, after consultation with the Resource Agencies.

(f) It is assumed that the Lower Susquehanna River Downstream Eel Study would involve tagging of approximately 100 silver eels in each of two years.

(g) For the Site-Specific Route-of-Passage study, the goal would be to collect and radio tag at least 100 and not more than 150 actively out-migrating silver eels in the months of September – November, with timing related to the start of silver eel natural migration as indicated by results from the Lower Susquehanna River Downstream Eel Study.

5. Monitoring.

(a) During the Lower Susquehanna River Downstream Eel Study, YORK HAVEN will perform monitoring via antenna arrays targeted to monitor downstream migrating silver eels at the following locations:

(i) East Channel

(ii) Main Dam

(iii) The Powerhouse Headrace Channel

(b) During the Site-Specific Route-of-Passage Study, YORK HAVEN will perform monitoring via antenna arrays targeted to monitor silver eels at the following locations:

(i) NLF Facility

(ii) East Channel Dam

(iii) Main Dam

(iv) Forebay entrance

(v) Forebay Sluice Gate

(vi) Tailrace (in an array to distinguish between Francis and Propeller Turbine Passage)

(vii) Brunner Island.

(c) In both studies:

(i) Monitoring for passage at YORK HAVEN Project would be continued until river water temperature falls to 4° C (approximately mid to late December).

(ii) If a large portion of the tagged eels are missing during the initial fall migration period, consider mobile surveys to locate eels/transmitters and possibly monitoring during spring and following fall.

(iii) During subsequent years of study, the monitoring period may be further reduced in time if data gathered indicates it is reasonable to do so without missing significant portions of the migration.

5. Analyze data and report.

(a) For the Lower Susquehanna River Downstream Eel Study, YORK HAVEN will collect, analyze and share radio telemetry data gathered at the 3 YORK HAVEN monitoring stations with the Resource Agencies within 90 days of the date of completion of the field work each year. Earlier informal sharing of preliminary data may also be arranged.

(b) For the Site-Specific Route-of-Passage Study, YORK HAVEN will collect and analyze the radio telemetry data and submit a report with a report to the Resource Agencies and FERC within 90 days of the date of completion of the

field work associated with the study.

APPENDIX H - DESIGN CRITERIA FOR EEL SURVIVAL STUDY

Eel survival studies will be performed according to balloon tagging techniques developed by Normandeau Associates, Inc. at several locations in the USA and France. Based on the frequency of individual turbine passage determined in the route of passage studies, one representative propeller unit and one representative Francis unit will be selected for testing. American eels of similar size to Susquehanna River silver eels will be tested. The number of eels tested at each representative turbine (minimum of 50 each turbine) will be sufficient to calculate appropriate statistical bounds around each survival estimate. Control eels for estimation of tagging-induced mortality will also be held for observation and subsequent adjustment of turbine mortality estimates, as appropriate.

August 19, 2014

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E. Rom 1-A
Washington, D.C. 20426

Re: 401 Water Quality Certification
Exelon Generation Company, LLC
DEP File No. EA 67-023
FERC Project P-1888-030

Dear Ms. Bose:

Enclosed is the FERC Project P-1888-030, Section 401 Water Quality Certification for the York Haven Hydroelectric Project.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.X. Section 7514, and the Administrative Agency Law, 2 Pa. C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, PO Box 8457, Harrisburg, PA 17105-8457, 7y17-787-3483. TDD Users may contact the Board through the Pennsylvania Relay Service, 800-654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717-787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

IF YOUWANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT FAFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717-787-3483) FOR MORE INFORMATION.

Sincerely,

Scott R. Williamson
Program Manager
Waterways & Wetlands Program

SRW/MDP/lmt

cc: Shelia Eyler at USFWS Chesapeake Bay Field Office
Shawn Seaman at MDNR
Joshua Tryninewski at PFBC
Drew Dehoff at SRBC
David R. David
Dennis T. O'Donnell

JOSHUA D. TRYNINEWSKI
FISHERIES BIOLOGIST
PENNSYLVANIA FISH & BOAT COMMISSION
1735 SHILOH RD.
STATE COLLEGE, PA 16801

SHEILA EYLER
USFWS - MARYLAND FISHERY RESOURCESO FFICE
177 ADMIRAL COCHRANE DR.
ANNAPOLIS, MD 21401

SHAWN A. SEAMAN
MARYLAND DEPARTMENT OF NATURAL RESOURCES
TAWES STATE OFFICE BUILDING B-3
580 TAYLOR AVENUE
ANNAPOLIS, MD 21401

ANDREW DEHOFF
SUSQUEHANNA RIVER BASIN COMMISSION
1721 NORTH FRONT STREET
HARRISBURG, PA 17102-2391

MS. KIMBERLY D. BOSE, SECRETARY
FEDERAL ENERGY REGULATORY COMMISSION
888 FIRST STREET, N.E. ROM 1-A
WASHINGTON, D.C. 20426

DAVID R. DAVID
YORK HAVEN POWER COMPANY, LLC.
YORK HAVEN HYDRO STATION
P.O. BOX 67
YORK HAVEN, PENNSYLVANIA 17370

DENNIS T. O'DONNELL
OLYMPUS POWER, LLC
67 PARK PLACE EAST
MORRISTOWN, NEW JERSEY 07960

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

WATERWAYS & WETLANDS PROGRAM

August 19, 2014

David R. David
York Haven Power Company, LLC.
York Haven Hydro Station
P.O. Box 67
York Haven, Pennsylvania 17370

Dennis T. O'Donnell
Olympus Power, LLC
67 Park Place East
Morristown, New Jersey 07960

Re: 401 Water Quality Certification
York Haven Power Company, LLC
DEP File No. EA 67-023
FERC Project P-1888-030

Dear Mr. David and Mr. O'Donnell:

Enclosed is the Section 401 Water Quality Certification for the York Haven Hydroelectric Project. Please review the certification so that you are aware of all its terms and conditions. These conditions will become part of the FERC license for this project.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.X. Section 7514, and the Administrative Agency Law, 2 Pa. C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, PO Box 8457, Harrisburg, PA 17105-8457, 7y17-787-3483. TDD Users may contact the Board through the Pennsylvania Relay Service, 800-654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717-787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

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Program Manager
Waterways & Wetlands Program

SRW/MDP/lmt

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Drew Dehoff at SRBC

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
WATERWAYS & WETLANDS PROGRAM

August 19, 2014

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888 First Street, N.E. Rom 1-A
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Sincerely,

Scott R. Williamson
Program Manager
Waterways & Wetlands Program

SRW/MDP/lmt

cc: Shelia Eyler at USFWS Chesapeake Bay Field Office
Shawn Seaman at MDNR
Joshua Tryninewski at PFBC
Drew Dehoff at SRBC
David R. David
Dennis T. O'Donnell

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

WATER QUALITY CERTIFICATION
FOR YORK HAVEN HYDROELECTRIC PROJECT
AND RELATED MITIGATION

DEP File No.--EA 67-023: York Haven Power Company, LLC

FERC PROJECT NO. P-1888-030

York Haven Power Company Contacts:

David R. David
York Haven Power Company, LLC.
York Haven Hydro Station
P.O. Box 67
York Haven, Pennsylvania 17370

Dennis T. O'Donnell
Olympus Power, LLC
67 Park Place East
Morristown, New Jersey 07960

Dauphin, Lancaster and York Counties

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WATER QUALITY CERTIFICATION
FOR YORK HAVEN HYDROELECTRIC PROJECT
AND RELATED MITIGATION
DEP File No.- EA 67-023
FERC PROJECT NO. P-1888-030

I. PROJECT DESCRIPTION

A. EA67-023 York Haven Power Company, LLC. York Haven Power Company contacts: David R. David, York Haven Power Company, LLC, York Haven Hydro Station ("YORK HAVEN" or "YHPC") P.O. Box 67, York Haven, Pennsylvania 17370 and Dennis T. O'Donnell, Olympus Power, LLC, 67 Park Place East, Morristown, New Jersey. YORK HAVEN Hydroelectric Project is located on the Susquehanna River in York, Dauphin, and Lancaster Counties, Pennsylvania. The project is operated as a run-of-river hydroelectric facility with a total plant capacity of 19.65 megawatts (MW) from its 20 turbines. The average annual generation of YORK HAVEN Project is 130,812 megawatt-hours (MWh).

B. Impacts to migration and movement of aquatic species will result from the continued operation of the facility. YHPC will mitigate the impact to aquatic species by constructing a nature-like fishway at or near the eastern end of the main dam apex in Londonderry Township, Dauphin County and abutment with the west shore of Three Mile Island ("TMI"). The fishway will facilitate movement of aquatic species over the dam and re-establish upstream/downstream river connectivity by creating a series of steps that will distribute the change in water surface and riverbed elevations caused by the dam over approximately 450 feet of the Susquehanna River. Maintenance of the fishway to its approved design configuration shall be conducted for the duration of the operation of YHPC as an electric generation facility.

II. PROVISIONS APPLICABLE TO ALL WATER QUALITY CERTIFICATION CONDITONS

A. Final Agency Action. Any action taken by the Pennsylvania Department of Environmental Protection ("DEP" or "PADEP") in response to any submission required or authorized under this certification or any action taken by DEP to require YORK HAVEN to undertake any action that affects YORK HAVEN's personal or property rights, privileges, immunities, duties, liabilities or obligations including, but not limited to, any action to approve, approve with conditions, disapprove, modify or establish operational or structural changes, plans, schedules, studies or monitoring programs shall constitute a "final agency action" and may be challenged in accordance with applicable law.

B. Operational modifications are a component of the adaptive management system to implement the approved plans, including the performance requirements of this certification. Operational modifications include modifications of seasonal and daily periods of operation of the fishways, dam and powerhouse, detailing how the plant shall be operated during fish passage season and throughout the year. These operational modifications may include:

- sequencing of turbine start-up and operation;
- procedures for estimating, monitoring and reporting flow management through the power house, in the tailrace, above, through and downstream of the nature-like fishway, and through the East Channel fishway as described in the Fishway Operating Procedures ("FOP");
- any other necessary provisions to implement elements of this certification for plant operation, to ensure attraction to and operation of the fishways or to meet other provisions of this certification and its procedures for monitoring and reporting on the

operation of each fish passage facility or other provisions of this certification or measure;

- procedures for annual fish passage facilities start-up and shut-down; and,
- procedures for use in case of emergencies and project outages significantly affecting fishway operations or other provisions of this certification.

C. Structural modifications are changes to project infrastructure, tailrace, fishways or other areas of the Susquehanna River pursuant to the provisions of this certification. No substantial alteration or addition not in conformity with the plans approved by the Federal Energy Regulatory Commission shall be made to any dam or other project works, constructed under the Federal Power Act without the prior approval or authorization of the Federal Energy Regulatory Commission.

D. Resources Agencies – Pennsylvania Department of Environmental Protection ("DEP" or "Department"), Pennsylvania Fish and Boat Commission ("PFBC"), Susquehanna River Basin Commission ("SRBC"), Maryland Department of Natural Resources ("MDDNR"), and the United States Fish and Wildlife USFWS ("USFWS").

E. General Requirements

1. The work authorized under this certification shall, at all times, be subject to oversight and inspection by representatives of DEP, and no changes in the maps, plans, profiles, and specifications as approved shall be made except with the written consent of DEP. DEP, however, reserves the right to require such changes or modifications in the maps, plans, profiles, and specifications as may be considered necessary to assure compliance with the Pennsylvania Clean Streams Law, Dam Safety and Encroachments Act and other appropriate requirements of state law. DEP further reserves the right to suspend or revoke this certification for failure to comply with appropriate requirements of state law, an administrative order of DEP or a term or condition of this certification.

2. YORK HAVEN shall notify DEP, in writing, of the proposed time for commencement of earth disturbance activity, under this certification at least 15 days prior to the commencement of the work.

3. YORK HAVEN shall prepare, implement and monitor the Erosion and Sedimentation Control Plan prepared in accordance with Chapter 102 so as to minimize erosion and prevent excessive sedimentation into the receiving watercourse or body of water.

4. All wetlands within the project area shall be accurately delineated and marked in the field prior to the start of construction activities and such field marking shall be maintained up to the time that earth disturbance activities are completed and the site has been stabilized. An acceptable means of field-identification is the use of an orange construction safety fence.

5. YORK HAVEN shall obtain either coverage under a general NPDES Permit or an individual NPDES Permit for Stormwater Discharges Associated with Construction Activity for earth disturbance activities requiring an NPDES permit, prior to conducting such earth disturbance activities.

6. Any additional information or revisions to any submittal required under this certification requested by the DEP in writing or any changes to implementation of any plans requested in writing by the DEP shall be submitted or completed within 15 business days of the request or such longer period of time approved by the DEP in writing.

F. Temporary stream crossings

1. All necessary causeway and/or cofferdams shall be constructed of rock, clean granular fill materials, or other materials meeting specifications approved by DEP reasonably free of fines, silts and other erodible material.

2. All temporary cofferdams shall be completely removed and the area restored and stabilized upon completion of the project in accordance with 25 Pa. Code Chapter 102 and the approved Erosion and Sedimentation Control Plan.

3. Roads shall cross all watercourses at a right angle to the stream, unless an alternative configuration is otherwise approved in writing by DEP.

4. A culvert, having as large a diameter as possible, must be provided to minimize placement of excessive fill and excavation of the streambanks. If the bank height prohibits a large diameter pipe culvert, the crossing could consist of a bridge. The minimum size diameter culvert to be used is 12 inches.

5. Road and causeway embankments shall consist of rock, clean granular fill materials, or other materials meeting specifications approved by DEP, reasonably free of fines and silt or other erodible material, to minimize stream channel sedimentation during placement, removal, and periods of overtopping. No construction materials or equipment shall be stockpiled or stored overnight on crossings or causeways.

6. Unless otherwise approved by DEP, approach roads to temporary road crossings shall utilize original grades. However, clean rock material or gravel to a depth of six inches above original grade shall be utilized for approaches as necessary.

7. Temporary road crossings shall be kept open and functioning at all times by maintaining the crossings free of debris and other obstructions.

8. Construction of the temporary roads and cofferdams at any public boat launching ramp along a waterway shall take place between September 15 and May 15.

G. Reasonable Assurance of Compliance – DEP supports issuance of a 46 year license by FERC for the project. Because of changes in the characteristics of the Susquehanna River that will occur by 2030 and because the FERC licenses for the Holtwood Hydroelectric

Facility and the Safe Harbor Hydroelectric Facility expire in 2030, this certification may be revised in 2030, as necessary, to establish requirements consistent with Section 401 of the Clean Water Act, 33 U.S.C Section 1341.

III. FISH PASSAGE

A. General Requirements

1. Fishway Operating Procedures ("FOP")

a. YORK HAVEN shall establish and maintain a FOP for the operation and maintenance of facilities related to migratory and resident fish passage, which shall be subject to review and approval by DEP and review and comment by the other Resource Agencies. The FOP will include, for each fishway, schedules for routine maintenance, procedures for routine operations (including: seasonal and daily periods of operation, dam and powerhouse operational measures) detailing with how the plant shall be operated during fish passage season including sequencing of turbine start-up and operation, debris management as well as any other necessary provisions for plant operation and related to attraction flow as a component of the fish passage system including the NLF provisions for the operation of the NLF, procedures for monitoring and reporting on the operation, and procedures for use in case of emergencies and Project outages significantly affecting fishway operations.

b. YORK HAVEN shall implement the FOP consistent with the approval by the DEP. YORK HAVEN shall provide written documentation to the Resource Agencies that all fishway operational

personnel have received training concerning the content of the approved FOP, which documentation shall be signed by the Project's operations manager.

c. Copies of the approved FOP and all modifications will be provided to the Resource Agencies.

d. By December 31 of each year, YORK HAVEN shall provide to the Resource Agencies an annual report detailing: (1) the implementation of the FOP, including any deviations from the FOP and a process to prevent or minimize those deviations in the future, or in the case of emergencies or Project outages, the steps taken by YORK HAVEN to minimize or mitigate adverse effects on fishway operation or fish passage measures; and (2) any proposed modifications to the FOP to further enhance its effectiveness in the future. YORK HAVEN shall meet with the Resource Agencies by January 31 of each year unless a different date is mutually agreed upon by YORK HAVEN and the Resource Agencies. Any required modifications to the FOP requested by DEP or the USFWS shall be submitted to the Resource Agencies within 30 days of receipt of such request for the modification unless a longer period is approved by DEP. The modifications to the FOP shall be implemented consistent with the approval of the DEP.

e. Except as otherwise specifically provided, for fish passage system enhancements and facilities that do not begin operation with the entry into operation of the Project under the new FERC license, 60 days prior to operation of the enhancements and/or facilities, YORK

HAVEN shall submit FOP provisions for any such new fish passage enhancements, facilities and measures to the Resource Agencies for review and approval by DEP and review and comment by the other Resource Agencies, and YORK HAVEN shall implement the FOP as approved by the DEP.

f. The FOP shall also include the procedures for resident fish passage.

2. **Nature-Like Fishway Construction** – YORK HAVEN will finance, design, permit and install a nature-like fishway facility ("NLF Facility") in the vicinity of the apex of the Main dam and Three Mile Island ("TMI") in accordance with the conditions set forth below.

a. Unless a different plan is approved by the DEP in writing, the NLF Facility shall be in substantial compliance with the design concept and criteria for the NLF Facility set forth in Appendix A and B hereto.

b. The NLF Facility shall be authorized, constructed and operated consistent with the following schedule unless the DEP approves a different schedule in writing. YORK HAVEN shall respond to all Resource Agency and FERC requests for additional information within 60 days from receipt of the request unless a different response time is approved by the DEP in writing.

i. By March 31, 2015, YHPC shall prepare and submit to the Resource Agencies a functional design of the NLF Facility, including hydrologic and hydraulic analyses, NLF configuration and dimensions, general arrangements drawings

with plan and profile views, and draft elements of applications for an ACOE Clean Water Act §404 Permit, a §401 Water Quality Certification, an Erosion and Sedimentation Control Plan and an NPDES Permit for Stormwater Discharge Associated with Construction Activities.

ii. By July 15, 2015, YORK HAVEN shall prepare and submit (a) a complete application to the ACOE for a Clean Water Act §404 Permit; (b) an application to DEP for a §401 Water Quality Certification; (c) an Erosion and Sedimentation Control Plan and application to DEP for an NPDES Permit for Stormwater Discharge Associated with Construction Activities; and (d) engineering designs and a request for construction approval from FERC.

iii. The process of issuing bid requests, evaluating bids, finalizing costs and completing procurement of construction contracts for the NLF Facility shall be completed within 150 days from issuance of all necessary governmental approvals for NLF Facility construction, including the Clean Water Act §404 permit, the related DEP water quality certification, the NPDES Permit for Stormwater Associated with Construction Activities, and the FERC approval for the NLF Facility.

iv. The NLF Facility shall be constructed and placed into operation within 3 full construction seasons after the date specified in ¶ iii above.

vi. Except as otherwise provided herein, other than facility and operations modifications to the NLF as provided in Sections III.B.1.d and e, YORK HAVEN shall not be required to design, construct or install any additional fish passage structure at the project prior to 2041.

c. YORK HAVEN shall implement the NLF operation and maintenance plan consistent with the approval of the DEP as part of the FOP.

B. American Shad Passage

1. Upstream Shad Passage

a. The period from completion of construction through the end of the first American shad upstream shad passage season following completion of the NLF Facility will be a "shake-down" period, during which YORK HAVEN shall conduct visual observations and make adjustments to the NLF Facility to address any unanticipated inhibitions or barriers that impede the NLF Facility's performance.

b. Starting in the second American shad upstream passage season following completion of the NLF Facility, YORK HAVEN shall commence telemetry studies to monitor the overall effectiveness of the NLF Facility, consistent with the following:

i. The telemetry studies will be conducted for at least two years, and potentially a third year if, after consultation with the Resource Agencies, it is determined to be necessary by YORK HAVEN or either the USFWS or PADEP in order to obtain observations over a range of high and low flows typical of

American shad passage seasons on the Susquehanna River. In general, the range defining typical high and low flows during the American shad upstream passage season would be anticipated to be as follows:

(1) Typical low flow range: 22,000 cfs to 35,300 cfs.

(2) Typical high flow range: 35,300 cfs to 55,600 cfs.

ii. The telemetry studies will be planned to be conducted during successive shad passage seasons, but may be performed on a non-successive basis under the following circumstances:

(1) YORK HAVEN may postpone conducting the telemetry studies, after consultation with the Resource Agencies and with the approval of the USFWS and DEP, in the event that extenuating circumstances (such as the unusual flows, construction at downstream dams or other conditions) are interfering or expected to interfere with upstream shad passage. The PADEP agrees that in the event that it becomes aware of circumstances that would warrant postponement of the telemetry studies, it will promptly notify YORK HAVEN, with the objective of providing notice to YORK HAVEN, to the extent practicable, as soon as possible prior to the anticipated start of the shad passage season.

(2) YORK HAVEN may postpone a successive season's telemetry study if YORK HAVEN determines, after consultation with the Resource Agencies and with the approval of USFWS and PADEP, that some physical adjustment to the NLF Facility is advisable based on the observations during the prior shad passage seasons, in which case YORK HAVEN shall implement the physical adjustments and perform the telemetry study during the American shad upstream passage season following implementation of the physical adjustment.

iii. The telemetry studies will utilize American shad tagged at the Safe Harbor Project, provided that access is granted by the owner of such Project or at such other location as required or approved by the PADEP in writing.

iv. The telemetry studies shall utilize radio telemetry, acoustic telemetry, or such other technologies as YORK HAVEN proposes and PADEP and the USFWS, after consultation with the other Resource Agencies, approve. The general parameters and protocols for such telemetry studies (number of fish, fish release sites, target areas for telemetry antennas) are described in Appendix C. At least 10 months prior to the start of the second Upstream American Shad Passage Season following completion of the NLF Facility, YORK HAVEN

shall prepare and submit to the Resource Agencies for review an NLF Facility Monitoring Plan (the "NLF Monitoring Plan") containing detailed protocols for the telemetry studies. YORK HAVEN shall confer with the Resource Agencies regarding the NLF Monitoring Plan, and shall provide for at least 90 days for PADEP and the USFWS to review and approve, and for the other Resource Agencies to review and comment on, the NLF Monitoring Plan.

c. Upstream American Shad Passage Target and Effectiveness Criteria:

i. The target established by the Resource Agencies is for at least 75% of the upstream migrating American shad passing the Safe Harbor Dam to pass upstream of the Project through the combination of the NLF Facility and the East Channel Fishway (the "Upstream Shad Passage Target"). The NLF Facility shall be designed and operated to be capable of achieving the Upstream Shad Passage Target, provided that adequate numbers of upstream migrating American shad reach the Project Area. YORK HAVEN shall not be deemed in violation of this condition if the Upstream Shad Passage Target is not achieved for reasons beyond the reasonable control of the Project. ("Project Area" is defined as the area upstream of a line drawn across the Susquehanna River from the downstream end of the powerhouse to the east bank of the river as depicted in Exhibit 1 to Appendix C hereto)

ii. The NLF Monitoring Plan is designed to investigate several issues: (i) whether the upriver migrating American shad passing the Safe Harbor Dam are reaching the Project Area; (ii) whether upriver migrating American Shad entering the Project Area are attracted to the downstream entrance of the NLF Facility; and (iii) whether there are barriers to American shad entering into and passing through the NLF Facility (e.g., velocity barriers or other constraints). Unless a different plan is approved by the DEP and the USFWS, the NLF Monitoring Plan shall be consistent with Appendix C, attached hereto.

iii. The NLF Facility will be deemed to be effective if: (1) in two consecutive years after installation or subsequent modification of the NLF Facility, (A) the Upstream Shad Passage Target, identified in paragraph B.1.c.i. above, is achieved or (B) 85% of the tagged American shad that enter the Project Area exit the combination of the NLF Facility and the East Channel Fishway (the "Project Area Passage Success Criterion").

iv. If the telemetry studies show that the Project Area Passage Success Criterion is achieved in two successive American shad upstream passage seasons which reflect a range of flows typical of shad passage seasons on the Susquehanna River, the Project Area Passage Success Criterion will be deemed

achieved and YORK HAVEN may terminate the telemetry studies.

v. If the telemetry studies show that the Project Area Passage Success Criterion is not achieved in two successive American shad upstream passage seasons, and such failure was not due to unusual or extenuating circumstances (such as unusual flow or temperature conditions), YORK HAVEN will undertake the actions set forth in Section B.1.d. below and then perform a telemetry study for at least two additional American shad upstream passage seasons to confirm achievement of the Project Area Passage Success Criterion.

d. YORK HAVEN shall, in consultation with the Resource Agencies, evaluate the fish movement data from the NLF Monitoring Plan to determine if there are barriers to timely passage of upstream migrating American shad within the Project Area. The Project area is the area from the downstream end of the powerhouse extending to the upstream exit of the NLF or East Channel Fishway, or such other area established by the DEP in writing after consultation with the Resource Agencies and York Haven. If such barriers to timely passage of upstream migrating American shad are identified within the Project Area, YORK HAVEN shall prepare and submit to the Resource Agencies a plan and schedule for those actions to address such conditions that are feasible, appropriate under the circumstances, reasonable and technically sound, provided that the

Project shall not be required to undertake the curtailment of electric generating operations. Such plan shall be subject to review and approval by PADEP and the USFWS and review and comment by the other Resource Agencies. Following approval by PADEP and the USFWS, YORK HAVEN shall implement the approved plan in accordance with the approved schedule.

e. If the Project Area Passage Success Criterion is not achieved, YORK HAVEN shall take the following measures, as appropriate and necessary, after consultation with the Resource Agencies:

i. Evaluate fishway hydraulics and access for velocity and shear stress barriers, recognizing that hydraulics of the NLF Facility will vary with river flow and flow through the NLF Facility.

ii. Adjust positions of rock weirs and attraction water discharge if necessary.

iii. Adjust timing of supplemental attraction flows.

iv. Install ultrasound to deter fish from an area (such as the Powerhouse or East Channel).

v. Reduce flows in the East Channel to reduce attraction of American shad to the East Channel.

vi. Adjust amount of supplemental attraction flows in the NLF Facility up to the Potential Increased Attraction Flow Value.

vii. Evaluate whether potential barriers exist in the channel downstream of the Main Dam hindering fish movement to the

entrance of the NLF Facility, and if reasonably necessary undertake feasible and cost-effective modifications to the channel to remove such barriers.

f. The upstream end of NLF Facility shall be designed to accommodate installation of Passive Integrated Transponder ("PIT") tag monitoring devices at such time as such PIT tag monitoring devices become available and feasible for reliably monitoring American shad exiting the NLF Facility. At such time as requested by PADEP or the USFWS, YORK HAVEN shall conduct a feasibility study to evaluate whether a PIT tag monitoring facility can be successfully installed and maintained near the upper end of the NLF Facility to reliably monitor American shad exiting the NLF Facility. YORK HAVEN shall install PIT tag readers, or such other monitoring technology as may be required by the PADEP, after consultation with the Resource Agencies, at the NLF Facility when such technology has become available, feasible, and technically sound for measuring American shad passage in the conditions of the NLF Facility as mutually agreed to, after consultation with the Resource Agencies. Upon installation of the PIT tag readers, YORK HAVEN shall implement a PIT tag monitoring plan, or other monitoring techniques approved by the DEP in consultation with the other Resource Agencies, on a schedule approved by the DEP.

g. If at the end of implementation of the measures described above, or such longer time as established by the DEP, the results indicate that

as measured as described above, less than 75% of the American shad that pass the Safe Harbor Dam pass through the Project and the Project Area Passage Success Criterion is not being achieved, within 6 months thereafter, YORK HAVEN shall propose a plan and schedule for mitigation, as defined in 25 Pa. Code Section 105.1 that is feasible, appropriate under the circumstances, reasonable and technically sound, provided that the Project shall not be required to undertake the curtailment of electric generating operations. This plan and schedule shall be submitted to the Resource Agencies for review and comment and to DEP for approval. YORK HAVEN shall implement the plan and schedule consistent with the approval of the DEP. In the event YORK HAVEN fails to submit the plan and schedule as required by this paragraph, the DEP, in consultation with the other Resource Agencies, may establish a plan and schedule and YORK HAVEN shall implement that plan and schedule consistent with the approval of the DEP.

2. **Downstream Shad Passage of Post-Spawning Adult American Shad**

a. YORK HAVEN shall provide for downstream passage of post-spawning adult American shad through maintenance of the existing Project and installation and operation of the NLF Facility, which shall achieve an 80% survival rate as demonstrated by implementation of the protocol set forth in Section b. below.

b. During the period of May 1 to June 30, if river flow exceeds the sum of Project Hydraulic Capacity, required flows through the NLF

Facility, required flows through the East Channel, and required flows (if any) over the Main Dam, YORK HAVEN will open and spill water via the Forebay Sluice Gate (~370 cfs) to the extent practicable for a period of one to two hours during the morning on weekdays, subject to Project personnel availability and access requirements for operations and maintenance purposes. Such spilling may be provided in connection with opening of the Forebay Sluice Gate for purposes of passing debris, it being understood by the Parties that during the passage of debris, it will not be feasible to utilize the chute structure.

c. If after operational modifications are implemented YORK HAVEN cannot achieve 80% survival of adult American shad, YORK HAVEN shall propose a plan and schedule for mitigation, as defined in 25 Pa. Code Section 105.1 that is feasible, appropriate under the circumstances, reasonable and technically sound, provided that the Project shall not be required to undertake the curtailment of electric generating operations This plan and schedule shall be submitted to the Resource Agencies within 6 months from the date the DEP determines that YORK HAVEN failed to achieve the 80% survival target. YORK HAVEN shall implement the plan and schedule consistent with the approval of the DEP. In the event YORK HAVEN fails to submit the plan and schedule as required by this paragraph, the DEP, in consultation with the other Resource Agencies, may establish a plan and schedule and YORK HAVEN

shall implement that plan and schedule consistent with the approval of the DEP.

3. **Downstream Juvenile American Shad Passage**

a. After issuance of the New License and until completion of the NLF Facility, YORK HAVEN shall implement the following protocol to facilitate downstream passage of juvenile American shad during the Downstream Juvenile American Shad Passage Period:

i. During the entire Downstream Juvenile American Shad Passage Period from October 1 until November 30, YORK HAVEN will operate the Project units in the following order of priority, depending upon available river flow: Unit 1-6 (Propeller units) may be operated without restriction up to available river flow; (2) Unit 14 (larger single Francis unit) may be operated if river flow exceeds capacity of Units 1- 6; (3) Units 7-13 and 15-30 (double Francis units) may be operated in ascending order if river flow exceeds capacity of Unit 1-6 and 14.

ii. During the entire Downstream Juvenile American Shad Passage Period, YORK HAVEN will open and spill water via the Forebay Sluice Gate (~ 370 cfs) between the hours of 5 pm to 11 pm Eastern Standard Time.

iii. If during the Downstream Juvenile American Shad Passage Period river flow exceeds the sum of Project Hydraulic Capacity, required flows through the East Channel, and

required flows (if any) over the Main Dam, YORK HAVEN will open and spill water via the Forebay Sluice Gate (~370 cfs) to the extent practicable for one to two hours during the morning, subject to Project access requirements for operations and maintenance purposes, in order to provide for downstream juvenile American shad passage.

b. After completion of the NLF Facility, unless a different protocol is approved by the USFWS and the PADEP, YORK HAVEN shall implement the following protocol to facilitate downstream passage of juvenile American shad during the Downstream Juvenile American Shad Passage Period:

i. During the entire Downstream Juvenile American Shad Passage Period, YORK HAVEN will operate the Project units in the following order of priority, depending upon available River flow: (1) Unit 1-6 may be operated without restriction up to available river flow; (2) Unit 14 may be operated if river flow exceeds capacity of Units 1-6; (3) Units 7-13 and 15-30 may be operated in ascending order if river flow exceeds capacity of Unit 1-6 and 14.

ii. During the entire Downstream Juvenile American Shad Passage Period, YORK HAVEN will open and spill water via the Forebay Sluice Gate (~ 370 cfs) between the hours of 5 pm to 11 pm EST.

iii. The NLF Facility will be operated to maintain a flow through the fishway of approximately 200 cfs.

iv. If during the Downstream Juvenile American Shad Passage Period river flow exceeds the sum of Project Hydraulic Capacity, required flows through the NLF Facility, required flows through the East Channel, and required flows (if any) over the Main Dam, YORK HAVEN will open and spill water via the Forebay Sluice Gate (~370 cfs) to the extent practicable for one to two hours during the morning, subject to Project access requirements for operations and maintenance purposes, in order to provide for downstream juvenile American shad passage.

c. The overall goal for juvenile American shad downstream passage is to achieve survival of 95% of juvenile American shad from above the Project powerhouse and dam to below the Project powerhouse and dam (the "Downstream Juvenile American Shad Passage Goal"). The effectiveness of downstream passage operations for juvenile American shad will be determined based upon (1) a route of passage analysis, and (2) confirmation that Forebay Sluice Gate provides for safe passage.

d. For purposes of the route of passage analysis, the DEP will assume that (1) juvenile American shad will pass through the NLF Facility, through the East Channel past the East Channel Dam, over the Main Dam, and into the head race in direct proportion to the amount of

flow via each such route; (2) any juvenile American shad passing through the NLF Facility, through the East Channel past the East Channel Dam, over the Main Dam, or through the Forebay Sluice Gate will survive; (3) juvenile American shad that do not pass through the NLF Facility, through the East Channel past the East Channel Dam, over the Main Dam, or through the Forebay Sluice Gate will pass through the turbines that are being operated in accordance with the priorities set forth above, and absent observations to the contrary, are allocated between the operating turbines in proportion to the flow through each turbine; and (4) the survival rate of juvenile American shad passing through individual turbines (based on previous balloon tag and blade strike analyses) are as stated in Appendix D. Based upon the foregoing assumptions and confirmation that Forebay Sluice Gate provides for safe passage as described in Section f. below, the juvenile American shad passage goal of 95% would be met if at least 60% of the tagged juvenile American shad released into the headrace exit via the Forebay Sluice Gate (that is, pass downstream of the Project headrace without passing through the turbines) (the "Headrace Shad Turbine Avoidance Target"). Unless a different method is approved by the USFWS and the DEP in writing, YORK HAVEN shall test the downstream passage efficiency of the operating protocols described above by a PIT tag monitoring study. YORK HAVEN shall, in consultation with the Resource Agencies, prepare a plan and schedule for the Headrace

Shad Turbine Avoidance Study for review and approval of the Resource Agencies, consistent with the design criteria set forth in Appendix F. The Project will be deemed to meet the Downstream Juvenile American Shad Passage Goal if (1) the Headrace Shad Turbine Avoidance Study shows that the Headrace Shad Turbine Avoidance Target is achieved and (2) YORK HAVEN complies with the provisions of Section III.B.3.e. below to establish conditions under which the Forebay Sluice Gate provides for safe passage of juvenile American shad.

e. Within four (4) years following License issuance and prior to performance of the downstream juvenile American shad studies referenced in Section III.B.3.d. above, YORK HAVEN shall prepare and submit to the Resource Agencies: (i) designs for a chute structure to convey flows beyond the roadway on the downstream side of the Cable Alley structure, meeting the design criteria set forth in Appendix E allowing juvenile and adult American shad to land unimpeded in the downstream pool; and (ii) removal of obstructions in or deepening of the downstream pool into which flows from the Forebay Sluice Gate land to provide an adequate depth of 1 foot for each 4 feet of drop into which juvenile or adult American shad may land. YORK HAVEN shall submit design plans for improvements and a proposed implementation schedule to the USFWS and PADEP for review and approval and to the other Resource Agencies for review and comment, and shall implement the proposed improvements in

accordance with the approved designs and schedule by the PADEP. Any such required improvements shall be completed coincident with completion of the NLF Facility, and in advance of commencement of the monitoring described in Section III.B.3.d. above.

f. If the effectiveness monitoring conducted pursuant to Section III.B.3.d. above shows that the Headrace Shad Turbine Avoidance Target is not achieved, unless the USFWS and the DEP approve alternative measures, YORK HAVEN shall implement the following sequence of adaptive measures in the next passage season:

   i. Open the NLF supplemental flow gate (800 cfs) during the same schedule as the Forebay Sluice Gate is opened.

   ii. Suspend operation of certain Francis turbine units during the hours of 5-11 pm EST when river flows are between 15,000 cfs and 22,000 cfs during the Downstream Juvenile American Shad Passage Period, up to a total generation loss of 1,000 Megawatt hours ("MWh").

   iii. Such other measures as may be agreed to by YORK HAVEN, the USFWS and DEP, after consultation with the other Resource Agencies.

g. Unless the DEP and the USFWS approve a different time in writing, within two years of implementing the adaptive measures referenced in Section 3.f. above, YORK HAVEN shall conduct a follow-up Headrace Shad Turbine Avoidance Study following the protocols referenced in Section III.B.3.d. above . If the follow-up Headrace

Shad Turbine Avoidance Study shows that Headrace Shad Turbine Avoidance Target is achieved, such adaptive measures shall continue to be implemented for the duration of the License.

h. If by January 1, 2028, (a) the Headrace Shad Turbine Avoidance Studies have not shown that Headrace Shad Turbine Avoidance Target is being achieved by adaptive measures implemented at the Project, and (b) based on all available information and after consultation with YORK HAVEN and the other Resource Agencies, the USFWS renders a final determination on the basis of the record reasonably finding that (i) YORK HAVEN has not demonstrated that the adaptive measures implemented at the Project are reasonably anticipated to meet the Downstream Juvenile American Shad Passage Goal, and (ii) additional measures that are reasonably required to achieve the Downstream Juvenile American Shad Passage Goal (the "Additional Measures Determination") then:

i. Within 12 months of the Additional Measures Determination, YORK HAVEN shall, in consultation with the Resource Agencies, prepare a design and schedule for implementation of additional structural and operational measures reasonably anticipated to meet the Downstream Juvenile American Shad Passage Goal that are feasible, appropriate under the circumstances, reasonable and technically sound. YORK HAVEN shall evaluate, among other options, options for a Fish Guidance System ("FGS") as described in the report

entitled *Evaluation of Fish Guidance Systems* (Draft April 2013), or other appropriate technology to achieve the Downstream juvenile American Shad Passage Goal. As part of the evaluation report, YORK HAVEN shall provide sufficient information to demonstrate the reasonable likelihood of the proposed option and measures to meet the Downstream Juvenile American Shad Passage Goal.

ii. Following approval of the design and schedule by the USFWS and DEP, after consultation with the other Resource Agencies, YORK HAVEN shall prepare and submit the applications for all required governmental approvals, including FERC approvals, and procure, install and implement the approved structural and/or operational measures in accordance with the approved schedule. Such approved measures shall be implemented by December 31, 2030 or such other date as agreed to by YORK HAVEN and the USFWS, after consultation with the other Resource Agencies, or as approved by FERC.

iii. If YORK HAVEN does not present a design and schedule for implementing additional structural and operational measures reasonably anticipated to meet the Downstream Juvenile American Shad Passage Goal that are feasible, appropriate under the circumstances, reasonable and technically sound, or based on all available information and after consultation with

YORK HAVEN and the Resource Agencies, the DEP does not approve YORK HAVEN's design and schedule for additional measures submitted pursuant to Section III.B.3.h. above, the DEP may prescribe such measures as the DEP determines are necessary for safe and effective passage of downstream migrating American shad and YORK HAVEN shall implement those measures within the schedule established by the DEP.

iv. Within one year after the implementation of the structural and operational measures implemented under Section III.B.3.h. above, YORK HAVEN shall perform a follow-up Headrace Shad Turbine Avoidance Study to evaluate the number of tagged juvenile American shad that exit the Forebay without exposure to the turbines.

C. Eel Passage

1. Upstream Eel Passage

YORK HAVEN shall provide for upstream passage of juvenile American eels through maintenance of the existing Project and installation of the NLF Facility. Based upon their present understanding of the behavior of juvenile American eels and the design of the NLF Facility, the USFWS expects that the existing design of the Project in conjunction with the installation of the NLF Facility will be adequate to provide for successful upstream passage of juvenile American eels past the Project, and no other measures are presently

believed to be necessary for such upstream passage of juvenile American eels.

2. Downstream Eel Passage

a. The overall goal for silver American eel passage shall be to achieve effective passage and survival of 85% of silver eels from above the Project dams and powerhouse to below the Project dams and powerhouse (the "Downstream Eel Passage Goal").

b. YORK HAVEN shall cooperate with the Resource Agencies and other interested parties in the conduct of (1) a Lower Susquehanna River Downstream Eel Study to evaluate the timing, magnitude, duration, annual variation and environmental conditions associated with active migration of silver eels from tributaries stocked with elvers, through the lower Susquehanna River to the Chesapeake Bay; and (2) a Site-Specific Route of Passage Study to evaluate the route of passage selected by migrating silver eels in the vicinity of the Project. The design criteria for the Lower Susquehanna River Downstream Eel Study and the Site-Specific Route of Passage Study are described in Appendix G.

c. At least 12 months prior to the anticipated date for completion of the NLF Facility, in consultation with the Resource Agencies, YORK HAVEN shall prepare a plan and schedule for conducting a discrete downstream passage effectiveness study ("Site-Specific Downstream Eel Study"), consisting of a Site Specific Route of Passage Study as described in Appendix G and an Eel Survival Study

as described in Appendix H. YORK HAVEN shall submit the Site-Specific Downstream Eel Study plan and proposed schedule to the Resource Agencies, for review and approval by the USFWS and PADEP and for review and approval. YORK HAVEN, in cooperation with the Resource Agencies, shall conduct the Site-Specific Route of Passage Study following completion of the NLF Facility in accordance with the approved plan and schedule, and YORK HAVEN shall conduct the Eel Survival Study in accordance with the approved plan and schedule.

d. If the results of the Site-Specific Downstream Eel Passage Study indicate that the then existing Project operating measures and protocols achieve the Downstream Eel Passage Goal, then YORK HAVEN shall continue to implement those protocols and measures.

e. If the results of the Site-Specific Downstream Eel Passage Study indicate that the Project's existing operating measures and protocols do not achieve the Downstream Eel Passage Goal, YORK HAVEN will prepare and submit to the Resource Agencies a plan and schedule for evaluating the feasibility and costs of potential physical and/or operational modifications to the Project to facilitate downstream eel passage (the Downstream Eel Improvements Study). The Downstream Eel Improvements Study plan and schedule shall be subject to review and approval by PADEP and the USFWS and review and comment by the other Resource Agencies. YORK HAVEN shall conduct the Downstream Eel Improvements Study in accordance with the

approved plan and schedule. The Downstream Eel Improvements Study will consider and evaluate whether any of the following adaptive measures to facilitate downstream eel passage, which may be implemented in a sequence or in combination, are feasible, appropriate under the circumstances, reasonable and technically sound and are reasonably expected to contribute toward achievement of the Downstream Eel Passage Goal:

i. Adjustment to NLF Facility operations.

ii. Installation of current inducers.

iii. Modifications to the juvenile American shad protection measure.

iv. Installation of a fish guidance system.

v. Replacement of turbine runner systems with units designed to have a lower mortality impact upon silver eels.

vi. Other measures mutually agreed to by YORK HAVEN, the USFWS and PADEP, after consultation with the other Resource Agencies.

f. If the Downstream Eel Improvements Study identifies physical or operational adaptive measures listed in Section III.C.2.e. above to facilitate downstream eel passage that are feasible, appropriate under the circumstances, reasonable and technically sound, YORK HAVEN shall prepare a plan and schedule for implementing such measures and an estimation as to the ability of such measures to achieve the Downstream Eel Passage Goal, and will submit the plan and schedule

to the Resources Agencies for review and approval by the USFWS and DEP and review and comment by the other Resource Agencies. Following approval of such plan and schedule, YORK HAVEN shall implement the measures described in the approved plan in accordance with the approval schedule.

g. Within 12 months following implementation of any such improvements, YORK HAVEN shall evaluate and provide a report to the Resource Agencies regarding the effectiveness of the measures in relation to achievement of the Downstream Eel Passage Goal.

h. If the adaptive measures implemented pursuant to the Downstream Eel Improvements Study do not result in achievement of the Downstream Eel Passage Goal, YORK HAVEN and the Resource Agencies shall on an annual basis consult as to potential additional studies or adaptive measures that are or may become feasible, appropriate under the circumstances, reasonable and technically sound, and reasonably expected to contribute toward achievement of the Downstream Eel Passage Goal.

D. Resident Fish Passage

1. General Requirements

a. The term "resident fish species" means those fish species that occur in that portion of Susquehanna River that includes YORK HAVEN Project area, excluding anadromous and catadromous fish species.

b. The term "East Channel" means the channel of the Susquehanna River that lies between Three Mile Island and the eastern shore of the Susquehanna River.

c. The term "East Channel Fish Passage System" means the existing fish passage facilities maintained by YORK HAVEN Project on the East Channel.

d. YORK HAVEN Project shall operate and maintain the East Channel Fish Passage System to allow passage of resident fish species each year from April 1 through the earlier of December 15 or until the average daily river temperature, measured at either the United States Geological Survey gage at Harrisburg or at the temperature sensor at YORK HAVEN Project is equal to or less than 40 degrees Fahrenheit for three consecutive days.

e. The East Channel Fish Passage System shall be operated as required by this certification and the FOP.

f. During the period that the East Channel Fish Passage System is in operation for the passage of fish, YORK HAVEN Project shall manage debris to maintain the functioning and operability of the East Channel Fish Passage System sufficient to allow and not significantly impede the passage of fish.

g. The provisions of this resident fish passage condition shall be included in the FOP for YORK HAVEN Project.

2. Prior to Operation of the NLF

a. After the American shad upstream passage season and during the resident fish passage period referenced above, YORK HAVEN shall operate the East Channel Fish Passage System to allow for passage of resident fish species and provide for corresponding flows in the East Channel as set forth in Section IV. below.

3. Subsequent to Completion of the NLF Facility

a. YORK HAVEN shall operate the NLF Facility as described in the FOP.

b. Except when the East Channel Fish Passage System must be closed for repairs and maintenance or except as otherwise approved by the PADEP in writing, YORK HAVEN shall leave the East Channel Fish Passage System open for passage of resident fish during the period April 1 through the end of the resident fish passage season (earlier of December 15 or until the average daily river temperature is $\leq$ 40 degrees Fahrenheit for three consecutive days).

IV. MINIMUM STREAM FLOW ("MSF")

A. Prior to Operation of the NLF

Unless alternative flows are approved by the DEP in writing, YORK HAVEN shall achieve the following.

1. Prior to completion and operation of the NLF Facility, Licensee shall operate the Project consistent with the following flow management criteria:

a. During the American Shad Upstream Passage Season, the Project shall be operated to provide:

i. An average daily minimum flow in East Channel below East Channel Dam of 2,000 cfs.

ii. Spill over Main Dam of equal to or greater than 4,000 cfs.

b. After American Shad Upstream Passage Season until end of resident fish passage season (earlier of December 15 or until the average daily river temperature is ≤ 40 degrees Fahrenheit for three consecutive days):

i. The Project shall be operated to provide a minimum stream flow in East Channel below East Channel Dam of 400 cfs.

ii. When river flows exceed hydraulic capacity of all available hydroelectric generating units, Licensee shall manage flows above the hydraulic capacity of available units in accordance with the following objectives:

a. To maintain the minimum flow in the East Channel of 400 cfs.

b. To maintain sufficient flow at the Main Dam to assure flow is released to the main channel in accordance with the existing FOP, except during times of maintenance work on the Main Dam when reservoir levels are lowered to permit such maintenance to occur safely.

c. To provide additional attraction flows to the East Channel Fish Passage System through operation of the wheel gates within their design capacity.

d. In the event that the flow is not sufficient to meet all such objectives 1-3 above, such objectives will be implemented in the order of precedence listed above.

c. The Project shall be operated to maintain the following minimum flows below the Project (the total of flows through the Powerhouse, over the Main Dam and East Channel Dam):

i. 1,000 cfs or inflow from upstream, whichever is less, at all times.

ii. An average daily minimum flow of 2,500 cfs or inflow from upstream, whichever is less.

iii. Whenever inflow from upstream is less than 3,000 cfs, the Project shall be operated on a run-of-river basis, adding or suspending operations at turbines to reflect, to the extent practicable, inflow from upstream and without adding or suspending turbine operations to deliberately drawdown or store water for purposes of generating electricity in particular time periods.

iv. Minimum flows may be temporarily modified if required by operating exigencies beyond the control of the YORK HAVEN.

B. After NLF Facility Completion.

Unless an alternative minimum stream flow is approved by the DEP, after completion and operation of the NLF Facility, Licensee shall operate the Project consistent with the following flow management criteria:

1. During the American Shad Upstream Passage Season, the Project shall be operated to provide:

   i. An average daily minimum flow in East Channel below East Channel Dam of a minimum of 267 cfs, understanding that as river flow increases above 21,000 cfs, flows over the East Channel Dam will occur in excess of the minimum of 267 cfs.

   ii. Flow through the NLF Facility (passage channel plus supplemental attraction flow channel) equal to at least 5% of river flow when river flows above the Project are between 5,000 and 150,000 cfs.

2. During the remainder of the year (other than the American Shad upstream passage season), the Project shall be operated to provide:

   i. An average daily minimum flow in East Channel below the East Channel Dam of 267 cfs.

   ii. The NLF Facility will be designed and operated to convey a minimum of 200 cfs when the river elevation is at the elevation of the Main Dam.

   iii. When river flows exceed the hydraulic capacity of all available hydroelectric generating units, YORK HAVEN shall manage flows above the hydraulic capacity of available units in accordance with the following objectives:

      a. To maintain a minimum flow in the East Channel of 267 cfs, understanding that as river flow increases above 21,000 cfs, flows over the East Channel Dam will occur in excess of the minimum of 267 cfs.

b. To maximize the remainder of flows above hydraulic capacity flowing over the Main Dam and through the NLF Facility. Within the limits of available flows in excess of the hydraulic capacity, except during the period of December 15 to the earlier of April 1 or the start of American Shad Upstream Passage Season, the supplemental attraction flow channel will be operated with the objective of maintaining a maximum attraction flow through the NLF Facility.

3. The Project shall be operated to maintain the following minimum flows below the Project (the total of flows through the Powerhouse, over the Main Dam and East Channel Dam):

i. 1,000 cfs or inflow from upstream, whichever is less, at all times.

ii. An average daily minimum flow of 2,500 cfs or inflow from upstream, whichever is less.

iii. Whenever inflow from upstream is less than 3,000 cfs, the Project shall be operated on a run-of-river basis, adding or suspending operations at turbines to reflect, to the extent practicable, inflow from upstream and without adding or suspending turbine operations to deliberately drawdown or store water for purposes of generating electricity in particular time periods.

i. Minimum flows may be temporarily modified if required by operating exigencies beyond the control of YORK HAVEN.

V. DEBRIS MANAGEMENT

A. Except as otherwise provided by the DEP in writing, YORK HAVEN shall (1) continue to implement its existing debris management program as described below; and (2) on or before January 15 of each calendar year, provide an annual contribution of $25,000 per year to the York County Conservation District or such other entity identified in writing by the DEP for the purposes of debris removal in the Lower Susquehanna River Watershed. The amount of the annual contribution shall be adjusted every ten years over the term of this certification. The amount of such adjustment shall be calculated to reflect the aggregate increase in the annual U.S. Department of Labor Consumer Price Index – (All Urban Consumers, All Items) over the ten year period. It is the understanding of the Parties that the York County Conservation District or such other identity identified by the DEP shall administer and utilize such funds for the sole purpose of debris removal in the Lower Susquehanna River Watershed.

B. Under the Project's debris management program, almost all of the debris arrives at the Project during high flow events when river flows far exceed the Project Hydraulic Capacity. Under such debris management program, much of that debris passes over the Main Dam and East Channel Dam, and debris that does not pass over the Main Dam or East Channel Dam accumulates in the forebay. Of the debris that enters the forebay, non-natural debris is removed from the accumulated debris in the forebay to the extent that safety considerations permit, and the remaining (primarily organic) debris material is sluiced downstream through the Forebay Sluice Gate in the masonry non-overflow "cable alley" wall located at the downstream end of the forebay. Prior to opening the Forebay Sluice Gate for debris passage, YORK HAVEN shall notify PPL's Brunner Island Station that debris is to be sluiced at least one-hour prior to debris sluicing, absent extraordinary or emergency circumstances.

8/19/14

Scott Williamson
Program Manager
Waterways and Wetlands Program
Department of Environmental Protection

Date

APPENDIX A - DESIGN CRITERIA FOR NATURAL LIKE FISHWAY

The NLF Facility will be designed and constructed consistent with the following requirements:

1. The NLF Facility shall consist of an in-river nature-like fishway with its downstream terminus at or near the toe of the Main Dam at or near the apex between the Main Dam and TMI, reaching upstream from the Main Dam, with a varying width of approximately 300 feet, a thalweg channel width of approximately 65 feet, and a supplemental attraction flow channel on the TMI side of the NLF Facility, as described in Section 3.0 (Option 4 Conceptual Design) of YORK HAVEN Project Nature-Like Fishway Conceptual Design Report, submitted by YHPC to FERC on March 15, 2013 (the "NLF Conceptual Design Report"). Refer to the conceptual plans provided in Appendix B for additional detail on the design of the NLF Facility.

2. The fishway channel in combination with the supplemental attraction flow facility shall be designed to be capable of conveying during the Upstream American Shad Passage Season at least 5% of the River flow when River flows are between 5,000 and 150,000 cfs. Of this amount, the supplemental attraction flow channel and related control structures shall be designed to convey variable attraction flow volumes of up to 800 cfs (the "Planned Attraction Flow Maximum Value"), but with the capacity to be readily modified to convey, if needed, a variable flow volume of up to 1,000 cfs ("Potential Increased Attraction Flow Value").

3. The NLF shall include a supplemental attraction water facility (SAWF) that will be capable of providing additional flows within and/or near the entrance to the fish passage channel.

   a. The SAWF shall be located on the land side of the fish passage channel and have a maximum discharge capacity of 1,000 cfs (i.e., accommodating both the Planned Attraction Flow Maximum Value and the Potential Increased Attraction Flow Value) when the reservoir is at its normal headwater elevation of 277.2 ft.

   b. The upstream entrance to the SAWF shall be located approximately 75 ft upstream of the nearest constructed upstream exit from the fish passage channel to minimize the chance for fall back through the SAWF. The

upstream entrance to the SAWF shall contain a trash rack to impede debris passage into the SAWF.

c. An inlet gate structure of either the underflow or overflow type shall control and regulate flow to the SAWF, allowing some adjustment of flow volumes available for attraction flow purposes. The current plan is to install two inlet gates; however, the final number of gates will be subject to operational and economic considerations, but in no case shall the SAWF design discharge capacity be less than 1,000 cfs at normal pond level (and thus able to accommodate both the Planned Attraction Flow Maximum Value and the Potential Increased Attraction Flow Value).

d. Downstream of the inlet gates, flow in the SAWF will travel in a rectangular concrete channel approximately 25 to 30 feet wide and 6 to 8 feet deep. Water from the SAWF may be delivered along the length of the SAWF channel through a series of weirs fitted with stop logs discharging to different points within the fish passage channel, over a sharp-crested weir or weirs at the downstream end of the SAWF delivering water to the holding pool at the entrance to the fish passage channel, and/or to a combination of both of these delivery mechanisms.

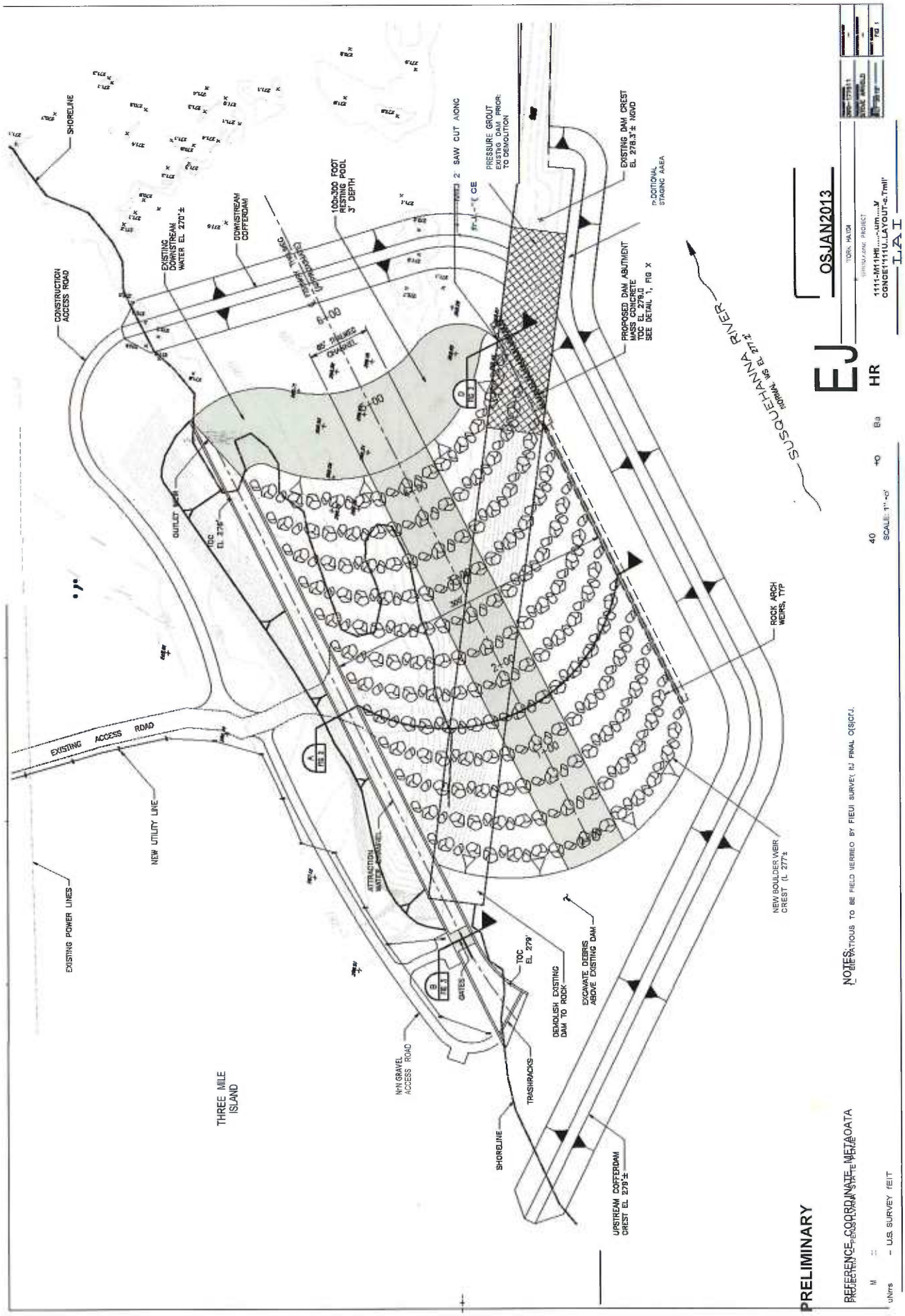
e. The final design of the flow dispersal mechanisms shall (1) minimize the chance for delay to American shad entering the fish passage channel from the resting pool; and (2) prevent or minimize the entry of American shad into the SAWF though creation of a localized flow disturbance zone over the sharp-crested weir, creating an elevation difference between the SAWF water elevation and tailwater of at least 2 feet, and/or providing an exclusion rack between the weir and the resting pool. The final design of the SAWF shall also allow for flexibility in the delivery of the attraction water by adjusting flow directly into the fish passage channel or to the downstream end of the SAWF channel. The downstream end of the SAWF shall also provide for flexibility in the direction of flow delivery ranging from parallel to perpendicular to the

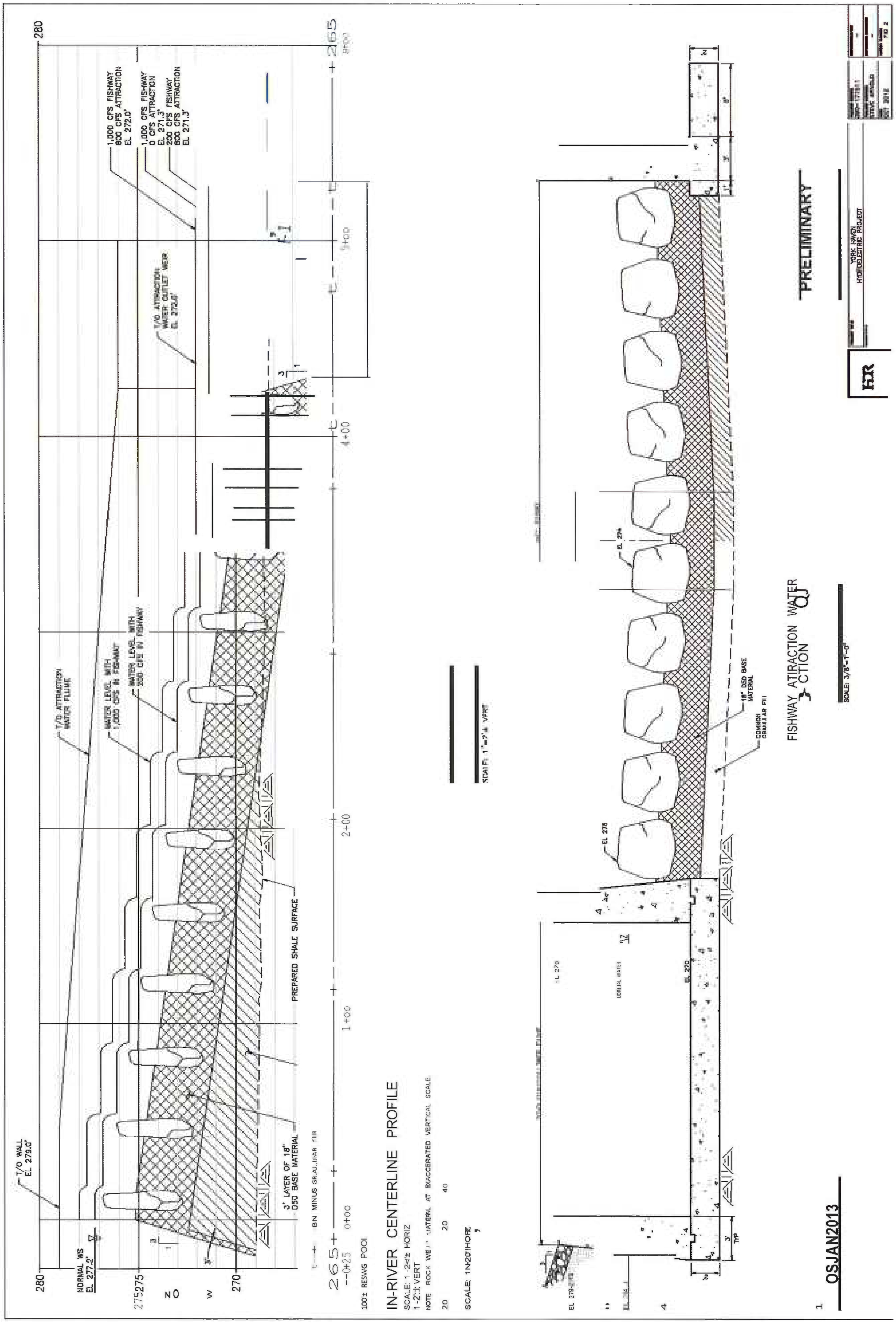
resting pool, allowing for varying the direction of a portion of the flow away from discharge directly into the resting pool.

4. The upstream end of the NLF Facility will be designed to accommodate installation of Passive Integrated Transponder ("PIT") tag monitoring devices at such time as such PIT tag monitoring devices become available and feasible for reliably monitoring American shad exiting the NLF Facility.

APPENDIX B - CONCEPTUAL DESIGN FOR NLF FACILITY

See attached





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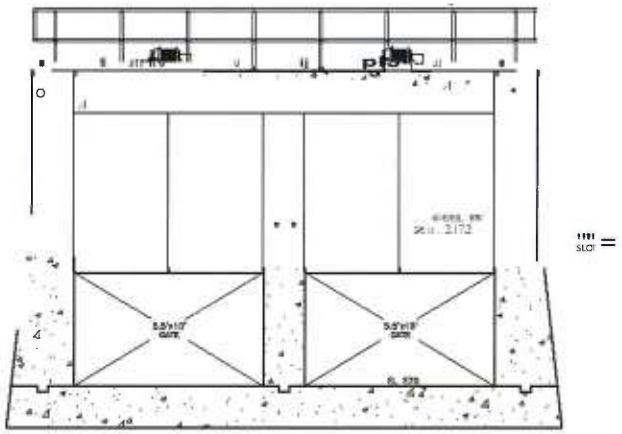
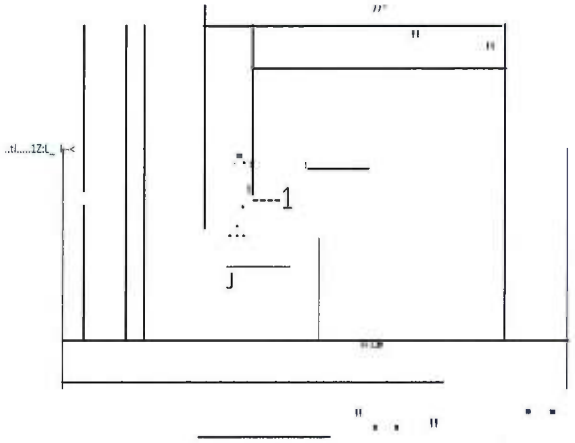
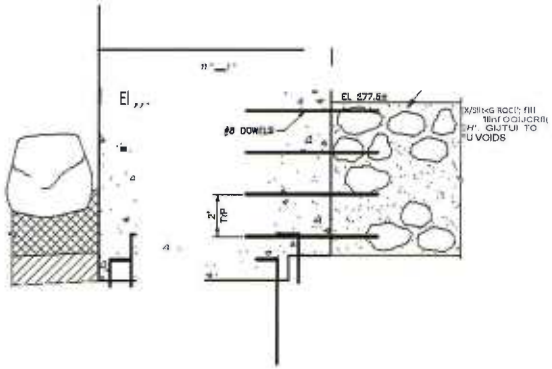




GATE SECTION 6|rl



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PRELIMINARY

OSJAN2013

APPENDIX C - DESIGN CRITERIA FOR NLF FACILITY MONITORING

Monitoring of NLF Facility effectiveness for upstream passage of American shad will be conducted consistent with the following general parameters and protocols:

1. INTRODUCTION

The Nature-Like Fishway (NLF) effectiveness study will be performed with telemetry tracking and monitoring techniques, building upon the site-specific experience and results of successful adult American shad tracking studies performed at YORK HAVEN in 2010 and 2012. American shad will be tagged at the Safe Harbor Dam fish lift required or approved by PADEP in writing, approximately 25 miles downstream and allowed to migrate upstream to YORK HAVEN Project on their own volition. Based on the results of the 2010 study, 70 percent of the shad tagged at Safe Harbor are expected to arrive at YORK HAVEN. Once at YORK HAVEN, a series of 10 monitoring station antennae will record tagged shad as they arrive at the Project, monitor their movements within the Project area, document the tagged shad that arrive at the NLF fishway entrance and document the tagged shad that exit the NLF fishway. Monitoring will also be performed below and above the East Channel Fishway to document tagged shad upstream passage via the East Channel. The study will be performed for at least two years following NLF construction.

2. STUDY GOALS

- Determine the proportion of American shad tagged at Safe Harbor arriving at YORK HAVEN Project.
- Of the tagged shad arriving at YORK HAVEN, determine the proportion arriving at the lower entrance of the new NLF.
- Of the tagged shad arriving at YORK HAVEN, determine the proportion exiting the NLF into YORK HAVEN impoundment.

- Of the tagged shad arriving at YORK HAVEN, determine the proportion that passes upstream via the East Channel Fishway.
- Evaluate movement patterns and travel times of tagged shad within YORK HAVEN Project area.

3. STUDY EQUIPMENT

Radio telemetry techniques, similar to those utilized for the 2010 and 2012 YORK HAVEN shad telemetry studies, are envisioned as the primary equipment for the fishway effectiveness studies. However, similar tracking technologies (e.g., acoustic telemetry) or new fish tracking technologies that are functionally equivalent (or superior) to and of comparable cost to radio telemetry techniques may be substituted upon consultation with the Resource Agencies and the approval of USFWS and PADEP.

4. FISH TAGGING

American shad will be tagged at the fish lift at Safe Harbor Dam (assuming owner approval) , unless an alternate location for the source of American shad is approved by PADEP in writing, similar to the 2010 American shad telemetry study. A target sample size of 150 American shad will be tagged for study. Assuming a drop-off rate similar to that observed in 2010 during volitional migration from Safe Harbor to YORK HAVEN (30%), this would result in a sample size of approximately 100 tagged shad arriving at YORK HAVEN. Two telemetry receivers will be installed at Safe Harbor during shad tagging operations; one at the fishway exit to confirm tagged shad have traveled through the fishway flume and entered into Lake Clarke, and a second in the Safe Harbor tailrace to detect any tagged shad that fall back downstream through Safe Harbor Dam. Efforts will be made to spread out tagging over the early, middle, and later portions of the shad run and to tag representative numbers of both male and female shad.

5. YORK HAVEN MONITORING

A network of 10 remote telemetry monitoring locations is proposed as illustrated in the attached Project area map. The location and purpose of each is described below:

1. Cross river monitoring at south end of powerhouse; documenting downstream Project study reach entry and exit
2. Tailrace monitoring; documenting tailrace presence, subdivided in to a) southern half and b) northern half of tailrace
3. Cross river monitoring just above the powerhouse; documenting movement upstream out of the tailrace or downstream into tailrace area
4. Cross river monitoring at upper end of headrace wall; documenting arrival/departure at the base of a steeper gradient channel reach
5. Cross mouth of East Channel; documenting arrival/departure at the lower end of the East Channel
6. TMI to Main Dam spillway; documenting arrival/departure to the Main Dam apex region at the upper extent of the steeper gradient channel reach
7. Across lower end of NLF; documenting tagged shad entry into NLF
8. Across upper end of NLF; documenting passage above YORK HAVEN Dam
9. Cross channel monitoring immediately below the East Channel Dam; documenting arrival at base of dam
10. Cross channel monitoring just above the East Channel Dam; documenting passage above the dam.

Monitoring will be performed from the day the first shad are tagged and released until the end of the upstream passage season. Manual ground-based tracking with a hand held receiver may also be conducted on an as-needed, discretionary basis, if it is deemed helpful to better define tagged shad locations or behavior within the Project area.

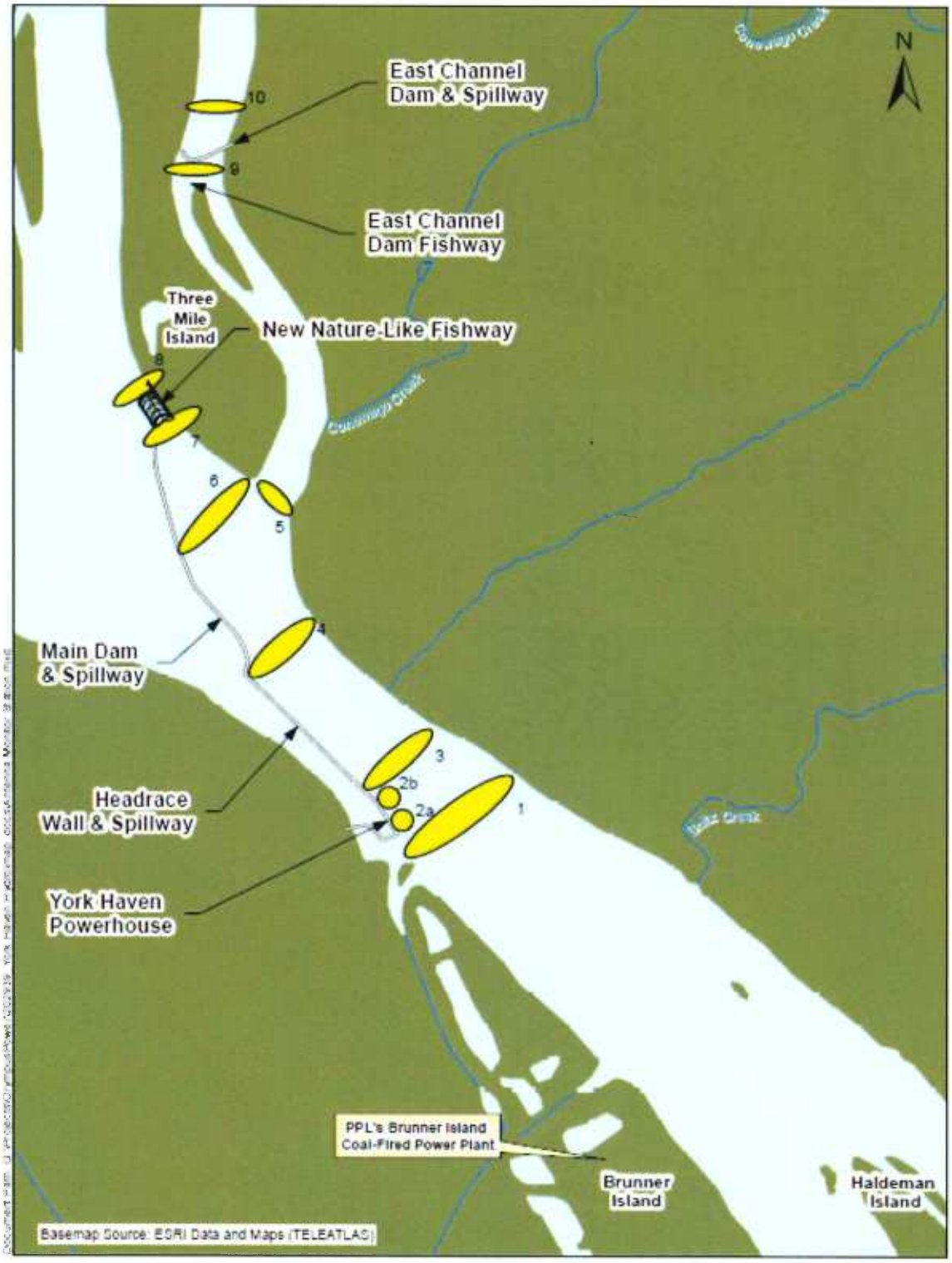
6. DATA MANAGEMENT AND ANALYSIS

Telemetry receiver data will be periodically downloaded and detection capabilities will be checked with a hand held transmitter on weekly intervals, and more frequently as appropriate during peak migration periods. Downloaded data files will be backed-up with duplicate files the same day. Upon completion of the field season data will be QC checked and processed for analysis.

7. REPORTING

A study summary report will be prepared and submitted for agency review within six (6) months following the completion of each year's monitoring program. Individual fish movement graphics, data summary graphics, and appropriate statistical treatment similar to the 2010 study supplemental data analysis, will be prepared and presented in the study report.

EXHIBIT 1 TO APPENDIX C



APPENDIX D - JUVENILE AMERICAN SHAD SURVIVAL RATES FOR PROJECT TURBINES

Turbine Type (Unit Nos.)	Survival Percentage *					
	Empirical Studies American Shad Juveniles			Turbine Blade Strike American Shad Juveniles		
	Mean	Min	Max	Mean	Min	Max
Kaplan (1-4)	**92.7%**	82.0%	100.0%	95.9%	91.6%	98.0%
Propeller (5)	-	-	-	**95.3%**	91.3%	97.4%
Propeller (6)	-	-	-	**96.5%**	93.5%	98.0%
Double-Francis (7-13 and 15-20)	**77.1%**	66.0%	88.0%	93.6%	92.4%	94.9%
Single Francis (14)	-	-	-	**92.5%**	90.9%	94.1%

* Mean values in **underlined bold** to be used in calculations of overall Project survival rates.

APPENDIX E - FOREBAY SLUICE GATE CHUTE DESIGN CRITERIA

The Forebay Sluice Gate Chute improvements shall be designed constructed consistent with the following requirements.

1. The Forebay Sluice Gate Chute shall be capable of maintaining a depth of water of at least 12 inches.
2. The landing pool below the downstream end of the Forebay Sluice Gate Chute shall have a depth of at least 1 foot for each 4 feet of drop, with a minimum of 4 feet of depth, in which adult or juvenile American shad may land.

APPENDIX F – HEADRACE JUVENILE AMERICAN SHAD TURBINE AVOIDANCE STUDY DESIGN

1. INTRODUCTION

The purpose of this study is to document the proportion of juvenile American shad arriving in YORK HAVEN powerhouse forebay that pass downstream via the Forebay Sluice Gate during the outmigration season. This information will be used in turn to evaluate whether or not the Project is achieving the desired overall juvenile American shad downstream survival goal of 95 percent. Modeling of juvenile American shad downstream passage has shown that the required sluice gate passage rate, to reach the overall Project survival goal of 95 percent, varies widely with river discharge and Project turbine operations. The worst case scenario is when no spill is occurring and all turbines are operating (17,000 cfs), plus the Nature-Like Fishway flow (200 cfs), East Channel minimum flow (200 cfs), and sluice gate flow (370 cfs), or approximately 18,000 cfs total river flow. Under this worst case condition 68 percent of shad in the fore bay must pass through the sluice gate to achieve the overall 95 percent survival goal. The required Forebay Sluice Gate passage rate to achieve the 95 percent goal declines at flows both above and below 18,000 cfs as illustrated in the summary table below of model results:

Estimated sluiceway bypass effectiveness metrics at various river flows of 6,000 to 30,000 cfs.

Total River Flow	30,000	27,000	24,000	21,000	18,000	15,000	12,000	9,000	6,000
Flow at Forebay	17,275	17,275	17,275	17,275	17,275	14,533	11,533	8,533	5,533
Total Project Survival	95%	95%	95%	95%	95%	95%	95%	95%	95%
Number of Total Shad Approaching the Project	100	100	100	100	100	100	100	100	100

Number of Shad Approaching the Forebay	58	64	72	82	96	97	96	95	92
Percent of Total Shad Passing	27	33	42	52	65	63	58	42	20
through the Sluiceway									
Percent of Forebay Shad Passing through the Sluiceway	**47**	**52**	**58**	**63**	**68**	**66**	**60**	**44**	**22**

Based on this analysis, an overall target of 60 percent of fore bay juvenile American shad passing through the sluice gate has been established to represent the overall conditions necessary to meet the 95 percent total survival goal under the variable river flows throughout the entire October through November downstream passage season.

2. STUDY GOAL

The study goal will be to determine the proportion of juvenile American shad confined to the fore bay that will pass through the fore bay sluicegate (avoiding turbine entrainment) under river flows and operations representative of the October through November downstream passage season.

3. STUDY EQUIPMENT

Due to their small size and fragile nature, out-migrating juvenile American shad are easily injured during handling, and are generally too small to be tagged with conventional telemetry transmitters. However, recent studies have had some success using abdominal implant PIT tags and new smaller radio transmitters (nano-tags) on juvenile American shad and river herring. Generally, the larger the fish the better the post tagging survival and therefore the use of juvenile American shad greater than 100 mm in length is recommended for tagging. Obtaining 100 mm juvenile American shad will likely require the assistance of PFBC to grow juvenile

American shad to this size in their shad hatchery facility or obtaining juvenile American shad from another hatchery, since only a small portion of the wild population reaches this size before outmigration. Fish used for the study will be tested for latent tagging mortality to establish a correction factor, which shall be discussed with the Resource Agencies during the performance of the study.

YHPC anticipates using abdominal implant PIT tags or possibly radio transmitter "nano-tags" or both. Telemetry equipment and methods are constantly improving, therefore new equipment that accomplishes the same study purpose and goals may be substituted, after consultation with the Resources Agencies, and approval by USFWS and PADEP.

4. STUDY METHODOLOGY

Sluice gate passage rates will be determined by releasing three groups of at least 100 tagged juvenile American shad into the powerhouse forebay and counting those that pass through the sluice gate on each of three separate (but not necessarily consecutive) days in the period of mid-October through mid-November. At least two days will be targeted to a period when river flows equal or exceed the hydraulic capacity of the Project (17,000 cfs) and the Project is operating normally. For purposes of this study, "operating normally" means that no more than two turbine units are temporarily out of operation for maintenance or other reasons. Monitoring for tagged shad passage will be performed with an antenna and receiver at the forebay sluice gate and monitoring will continue for at least two weeks after the release of test fish. Test shad will be released at a point far enough upstream of the headrace to avoid bias to their movements downstream.

5. DATA ANALYSIS

Since monitoring the 20 generating turbines for tagged juvenile American shad passage at YORK HAVEN Powerhouse is not practical with current tagging and detection technologies, shad that

are not detected passing through the sluice gate will be assumed, by default, to have been entrained through a turbine. This assumption creates the risk of overstating entrainment, as it would not account for potential predation by larger fish on test fish in the forebay, if any tagged fish swim upstream out of the forebay and pass downstream at other locations, or mortality due to handling and tagging. Some of this risk will be managed by keeping a number of control fish that are handled identically to the test fish captive for observation to provide for a handling mortality control estimation. If radio transmitter nano-tagging of some test fish is practical, tracking these fish may provide insight into upstream escape or predation sources of bias.

However, eliminating the study bias to overestimate entrainment is not possible with currently available methodologies and study results must be reviewed with this possibility in mind.

6. REPORT

A study report describing study methods and results will be prepared and submitted for Resource Agency review within 90 days following the completion of the field study.

APPENDIX G - DESIGN CRITERIA AND ELEMENTS OF THE LOWER SUSQUEHANNA RIVER DOWNSTREAM EEL STUDY AND SITE-SPECIFIC ROUTE- OF-PASSAGE STUDY

1. Lower Susquehanna River Downstream Eel Study

a. The Lower Susquehanna River Downstream Eel Study will consist of those elements developed by the USFWS, in consultation with YORK HAVEN and other Resource Agencies.

b. During the Lower Susquehanna River Downstream Eel Study, YORK HAVEN shall cooperate and participate by monitoring the tagged eels as they pass YORK HAVEN Project, gathering site specific data on timing and duration of silver eel migration at the Project over a period 2 or more years while the Lower Susquehanna River Downstream Eel Study is being conducted.

2. Site-Specific Downstream Eel Study

a. The Site-Specific Downstream Eel Study will consist of the following elements:

(1) The study will include a site-specific route-of-passage evaluation using radio telemetry, Didson monitoring, or other methods to evaluate the passage routes taken by silver eels migrating in the vicinity of the Project, specifically including passage via the East Channel, through the NLF Facility, over the Main Dam, down the headrace, through powerhouse turbines, and through the Forebay Sluice Gate. The Site Specific Route of Passage study will be conducted during the primary anticipated silver downstream eel passage period(s) as determined by the earlier Lower Susquehanna River Downstream Eel Study.

(2) A study of silver eel survival through the following representative Project turbines: Propeller (Units 1-6), Francis (Units 7-20). Testing shall be conducted in one representative turbine within each category via balloon tag tests or other methods approved by the Resource Agencies.

(3) An analysis based on the results of the route-of-passage and survival evaluations, as to anticipated overall downstream eel passage effectiveness at the Project.

3. Source of Silver Eels.

(a) An in-basin source of silver eel will be utilized for both the Lower Susquehanna River Downstream Eel Study and the Site-Specific Route-of-Passage Study.

(b) Current tributary stocking is conducted in Pine Creek ~165 mi upstream from YORK HAVEN Project and Buffalo Creek ~80 mi upstream from YORK HAVEN Project. These eels may be suitable for the Lower Susquehanna River Downstream Eel Study if a sufficient number of silver phase eels can be located, captured, and radio tagged.

(c) For purposes of Site-Specific Route-of-Passage Study and survival study, a local source of silver eels is needed (avoiding long transit times with higher potential for loss of tagged eels, and long distance transport of eels). For these purposes, the Resource Agencies will consider stocking of Swatara Creek and Conodoguinet Creek, major tributaries entering the Susquehanna River upstream of the Project. Such a stocking program, if commenced in 2014-15,

should result in a local supply of silver eels around the 2020 – 2025 timeframe, which would be an ideal source of silver eels for the site- specific route of passage study. The timing and performance of the Site-Specific Route- of-Passage Study is dependent upon the ability to collect and tag an adequate number of such silver eels.

4. Collection and Tagging of Silver Eels for Study.

(a) To facilitate consistency, the Parties contemplate that that the Resource Agencies will perform the collection and tagging of silver eels for studies, using similar tags and techniques; however, the USFWS cannot promise to do so.

(b) It is assumed that the Lower Susquehanna River Downstream Eel Study will utilize silver eels from Buffalo and/or Pine Creeks as these tributaries have been stocked with elvers since 2010 and will be the first available in-basin source of silver eels.

(c) The Site-Specific Route of Passage study would be performed in the year following NLF Facility completion, utilizing silver eels collected from Swatara Creek or Conodoguinet Creek.

(d) In both studies, the preference would be to collect actively outmigrating silver eels by fyke nets. Alternatively, electrofishing or other active sampling methods may be used to pursue eels. Radio tags would be surgically inserted in those eels that exhibit physical characteristics of silver outmigration (movement, size, color, eye size/darkness).

(e) All silver eels captured will be tagged with radio telemetry tags, and released at

a site agreed upon by YORK HAVEN, USFWS and PADEP, after consultation with the Resource Agencies.

(f) It is assumed that the Lower Susquehanna River Downstream Eel Study would involve tagging of approximately 100 silver eels in each of two years.

(g) For the Site-Specific Route-of-Passage study, the goal would be to collect and radio tag at least 100 and not more than 150 actively out-migrating silver eels in the months of September – November, with timing related to the start of silver eel natural migration as indicated by results from the Lower Susquehanna River Downstream Eel Study.

5. Monitoring.

(a) During the Lower Susquehanna River Downstream Eel Study, YORK HAVEN will perform monitoring via antenna arrays targeted to monitor downstream migrating silver eels at the following locations:

(i) East Channel

(ii) Main Dam

(iii) The Powerhouse Headrace Channel

(b) During the Site-Specific Route-of-Passage Study, YORK HAVEN will perform monitoring via antenna arrays targeted to monitor silver eels at the following locations:

(i) NLF Facility

(ii) East Channel Dam

(iii) Main Dam

(iv) Forebay entrance

(v) Forebay Sluice Gate

(vi) Tailrace (in an array to distinguish between Francis and Propeller Turbine Passage)

(vii) Brunner Island.

(c) In both studies:

(i) Monitoring for passage at YORK HAVEN Project would be continued until river water temperature falls to 4° C (approximately mid to late December).

(ii) If a large portion of the tagged eels are missing during the initial fall migration period, consider mobile surveys to locate eels/transmitters and possibly monitoring during spring and following fall.

(iii) During subsequent years of study, the monitoring period may be further reduced in time if data gathered indicates it is reasonable to do so without missing significant portions of the migration.

5. Analyze data and report.

(a) For the Lower Susquehanna River Downstream Eel Study, YORK HAVEN will collect, analyze and share radio telemetry data gathered at the 3 YORK HAVEN monitoring stations with the Resource Agencies within 90 days of the date of completion of the field work each year. Earlier informal sharing of preliminary data may also be arranged.

(b) For the Site-Specific Route-of-Passage Study, YORK HAVEN will collect and analyze the radio telemetry data and submit a report with a report to the Resource Agencies and FERC within 90 days of the date of completion of the

field work associated with the study.

APPENDIX H - DESIGN CRITERIA FOR EEL SURVIVAL STUDY

Eel survival studies will be performed according to balloon tagging techniques developed by Normandeau Associates, Inc. at several locations in the USA and France. Based on the frequency of individual turbine passage determined in the route of passage studies, one representative propeller unit and one representative Francis unit will be selected for testing. American eels of similar size to Susquehanna River silver eels will be tested. The number of eels tested at each representative turbine (minimum of 50 each turbine) will be sufficient to calculate appropriate statistical bounds around each survival estimate. Control eels for estimation of tagging-induced mortality will also be held for observation and subsequent adjustment of turbine mortality estimates, as appropriate.

Document Content(s)