CAPACITY-RELATED LICENSE AMENDMENT

HOLTWOOD HYDROELECTRIC PROJECT

FERC NO. 1881

EXHIBIT A

PROJECT DESCRIPTION

December 2007

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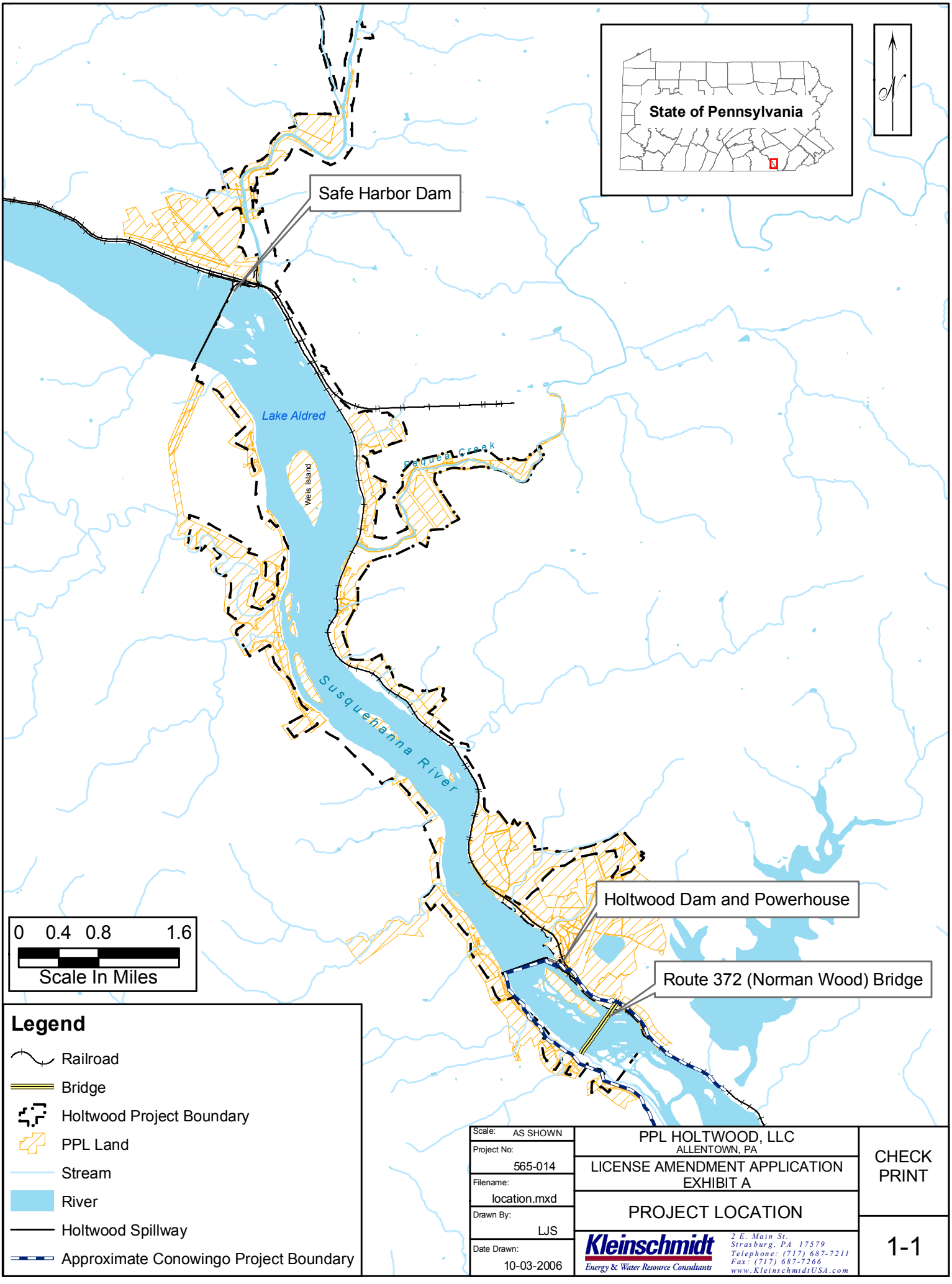
PROJECT DESCRIPTION

1.0 INTRODUCTION

The Holtwood Hydroelectric Project (Project) is an existing, licensed major hydroelectric facility owned and operated by PPL Holtwood, LLC (PPL), a wholly owned subsidiary of PPL Generation, LLC, both indirectly wholly owned subsidiaries of PPL Corporation.

The existing Holtwood Project includes 10 similarly sized hydroelectric units with a current licensed capacity of 107.2 megawatts (MW). These units are housed within a concrete powerhouse that abuts a 2368-foot long, 55-foot high dam across the lower Susquehanna River in Lancaster and York Counties in southeastern Pennsylvania (Figure 1-1). The Project is located approximately 25 miles upstream of the Chesapeake Bay, just downstream of the 418 MW Safe Harbor Hydroelectric Station (river mile 33) and upstream of the 536 MW Conowingo Hydroelectric Station (river mile 10). The 1072 MW Muddy Run pumped-storage hydroelectric station is located in between the Holtwood and Conowingo stations and uses the Conowingo pond as its lower reservoir.

The current Federal Energy Regulatory Commission (FERC) License (No. 1881) for the Holtwood Project was issued on August 14,1980 for a term of 34 years, and expires on September 1, 2014. Under this license amendment application PPL is requesting an extension of its license until September 1, 2030.



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Drawn By:	LJS
Date Drawn:	10-03-2006

PPL HOLTWOOD, LLC
ALLENTOWN, PA

LICENSE AMENDMENT APPLICATION
EXHIBIT A

PROJECT LOCATION

CHECK PRINT

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The Holtwood Project went into operation in 1910, and has essentially maintained its original configuration. Turbine runner and shaft replacements have been ongoing at the Project since 1986. PPL has replaced the runners and shafts for six of the 10 existing units (Units 3, 5, 6, 8, 9, and 10). The replacement of runners and shaft on the remaining units is scheduled in the 2009 through 2011 timeframe. In addition, the generators of Units 9, 8, and 3 were rewound in 1987, 1988, and 1991 respectively.

One significant modification was made in 1997, as part of a cooperative effort to restore American shad to the lower Susquehanna, when PPL installed a $21 million fish elevator (fish lift) at the Project. Migratory fish passage performance since installation of the fish lift has been poor.

This License Amendment Application is being filed due to PPL's proposal to perform significant modifications at the Project to increase Project generation and to resolve issues with respect to migratory fish passage. This application is based on PPL's proposed plan of operation.

Proposed modifications include:

- Construction of a new power station with two new turbines each with a maximum generating capacity of 66 MW (0.9 PF)at 60 feet net head, and a total installed capacity of 80.6 MW (0.9 PF) at best gate (maximum efficiency point) at a rated head of 50.75 feet,
- Installation of two additional smaller generating units that would be located in the turbine bays in the existing powerhouse that are currently occupied by two retired water-driven exciter units. These replacement units would have a combined additional installed capacity of 2.4 MW at best gate and 50.75 feet of head,

- Excavation in the Project tailrace and spillway to improve hydraulic conditions for generation and migratory fish passage,
- Construction of a new skimmer wall upstream of the power station, and additional forebay excavation to accommodate flow to the new generating units and to replace deteriorating infrastructure,
- Rerouting of Unit 1 in the existing powerhouse to discharge to the east spillway channel to enhance fish passage up Piney Channel,
- Reconstruction of certain components of the Project fish lift for enhanced operations and fish passage,
- Implementation of certain measures to enhance migratory fish passage and to provide for certain minimum stream flows and to undertake studies and evaluations as set forth in greater detail in a Consent Order and Agreement ("COA") between the licensee and the Pennsylvania Department of Environmental Protection ("PADEP") which COA together with its Appendix A is incorporated into this application by reference as if fully set forth. The COA is attached in Appendix A to the Initial Statement,
- Other operational, mitigation and enhancement measures as further described in this application and Appendix A to the Initial Statement, and
- Modifications to license terms and conditions to ensure consistency with the terms and conditions as contained in Appendix A to the COA.

As part of the license amendment PPL is also proposing to modify the Project's licensed capacity to reflect the addition of the new units, and completed and planned upgrades to the existing generating units at the Project.

In addition to the modification proposed as part of the Project, PPL will file a separate license amendment application to transfer Project lands to Lancaster County Conservancy as part of an agreement to create a sustainable endowment fund for future lands maintenance and preservation, in support of state and regional greenways and heritage interests.

Proposed modifications to the license are described in greater detail in Section 5.0 below.

The information in this License Amendment Application is required by the FERC under the Code of Federal Regulations Part 18, § 4.201. This exhibit provides a detailed description of the Project. Additional drawings showing details of the existing and proposed Project structures and the Project area are included in Exhibits F and G of this License Amendment Application, respectively. All references to elevations in this application are to the United States Geological Survey North American Vertical Datum (NAVD) of 1988. A brief summary of existing Project characteristics is shown in Table 1-1 below.

Table 1-1. Existing Holtwood hydroelectric Project summary.

DESCRIPTION	
General Information	
FERC Number	1881
License Effective Date	August 1980
License Expiration Date	September 1, 2014
Licensed Capacity	107,200 kW
Project Location	Susquehanna River, Lancaster and York counties, PA
Total Area Encompassed by Existing Project Boundary (land and water)	6,325 acres
Acres of Water Within Existing Project Boundary	3,114 acres
Acres of Land Within Existing Project Boundary	3,211 acres
Drainage Area	26,800 mi^2
1. Dam	
Start Date of Construction	1906
In-Service Date	1909
Construction Type	Concrete Gravity
Elevation Top of Permanent Dam	165.0 ft
Elevation top of Rubber Dam/Flashboards	169.75 ft
Minimum Foundation Elevation	110 ft
Height of Dam	55 ft
Total Length of Water Retaining Structures	3,075 ft
Length of Spillway (total)	2,368 ft
Hazard Classification	Low
Spillway Capacity -Top of Boards (El. 169.75 ft)	80,000 cfs
Maximum Spillway Capacity - Top of Gatehouse Floor (El. 185 ft –)	1,000,000 cfs
2. Upper Pool (Lake Aldred) - General Information	
Length of Impoundment	Approximately 8 mi
Pool Elevations: Maximum without spill	169.75 ft
Minimum May 15 to September 15	167.5 ft
Minimum September 16 to May 14	163.5 ft
Gross Storage: Permanent Crest Elevation (165 ft)	42,850 acre-ft
Top of Flashboards (169.75 ft)	54,768 acre-ft
Usable Storage Capacity Between 169.75 & 163.5	15,224 acre-ft

DESCRIPTION	
Surface Area (at El. 169.75)	2,648 acres
Miles Shoreline (including tributaries at El. 169.75)	44 mi
Number of PPL Owned Boat Launch ramps	4
Water Temperature Range:	
Average Summer Maximum	81ºF
Typical Winter Minimum	33ºF

3. Powerhouse

Length (Superstructure)	500 ft
Width (Superstructure)	176 ft
Height	147 ft
Minimum Foundation Elevation	83.0 ft
Top of Roof	229.75 ft
Construction Type (Superstructure)	Concrete w/ steel framed roof
Construction Type (Substructure)	Concrete
Draft Tube Crest Elevation	101.0 ft
Draft Tube Invert Elevation	86.0 ft
Generator Operating Floor Elevation	151.0 ft
Gross Head at Normal Maximum Pool Elevation	50.75 ft
Normal Tailwater Elevation (Full Generation)	118.7 ft
Intake Openings: Number of Openings	42
Crest Elevation	157.0 ft
Invert Elevation	141.0 ft
Gate Opening	6.25 ft by 16 ft high
Total Area of Trash Racks per Unit:	
Francis Units (10)	2140 ft^2
Exciter Bay Units (2)	480 ft^2
Invert Elevation	129.75
Grating Opening	4 in
Indoor Powerhouse Bridge Crane	135 tons/10 tons
Indoor Gatehouse Bridge Crane Capacity (West Crane)	15 tons/3 tons
Indoor Gatehouse Bridge Crane Capacity (East Crane)	25 Tons

4. Turbines

Rated Net Head Units: (1, 2, 4),	53 ft
(5),	51 ft
(3, 6, 8, 9),	61.25ft
(7, 10)	62 ft

Turbines: 7 Double Runner & 3 Single Runner	
Manufacturer (original)	I.P. Morris
Type	Francis
Rated Discharge Capacity: Maximum Theoretical	31,500 cfs total

5. Generators

Total Generating Capacity	112.5 MW
Manufacturers (original):	General Electric (Units 1- 5), Westinghouse (Units 6-10)
Power Factor	0.8, (0.9 Unit 3)
Voltage	13,200
Number of Phases	3
Frequency	60 Hz
Average Annual Generation	595,000 MWh

6. Transformers

Transmission Voltage	69 KV

7. Flood Flow - Flashboards Down/Rubber Dam Deflated

10 Year Flood: Headpond Elevation	176.2 ft
P.H. Tailwater Elevation	135.4.0 ft
Flow	445,000 cfs
50 Year Flood: Headpond Elevation	180.0 ft
P.H. Tailwater Elevation	142.7 ft
Flow	670,000 cfs
100 Year Flood: Headpond Elevation	182.0 ft
P.H. Tailwater Elevation	145.4 ft
Flow	760,000 cfs
500 Year Flood: Headpond Elevation	186.9 ft
P.H Tailwater Elevation	155.8 ft
Flow	1,170,000 cfs
Probable Maximum Flood:	
Headpond Elevation	193.2 ft
Tailwater Elevation	172.0 ft
Flow	1,750,000 cfs
Flood of Record: Flow (1972)	1,098,000 cfs

8. Tailwater Conditions

Piney Channel (below Dam)	
Maximum Water Elevation (PMF):	172.0
Normal Water Elevation (Non-spill condition)	110.0
Main Tailrace	
Maximum Water Elevation (PMF)	158.0
Normal Plant Tailwater Elevation (Max. Generation)	118.7
Normal Plant Tailwater Elevation (No Generation)	108.5

2.0 PROJECT LOCATION

The Project is situated approximately seven miles north of the Pennsylvania/ Maryland border, and is one of five hydroelectric projects located along the lower Susquehanna River. Four of these projects are mainstem dam projects and one (Muddy Run) is a pumped storage station that uses the Conowingo Pond as its lower storage pond. Moving from downstream to upstream, these Susquehanna River hydroelectric projects are:

Project	FERC Project No.	Owner	Approx. River Mile	Generating Capacity MW
Conowingo	405	Exelon	10	536
Muddy Run	2355	Exelon	23	1,072
Holtwood	1881	PPL	25	107
Safe Harbor	1025	Safe Harbor Water Power Corp.	33	418
York Haven	1888	FirstEnergy	54	20

Source: FERC http://www.ferc.gov/industries/hydropower/gen-info/licensing//licenses.xls

Accessed: January 19, 2005.

3.0 PROJECT LANDS AND BOUNDARY

The existing Project boundary is shown on Figure 1-1, and in Exhibit G. The total land area within the Project boundary is approximately 6,320 acres, which is almost entirely owned by PPL. PPL owns flooding rights on 4,100 acres within the Project boundary. Lake Aldred covers approximately 2,648 acres at a lake elevation of 169.75. The area below the Holtwood dam and powerhouse is within the Project boundary of both Holtwood and the downstream Conowingo Project (FERC No. 405) which is owned and operated by Exelon. The Conowingo Dam creates backwater conditions that extend up to the base of the Holtwood powerhouse, and both PPL and Exelon own select lands parcels and islands within the joint Project boundary area. PPL and Exelon have entered into a joint flooding rights agreement and backwater agreement with respect to the joint Project lands. Each individually manages and maintains land parcels under its ownership.

In addition, PPL will file a separate license amendment application to modify the Project boundary to exclude lands not required for the continued operation of the Project. Under the terms of a separate agreement with the Lancaster County Conservancy PPL will: 1) retain sufficient property rights to operate the Project as described in this application, 2) continue to operate and maintain existing designated recreation areas within the Project boundary, with the exception of maintenance of recreational trails, and 3) have default responsibility under its license to ensure that recreational trails are being adequately maintained.

4.0 EXISTING PROJECT STRUCTURES

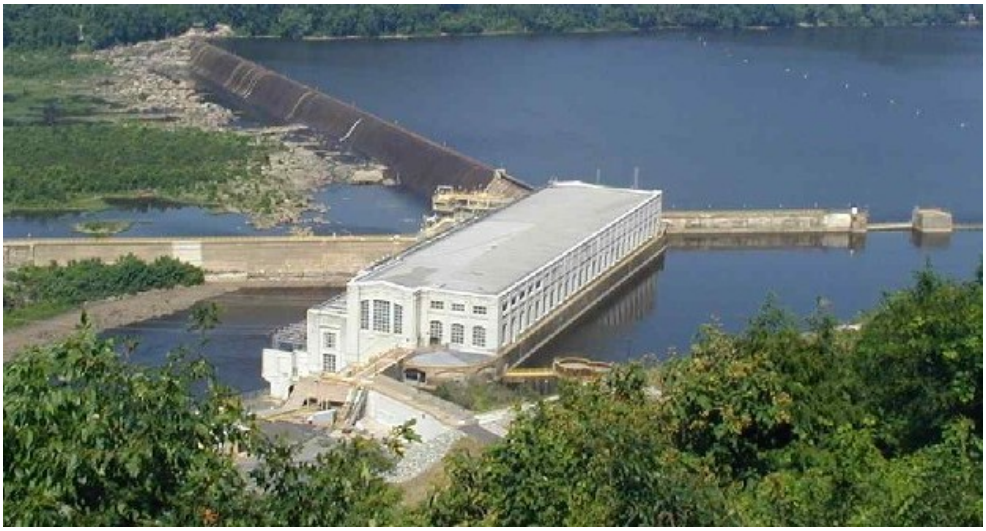
4.1 EXISTING HOLTWOOD DAM

The Holtwood dam is an overflow-type structure that consists of a 2,368 ft long by 55 ft high, low hazard, concrete gravity dam with a spillway crest at El. 165.0 ft, and a 24 foot wide pier and fish lift exit channel at its eastern end. The 2368 ft long spillway section of the dam is raised to an effective elevation of 169.75 ft via the use of wooden flashboards and inflatable rubber dam sections. The inflatable rubber dam sections include a 40 ft long by 10 ft high section on the east side of the dam near the fish lift exit and a 300 ft long by 4.75 ft high section installed adjacent to the 10 ft high segment and separated by an intermediate pier. Both of these inflatable dams were installed in 1996. Two additional 387-ft long by 4.75 ft high sections and an additional intermediate pier were installed in 2001. All of these rubber dams are used for control of Project spills.

Since 2004, PPL Holtwood has been installing 200 ft. of 6 ft. high flashboards from the York County abutment as a measure of public safety. Members of the public who go out on the river bottom directly below the dam do not always heed the river warning system and leave when spill over the flashboards is imminent. The additional flashboard height allows for safe egress over to the York County shore. The remaining 1,026 linear ft of dam crest still utilizes the original 4.75 ft high steel pin supported wooden flashboards. At present, rubber dam sections 2 and 3 have failed and are not repairable. Flashboards have been installed in front of these sections in order to maintain lake elevations. This increases the amount of flashboards by another 687 ft. PPL anticipates the continued use of wooden flashboards until such time as the root cause of inflatable rubber dam failures can be determined and corrected.

At the western end of the dam is a non-functional fish ladder that was constructed in 1914. At that time fish passage technology was immature and the facility was never successful in passing American shad. The facility was abandoned in place around 1920.

Photo 4-1. Holtwood powerhouse and dam (taken from east side of river).



4.2 EXISTING POWERHOUSE

The existing Project powerhouse is located on the east side of the river along the Lancaster County shoreline (Figure 1-1 and Photo 4-1). The powerhouse is a manned station that is locally operated by PPL and is 500 ft long, approximately 176 ft wide, and 147 ft tall. The concrete structure contains 10 similarly sized vertical Francis turbine – generator units with a total generator nameplate capacity of 112.5 MW[1], and a hydraulic capacity of 31,500 cfs. Discharge from the turbines flows into an approximately one mile long tailrace that runs along the Lancaster County shore. The Project has an average annual energy production of approximately 595,000 MWh per year.

[1] The existing station has a maximum operating output of approximately 110 MW when all units are in service due to backwater from the Conowingo Pond (normal pond El 108.5) and hydraulic constrictions in the tailrace that cause the head to decrease by as much as 10 feet at full station capacity.

Historically two water-driven direct-current exciter units provided station electrical service. In 1996 and 1999 these units were retired and replaced by static excitation systems.

The proposed addition of the new power station and additional generating capacity discussed in Section 5.2 below would nearly double the amount of water that would pass down the tailrace when the Project is generating at full capacity. It is expected that after construction, the net head that would be experienced at maximum generation of both the existing and proposed units with no spill over the dam would be approximately 50.75 feet, which is up to 12.25 feet less than the manufacturer's rated head of some of the existing units. These units were set in place over 90 years ago prior to backwater conditions resulting from the construction of the Conowingo Dam in 1928.

4.3 EXISTING PROJECT TAILRACE

The Project tailrace is separated from the main river channel area by Piney and Barkley Islands, and a concrete deflection wall that extends from the dam to the upper end of Piney Island. The deflection wall has a top elevation of 155.0 ft and serves to prevent high water conditions in the tailrace during periods of Project spill. The existing tailrace to the Project receives the discharge from all ten of the hydroelectric generating units and rejoins the main stem of the Susquehanna River approximately 6,500 ft downstream of the powerhouse. Under normal conditions the tailrace varies in water depth from approximately 8 ft to over 70 ft deep over its entire length and averages approximately 200 ft wide. The normal operating water level in the tailrace during periods of non-generation is approximately 108.5 ft, due to backwater from the Conowingo pond. During generating periods, the normal maximum tailwater level increases to 118.7 ft.

4.4 EXISTING SKIMMER WALL AND FOREBAY

The forebay to the Project is protected by a 600-foot long skimmer wall. The skimmer wall blocks and diverts the majority of the ice and floating debris away from the intake of the powerhouse and directs it over the dam. The skimmer wall is a straight structure that extends from the northwest corner of the powerhouse to the Lancaster County shore. The top elevation of the concrete portion of the skimmer wall is 187.0 ft, and it extends down to approximate El 158 ft, which is approximately 12 ft below the normal maximum water surface elevation. It is based on a number of piers founded on timber crib sections and also contains two floating timber boom sections having lengths of approximately 100 and 200 feet. The draft of each of the floating booms is approximately seven and one-half feet below the water surface. At normal maximum lake elevation, the forebay surface area is approximately 5.28 acres in size and is approximately 50 - 60 ft deep.

4.5 EXISTING FISH LIFT

A fish lift was placed in service at the Project in the spring of 1997 to facilitate the upstream migration of American shad and River herring. It was designed to pass 2,700,000 American shad and 10,000,000 river herring and is located along the deflection wall between the powerhouse and dam. The fish lift has three downstream entrances, one on the spillway side of the deflection wall and two in the tailrace. Internally the fish lift has two crowder drives and hoppers that feed a common exit channel that discharges into Lake Aldred immediately upstream of the dam on the lake side of the skimmer wall. All attraction water for fish lift operations is presently provided from Lake Aldred through the fish lift exit channel. The current attraction water flow arrangement has been problematic due to the creation of hydraulic vortices in the fish lift exit channel.

4.6 EXISTING FISH LIFT ATTRACTION WATER SUPPLY

The fish lift has a design capacity of 800 cfs to supply attraction flows to the three entrances (300 cfs for both Entrance A and B individually (Tailrace side) and 200 cfs for Entrance C (Spillway side)). Currently the 800 cfs enters the fish trough through the upstream fish lift exit gate and is split between two separate intakes located in the trough floor which transfer the water to the distribution piping system. These include:

- One 770 square foot floor intake with grating and baffles located just upstream of the fish lift counting room, and
- A similar 314 square foot floor intake located at the furthest end of the fish trough.

Due to the flow velocity at 800 cfs and the physical geometry of the exit trough, counting room screens, and the floor diffuser, the design capacity can not be achieved without unacceptable vortices developing within the existing fish lift exit trough. Currently, the existing upstream attraction water entrance (fish lift exit) can only handle a maximum entrance flow of 500 cfs at a normal headpond of 169.75 feet before vortices begin to develop. Entrance flows of approximately 450 cfs are typically used during operation to avoid vortex problems. These flows thus reduce the amount of attraction flow that each entrance can discharge and may correspondingly reduce the ability of the fish to locate the entrances.

5.0 PROPOSED PROJECT STRUCTURES

5.1 PROPOSED HOLTWOOD DAM MODIFICATIONS

PPL is proposing a replacement of the 10 foot high by 40 foot long rubber dam segment with an in-kind bladder, or redesign of this spillway segment to include a new spillway sluice gate and trippable flow gate. Neither alternative will reduce the Project's spill capacity during flood events. As noted in Section 4.1, PPL continues to experience failures of the inflatable bladder sections on the spillway crest. Currently the 300 foot and one 387 foot length of rubber bladders have failed and flashboards are being used to maintain lake elevation. The 10 foot high rubber bladder has also been repaired but requires replacement. PPL has been consulting with the rubber dam manufacturer regarding these failures, however, the root cause of these problems has yet to be determined. PPL is currently investigating the costs and benefits of alternative crest control measures and anticipates the inclusion of new crest control structures in the final Project design.

5.2 PROPOSED NEW POWER STATION

PPL is proposing to construct a new power station adjacent to the existing powerhouse on the Lancaster County side of the river in an area previously occupied by an 80 MW coal-fired generating station. The steam station was demolished in 2000, creating the physical space necessary for the proposed new power station. A photo of the steam station in the 1950s is included as Photo 5-1. The construction of the new power station would require significant excavation of rock and soil upstream, downstream and adjacent to the existing powerhouse.

Photo 5-1. Steam station that occupied area of current proposed development.

The proposed new power station superstructure would be approximately 240 ft wide and 130 ft long and would house two vertical Kaplan turbines that each have an output of 40.3 MW at its most efficient operating point at the rated head, giving a total installed capacity of the new power station of 80.6 MW. The new power station would have a separate intake and trashrack setup from the existing powerhouse. Preliminary design drawings of the proposed power station can be found in Exhibit F of this license application.

In addition to the new power station, PPL is proposing to install two new small vertical Francis turbine-generator units in the existing turbine bays occupied by two retired water driven exciter units in the existing powerhouse. These auxiliary units would each have an installed capacity of 1.2 MW and a hydraulic capacity of 300 cfs. Preliminary design drawings of these new units are provided in Exhibit F.

5.3 PROPOSED MODIFICATIONS TO PROJECT TAILRACE

The addition of approximately 30,000 cfs to be discharged through the new proposed turbines mentioned in Section 5.2 requires that the tailrace to the Project be enlarged to accommodate the water in order to maintain the 50.75 feet net operating head on the existing and new units. The proposed excavation attempts to minimize tailrace velocity within the constraints of the available space by removing hydraulic constrictions along the shorelines and the tailrace bottom. The preliminary excavation plan has been developed in cooperation with both state and federal resource agencies, and has been designed to avoid where possible any direct impacts to sensitive environmental/ archeological areas. Final excavation plans will be developed in accordance with the COA. Most of the excavation within the tailrace would be below waterline limiting aesthetic impacts to the area.

The proposed modifications to the tailrace would widen and deepen the channel, which would help to alleviate backpressure on the turbines by reducing the velocity and hydraulic losses, and therefore would optimize the electrical generation capabilities of the hydroelectric units. The expansion of the channel would also create reduced velocity conditions that are expected to enhance upstream passage by migratory species. The expected effects of the tailchannel excavation on fish migration in the tailrace are discussed in Exhibit E of this license application.

5.4 PROPOSED REROUTING OF UNIT 1 TO EAST SPILLWAY CHANNEL

As is described in Exhibit E of this license application, PPL is proposing numerous modifications at the site to help facilitate the migration of anadromous fish over the dam. One such modification is to add an extension to the draft tube of existing Unit number 1 in order to route the unit's discharge under the plant's deflection wall and into the Piney Channel, on the east side of the spillway. This potential addition of up to approximately 3,150 cfs into Piney Channel is expected to help attract upstream migrating fish to that channel and into the spillway fish lift entrance. A conservation flow to Piney Channel will be determined in accordance with the procedures in the COA.

The proposed draft tube extension consists of two concrete passages that are approximately 153 ft long, extending from the downstream end of the original draft tube and exiting below the diversion wall under its west face. The passages are about 15.5 ft wide by 17 ft tall and are separated by a 2 foot thick concrete center pier. The downstream end of the draft tube extension would have two bulkhead gates measuring 19.8 ft wide by 18.9 ft tall. The gates would be used in conjunction with a pump room, located near the mid-section of the draft tube extension, to dewater the passages for maintenance and inspection.

A discharge channel will be constructed downstream of the unit one draft tube exit a distance of approximately 140 feet to improve channel conveyance and reduce backwater on the unit.

5.5 PROPOSED NEW SKIMMER WALL

The existing skimmer wall and its timber crib piers are nearing the end of their useful life and it is inadequately sized because of the restricted arched openings to handle the proposed Project’s increased flow. As part of the Project redevelopment, PPL is proposing to replace the existing skimmer wall with a new concrete skimmer wall and to

excavate the forebay area to provide the required flow area for the new generating units. The new skimmer wall would tie into the main dam at the same location as the existing skimmer wall and would run from the existing main dam upstream for approximately 600 feet to the Lancaster shore along the same alignment as the existing skimmer wall (see Figures 1.4 - Existing Plan & Section of Skimmer Wall and 2.7 - Proposed New Plan & Section of Skimmer Wall in Exhibit F of this license application). The most downstream skimmer wall pier would be built into the existing dam. A total of six concrete piers would be spaced at 100 foot centers at a 100 degree angle to the main dam.

The new skimmer wall would maintain fundamentally the same basic elevations as the existing skimmer wall such that the top elevation would be 187.0 ft, and it would extend down to elevation 157.5 ft, approximately 12.25 ft below the normal maximum water surface elevation. Unlike the existing wall, the proposed skimmer wall would include a full-length roadway for improved access along the wall and the upper end of the fish passage facility. The existing fish lift exit channel would be unaffected by the new skimmer wall arrangement.

The proposed forebay design will require approximately 363,000 cy of excavation. The existing maximum forebay depth would not change but the surface area of the forebay would increase from about 5.8 acres to 11.4 acres as a result of excavation inland for the new power station approach area to an invert between EL 130 ft to 140 ft (average depth of 30-40 feet). The new excavation is designed to increase the flow capacity of the forebay to accommodate the installation of the proposed turbines.

5.6 PROPOSED FISH LIFT ATTRACTION WATER SUPPLY

The proposed construction would increase the amount of attraction flow by at least 300 cfs to return the attraction flow capacity to its original design intent. The construction would include a new intake pipe that would draw water directly from the

forebay through a screened entrance behind the new skimmer wall. The new intake pipe would be sized to provide at least 650 cfs directly from the forebay into the distribution system piping. This would allow for a trough flow of only 150 cfs which would reduce the fish lift trough velocity from 3.3 fps at 500 cfs to 1.1 fps making it easier for the fish to exit the fish lift system. The 150 cfs would continue to enter the 314 square foot floor intake and be added to the 650 cfs in the distribution system to produce a total of at least 800 cfs of attraction water. Use of the existing 770 square foot floor intake would be discontinued but the intake would be left intact to serve as a backup if maintenance is required on the new entrance piping.

5.7 OTHER PROPOSED FISH LIFT MODIFICATIONS

PPL is also proposing to modify the existing fish lift entrance C located below the Project dam. This entrance's leaf gates have been subject to repeated damage during flood events and are currently not functioning. An improvement and modification of the entrance is required to prevent repeated damage of the gates during flood events therefore improving the reliability of the fishlift system. In addition, fish lift construction plans and operations will be finalized as part of the Fishway Operation Procedure manual provided for under the COA.

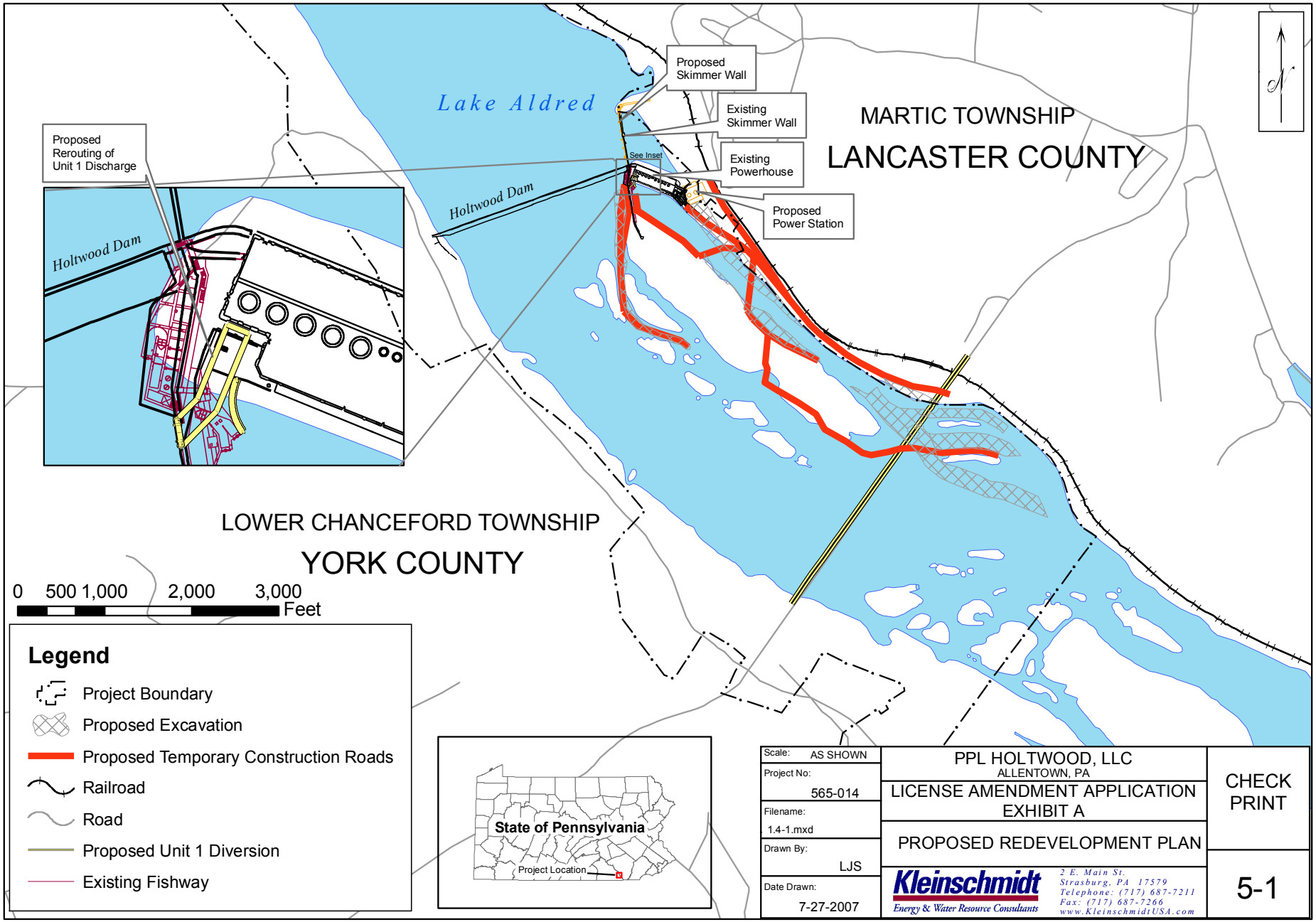
The tailrace crowder's travel limits will also be extended in an attempt to allow the crowder to traverse beyond an area of the entrance where shadows appear to discourage migratory fish from entering the tailrace fish lift entrances. Eel ramps and PIT tag readers will also be installed at the fish lift in accordance with the COA.

5.8 PROPOSED RECREATIONAL ENHANCEMENTS

As part of the Project redevelopment PPL is proposing to undertake the following recreational improvements at the Project:

- Construction of a new elevated roadway over the Norfolk-Southern track along the Lancaster County shore for enhanced and safer public access to the Project tailrace and river corridor lands,
- Construction of a new public parking area along the Lancaster shore and reconstruction of the tailrace fishing area,
- Enhanced parking along the township road in York County and the construction of improved trail access to the river below the dam,
- Extension of the boat ramp at the York Furnace boat launch to improve the ramps utility on a year-round basis,
- Improvements to the Pequea Creek boat launch area, including the replacement of the boat ramp that will be eliminated as a result of PA Department of Transportation construction in the area, and
- Funding for the construction of whitewater boating features.

In addition to the modification proposed as part of the Project, PPL will file a separate license amendment to transfer approximately 3,500 acres of land to the Lancaster County Conservancy and the Lancaster York Heritage Region for management as a public trust. PPL will donate the proceeds from the transfer ($5,000,000) to create a sustainable endowment fund. Additional contributory funding to the endowment fund is also proposed without escalation for 22 years through 2030.


Lake Aldred
Proposed Skimmer Wall
Existing Skimmer Wall
Existing Powerhouse
Proposed Power Station
See Inset
Holtwood Dam
Holtwood Dam
Proposed Rerouting of Unit 1 Discharge
MARTIC TOWNSHIP
LANCASTER COUNTY
LOWER CHANCEFORD TOWNSHIP
YORK COUNTY
0 500 1,000 2,000 3,000
Feet
Legend
Project Boundary
Proposed Excavation
Proposed Temporary Construction Roads
Railroad
Road
Proposed Unit 1 Diversion
Existing Fishway
State of Pennsylvania
Project Location
Scale: AS SHOWN
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Drawn By: LJS
Date Drawn: 7-27-2007
PPL HOLTWOOD, LLC
ALLENTOWN, PA
LICENSE AMENDMENT APPLICATION
EXHIBIT A
PROPOSED REDEVELOPMENT PLAN
CHECK PRINT
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5-1

6.0 RESERVOIR CHARACTERISTICS

Lake Aldred was formed by the construction of the Holtwood dam and extends up the Susquehanna River a distance of approximately eight miles to the base of the Safe Harbor Hydroelectric Project. The lake is currently managed to maintain a minimum operating level of El. 167.5 ft from May 15th through September 15th to support lake recreational uses and access. The minimum operating level during the balance of the year is El. 163.5 ft, which is based on the hydroelectric station's fire protection water intake requirements. The lake's current maximum useable storage capacity is 15,224 acre-ft between the top of dam flashboards (El. 169.75 ft) and El. 163.5 ft. This is equivalent to 184,210 cfs-hours of stored water that is only enough to support approximately six hours of operation of the existing generating station at full capacity. Additional information on Lake storage and seasonal lake level management is provided in Exhibit B of this License Application.

7.0 TURBINES AND GENERATORS

7.1 EXISTING TURBINES AND GENERATORS

Historically two water-driven direct-current and two motor-generator direct-current exciter units provided station DC electrical service. In 1996 and 1999 the two water-driven direct-current units were retired, using the motor-generator direct-current exciter units until they could be replace by DC rectifiers. The DC rectifiers were placed in-service in 2001 to provide the remaining small DC electric energy requirements within the plant. PPL is proposing as part of this license amendment to install two new AC turbine generator units in the existing exciter unit bays, each designed to produce 1.2 MW of generation at best gate. These potential new units are described in Section 7.2 below.

PPL has replaced the runners and shafts for six of the 10 existing units (Units 3, 5, 6, 8, 9, and 10), and these operate with efficiencies in the range of 87-92%. The four remaining units are estimated to have efficiencies in the 70-85% range. The replacement of runners and shafts on the remaining units is scheduled in the 2009 through 2011 timeframe. Runner and shaft replacements on Units 1 and 2 is expected in 2009 coincident with units outages expected to be required to reroute Unit 1 to the Piney Channel as part of the proposed redevelopment plan. Units 4 and 7 are currently scheduled for runner and shaft replacements in 2010 and 2011 respectively.

The cumulative hydraulic capacity of the existing generating units is theoretically 31,500 cfs, but the units typically operate at a lower rate of release. The minimum operating discharge of each unit varies from about 1,200 to 1,500 cfs.

In combination with runner and shaft replacements on Units 3, 8, and 9, PPL has also completed generator stator rewinds on these units which resulted in an increase in generator nameplate capacity. Tables 7.1 and 7.2 provide a summary of historical and current turbine and generator data.

Table 7-1. Installed capacity - based on original turbine/generator nameplate data.

	Turbines				Generators				
Unit	**Original Installation Date**	**Original Rated Head (Nameplate)**	**Original Nameplate Horsepower Rating**	**KW**	**Volts**	**Amps**	**KVA Rating**	**KW Rating**	**Installed Capacity KW**
1	1910	53	13,500	10,125	13,200	569	13,000	10,400	10,125
2	1911	53	13,500	10,125	13,200	569	13,000	10,400	10,125
3	1911	53	13,500	10,125	13,200	569	13,000	10,400	10,125
4	1911	53	13,500	10,125	13,200	569	13,000	10,400	10,125
5	1911	53	13,500	10,125	13,200	570	13,000	10,400	10,125
6	1912	62	17,000	12,750	13,200	568	13,000	10,400	10,400
7	1913	62	17,000	12,750	13,200	568	13,000	10,400	10,400
8	1914	63 (net)	16,500	12,375	13,200	568	13,000	10,400	10,400
9	1924	62 (net)	20,000	15,000	13,200	655	15,000	12,000	12,000
10	1924	62 (net)	20,000	15,000	13,200	655	15,000	12,000	12,000
11	1910	53	1,000	750	500	250	2,000	500	500
13	1910	53	1,000	750	500	250	2,000	500	500
								Total =	**106,825**

Table 7-2. Existing Holtwood hydroelectric station turbine best gate and generator nameplate data.

	Turbines				Generators					
Unit	**Retirement or Upgrade Date**	**Rated Head - Upgraded (Nameplate)**	**Calculated Horsepower at Best Gate and Rated Head**	**KW**	**Retirement or Upgrade Date**	**Volts**	**Amps**	**KVA Rating**	**KW Rating**	**Current Installed Capacity KW**
1	-	53	12,667	9,500	-	13,200	569	13,000	10,400	9,500
2	-	53	12,667	9,500	-	13,200	569	13,000	10,400	9,500
3	1990	61.25	18,267	13,700	1991	13,200	656	15,000	13,500	13,500
4	-	53	12,667	9,500	-	13,200	569	13,000	10,400	9,500
5	2002	51	12,400	9,300	-	13,200	570	13,000	10,400	9,300
6	1991	61.25	18,267	13,700	-	13,200	568	13,000	10,400	10,400
7	-	62	12,000	9,000	-	13,200	568	13,000	10,400	9,000
8	1989	61.25	16,267	12,200	1988	13,200	625	14,300	11,440	11,440
9	1987	61.25	19,733	14,800	1987	13,200	720	16,500	13,200	13,200
10	2007	50.75	18,816	14,112	-	13,200	655	15,000	12,000	12,000
11	1996	N/A	N/A	N/A	1996	N/A	N/A	N/A	N/A	N/A
13	1999	N/A	N/A	N/A	1999	N/A	N/A	N/A	N/A	N/A
									Total =	**107,340**

7.2 PROPOSED TURBINES AND GENERATORS

PPL is proposing to install two vertical Kaplan turbine generator sets in the new power station previously described in Section 5.2. Both five-blade, 85.7 rpm runners would be 282 inches in diameter and would be equipped with features that would also be conducive to safe fish passage such as a limited number of wicket gates and stay vanes, a minimized wicket gate overhang, and combined spherical and cylindrical interface between the runner and discharge ring to limit the gaps between the two components.

The modern turbine design would develop maximum and minimum efficiencies of 94.75% and 77.5% respectively (minimum efficiency is the unit efficiency at minimum flow and minimum head). Additionally each runner would have a maximum hydraulic capacity of 15,000 cfs at a rated head of 50.75ft (head developed with full existing and proposed station flows). Under best gate and rated head conditions each unit would generate 40.3 MW of power. The minimum operating discharge of each unit is about 3,000 cfs. A table detailing the rated generator nameplate data is shown in Table 7-3. The installed capacity of the new units would be governed by the turbine horsepower at the rated head and would be limited to 80.6 MW.

Figure 2.6-2 in Exhibit B of this License Amendment Application shows the minimum, rated, and maximum output vs. flow graph for the new Kaplan units.

Table 7-3. Proposed Holtwood hydroelectric station generator rated nameplate data.

Unit	Manufacturer	Volts	Amps	KVA Rating	KW Rating
18	Voith-Seimens	13,200	2,804	64,100	57,690
19	Voith-Seimens	13,200	2,804	64,100	57,690

As previously noted PPL is proposing to replace two decommissioned water driven exciter units located in the center of the existing powerhouse with two vertical Francis units. The two runners would be approximately 52 inches in diameter and have a hydraulic capacity of 300 cfs at a rated head of 50.75 ft. At the rated head and flow each individual proposed unit would be capable of generating 1.24 MW. The units would also be equipped for black start capability. A table detailing the rated auxiliary unit's generator nameplate data is shown in Table 7-4.

Table 7-4. Holtwood hydroelectric station proposed auxiliary generator preliminary nameplate rated data.

Unit	Manufacturer	Volts	Amps	KVA Rating	KW Rating
11	TBD	13,200	54.7	1,390	1,250
13	TBD	13,200	54.7	1,390	1,250

As part of this license amendment PPL is proposing to increase the authorized installed capacity of the existing Project by an amount to be determined after turbine manufacturer performance data is provided for the planned runner and shaft replacements on Units 1, 2, 4, and 7. These units would each have a nameplate rated head of 50.75 ft which is based on a full pond elevation of 169.75 ft, expected tailwater levels of approximately 118.5 ft under existing and proposed conditions, a normal Conowingo pond level of 108.5 ft, and hydraulic losses of 0.5 ft.

Table 7.5 provides a summary of proposed unit installed capacity ratings based on information currently available to PPL.

Table 7-5. Proposed installed capacity after new unit installation and additional runner and shaft replacements.*

	Turbines*				Generators					
Unit	**Upgrade Date**	**Rated Head - Upgraded (Nameplate)**	**Horsepower at Best Gate and Rated Head****	**Calculated KW****	**Upgrade Date**	**Volts**	**Amps**	**KVA Rating**	**KW Rating**	**Proposed Installed Capacity KW**
1	2009	50.75	TBD	TBD	-	13,200	569	13,000	10,400	TBD***
2	2009	50.75	TBD	TBD	-	13,200	569	13,000	10,400	TBD***
3	1990	61.25	18,267	13,700	1991	13,200	656	15,000	13,500	13,500
4	2010	50.75	TBD	TBD	-	13,200	569	13,000	10,400	TBD***
5	2002	51	12,400	9,300	-	13,200	570	13,000	10,400	9,300
6	1991	61.25	18,267	13,700	-	13,200	568	13,000	10,400	10,400
7	2011	50.75	TBD	TBD	-	13,200	568	13,000	10,400	TBD***
8	1989	61.25	16,267	12,200	1988	13,200	625	14,300	11,440	11,440
9	1987	61.25	19,733	14,800	1987	13,200	720	16,500	13,200	13,200
10	2007	50.75	18,816	14,112	-	13,200	655	15,000	12,000	12,000
11	2009	50.75	1,573	1,180	2009	13,200	54.7	1,390	1,250	1,180
13	2009	50.75	1,573	1,180	2009	13,200	54.7	1,390	1,250	1,180
18	2011	50.75	53,733	40,300	2011	13,200	2,535	64,389	57,950	40,300
19	2011	50.75	53,733	40,300	2011	13,200	2,535	64,389	57,950	40,300
									Total =	TBD***

* *Runner and shaft replacements on Units 1,2,4,and 7, are planned between 2009 and 2011. All turbines at the Project will be rated at a net head of 50.75 feet which corresponds to a Project net head at full pond (El 169.75) and existing and expected full load tailwater levels, based on a normal Conowingo Pond Elevation of 108.5 and a hydraulic head loss of 0.5 feet. No additional generator rewinds are currently planned.*

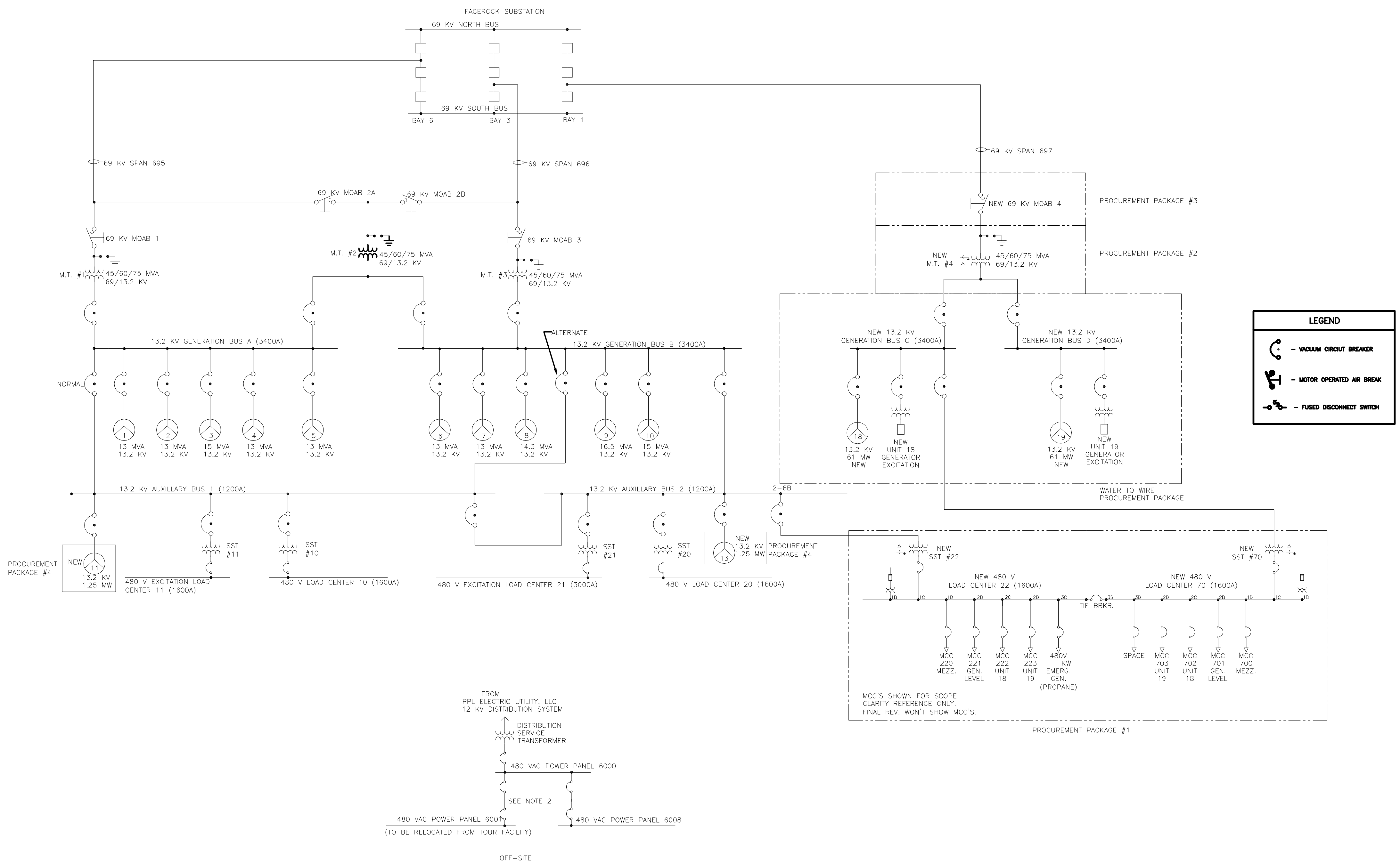
** *Turbine horsepower and KW at best gate will be computed when upgraded turbine performance data is provided by the manufacturer. TBD=To Be Determined.*

*** *The installed capacity for Units 1, 2, 4, and 7 will be less than the current FERC authorized installed capacity due to new planned nameplate ratings at a lower rated head.*

8.0 TRANSMISSION SYSTEM

The existing station 13.2 kV generation is connected to the 69 kV transmission system through three 45/60/75 MVA transformers. Two of the transformers are individually connected to one of the two 13.2 kV, 75 MVA generation bus, each serving five generators or half the station capacity. The third transformer is connected as a standby to each of the two busses. All switching operations are performed by the plant operations personnel. As part of the proposed redevelopment, the fourth 90/120/150 MVA transformer would be installed and dedicated to the two new 64.1 MVA generators.

Project generation is transmitted to the 69 kV transmission grid through the Face Rock Substation which is located in Lancaster County on the hillside above the plant. A PJM Interconnection study has indicated that there would be projected stability concerns for the additional 140 MW. The Direct Connection Requirements are that the Holtwood-Face Rock 697 span would be rebuilt and reconnected with 1133ACSR (156MVA) conductors to accommodate the addition of fourth transformer (MT4). The Holtwood-Face Rock 696 span will have new Optical Ground Wire (OPGW) installed and the 695 span will remain as is. A new substation and dead-end structure would be constructed at the new units for the 697 span. The dead-end structures for the 695, 696, and 697 spans will serve as the Points of Interconnection (POI) for each line. To prevent generation from being curtailed during periods of light load, the Face Rock-Five Forks #2 line will be arranged for normally closed operation in parallel with the Face Rock-Five Forks #1 line to resolve load flow problems, and breakers at Face Rock will be upgraded to resolve stability concerns. Both lines to Five Forks will remain as is (i.e. terminated in bay 6 at Face Rock Switchyard, though the 115kV side of the lines will be tied together for purposes of relay protection settings). Work would be required at Five Forks to accommodate the paralleling of the #1 and #2 lines. A one-line diagram of site electrical transmission is shown in Figure 8-1.



REFERENCE TITLE	NUMBER	REFERENCE TITLE	NUMBER

NO.	DATE	ACCT.	REVISION	REF BY	CB REVIEWED	WBG APPROVED

LOCATION CODES

ACCT- 0
SCALE- AS SHOWN
BY- REF
REVIEWED WBG

HOLTWOOD H.E. STATION
NEW INTAKE AND POWERSTATION
13.2KVA BUS C & D
ELECTRICAL ONE-LINE DIAGRAM

APPROVED DATE

PPL CORP.

PPL DRAWING NO. SK-WBG-D323880 | SHEET NO. 8 - 1 | REV. 0

SK-WBG-D323880_S1.dwg

PC CAD

9.0 SPECIFICATIONS OF APPURTENANT FACILITIES

9.1 EXISTING PROJECT

A listing of the major auxiliary plant equipment at the existing station is as follows:

9.1.1 Governor System

The governors for the existing units are all operated from a central pumping system, using environmentally-compatible hydraulic oil for the pressure medium. There are a total of five pumps that provide the system operating pressure. Three pumps are mounted adjacent to a 1200-gallon oil reservoir and the other two pumps are mounted on a separate but interconnected skid. Six accumulator tanks are connected to the system and provide pressure storage capacity. The accumulator tanks are pressurized with nitrogen.

9.1.2 Oil Lubricating System

The lubricating oil for the thrust bearings and turbine and generator guide bearings are supplied through a central gravity flow system. There are three storage tanks located in the gatehouse at an elevation above the units. The oil flows by gravity to the various bearings of the units, and then to filter tanks in the operating tunnel below the units. Motor driven pumps return this oil from the filter tanks to the storage tanks in the gatehouse.

9.1.3 Fire Protection Equipment

The plant fire protection system is supplied via three pumps, one of which is a dedicated fire pump. One pump is in service at all times and provides general service water for plant equipment. If pressure on the water system drops, such as in the case of a fire system activation, the fire pump will automatically start, restoring pressure and

providing volume. Generator fire protection systems are manually activated by operators. Transformer fire protection systems are automatically activated by heat detection equipment.

9.1.4 Cranes – Powerhouse

There is a traveling bridge crane with a main hoist capacity of 135 tons and an auxiliary hoist with a 10 ton capacity located in the generator room. This crane was upgraded in 1986 for increased capacity and again in 1996 for new controls. Also within the generator room, there is a jib crane with a 4 ton capacity located near the shore end of the room. The jib crane is used primarily for transferring materials from the generator room to the gatehouse, or vice versa.

9.1.5 Gates, Hoists, Cranes – Head Works and Tailrace

There are four roller type steel headgates for each of the 10 main hydroelectric units, each gate closing a clear opening of 6-ft wide by 16-ft deep. Each of the two exciter units has one headgate of the same type, although the intake area is only 6-ft deep. The headgates are raised and lowered by a sprocket on a motor driven shaft engaging a rack on the gate stem. There are four electrically operated gate winches that serve the units. The hoisting units are designed to lift 50,000 lbs on each stem. Two traveling bridge cranes can also be used to raise the headgates in the case of winch failure.

In addition to the regular gate slots, all units have stoplog slots for emergency gate installation and closure. There are thirty-six emergency headgates, four being required for each intake, sixteen total for one unit. These emergency gates are of steel construction with hard rubber seals to aid in minimizing leakage. The emergency gates are normally installed during maintenance inspection outages. All intake openings are protected by steel trash screens.

For emergency gate and screen handling, the station has two traveling bridge cranes. Both of these use the same runway which extends the full length of the gatehouse. The crane on the river-end has a main hoist capacity of 15 tons and an auxiliary hoist with a 3 ton capacity. The shore-end crane has one hoist with a 25 ton capacity.

The station also has 20 draft tube stoplogs that are used to dewater the wheel pits and draft tubes. Ten stoplogs are required for each main unit. These stoplogs are handled by means of an electric hoist and two hand-operated emergency chain hoists, all of the monorail type. The electric hoist has two hooks, each having a capacity of 4 tons.

9.1.6 Trash Screens

The unit intakes are protected by steel trash screens. Each trash screen is 10' x 10' and each intake opening requires five screens for full protection. There are a total of 206 screens installed. The screens have a bar spacing of 4" for normal operation thus preventing larger material and debris from entering the turbines. Trash and debris are periodically removed by raking with a basket suspended from one of the Gatehouse cranes. The material and debris that is removed is segregated between natural and man-made items and all is properly disposed of. During the adult American shad out migration period, trash screens with 6" bar spacing are installed on Units 8, 9 and 10 to allow the shad to pass through the screens and through the units.

9.2 PROPOSED NEW POWER STATION

Proposed auxiliary plant equipment is as follows:

- Intake trashracks with a 7 inch clear opening designed to protect the turbine equipment from large debris and allow downstream fish passage of adult American Shad during migration season.

- An intake trashrake equipped with a single 30 ton maintenance bulkhead hoisting system mounted on the downstream end of the traveling trashrake gantry. The trashrake gantry will be able to individually transport the fifteen 22 foot 6 inch wide by 17 foot 6 inch tall maintenance bulkhead sections to storage slots on the east end of the intake.
- A mobile Material Handler capable of removing up to 12-ton logs and debris from upstream of the new skimmer wall. The Material Handler would access the debris from the new skimmer wall's roadway deck.
- Six dedicated wire rope hoist directly connected to six individual master headgates (three headgates for each unit). Each unit's three master headgates will seal off each individual 19 foot wide by 46 foot tall intake bay and will be capable of simultaneously closing under full flow and head in less than ten minutes to provide closure in emergency situations. The gates will be roller type and will have hard rubber seals around the perimeter.
- A power station gantry crane with 300-ton, 50-ton, and 10-ton capacity trolleys which will provide lifting capacity for all interior equipment as well as hoisting capacity for the three individual 22 foot 9 inch wide by 18 foot tall downstream draft tube gates.
- Provisions for a tailwater suppression system that would include the future associated air compressors, valves, tanks, *etc*.
- Two air compressors for the governor accumulator tank, and one air compressor for station service.
- 125 V DC station battery for control and emergency services.
- Motor Control Centers and Switchgear located on the electrical mezzanine.
- Fire protection over select combustible materials and hydraulic oil reservoirs and a detection system throughout the power station.

- Four 1,610 gpm pumps to provide both primary (1 pump for each unit) and backup (1 pump for each unit) cooling water and shaft seal water. Two smaller 70 gpm AC pumps will provide critical cooling water for each unit during shutdown in case of loss of station AC power (operate off from Critical AC Backup Propane Generator).
- Three sump pumps (lead lag operation and one full capacity backup) and two 3,000 gpm dewatering pumps.
- Four oil-water separation tanks and a new Incidental Waste Basin for removal of any oils or solids.
- Station electric heating and ventilation system.
- Local battery enclosure and control complex heating, ventilation, and air conditioning system.

10.0 LANDS OF THE UNITED STATES

There are no federal lands present within the Project boundary.