Section H
Project Description

Project Description

PPL Bell Bend Nuclear Power Plant
Salem Township, Luzerne County, PA

1. Project Summary

PPL Bell Bend, LLC (the Applicant) proposes to construct a new nuclear power plant, the Bell Bend Nuclear Power Plant ("BBNPP" or "the Project"), at a site adjacent to the existing Susquehanna Steam Electric Station (SSES) in Salem Township, Luzerne County, Pennsylvania. The purpose of the BBNPP is to generate 1,600 MWe of nuclear baseload electrical supply to address the growing demand for electricity in the PJM Interconnection, LLC market area. The Applicant is in the process of designing, siting and licensing the new nuclear facility, and this Joint Permit Application (JPA) is intended to support the required permitting for the unavoidable encroachments and obstructions to Waters of the Commonwealth and Waters of the United States. These unavoidable impacts will affect the North Branch of the Susquehanna River (NBSR) and adjacent wetlands and an unnamed tributary, as well as Walker Run (a second order tributary to the NBSR), its tributaries, and wetlands within the Walker Run watershed.

The Project Boundary consists of approximately 2,055 acres (ac) in Luzerne County, Pennsylvania, near the west bank of the NBSR, approximately 5 miles northeast of Berwick, Pennsylvania. Of these 2,055 ac, approximately 687 ac will be altered to support construction.

2. Alternatives, Avoidance, and Minimization

Alternatives to the proposed project were examined in detail including the no-action alternative, energy generation alternatives, and alternative locations for the nuclear facility. The detailed Alternatives Analysis is included in Section Q of this JPA. No alternatives were determined to be preferable to a nuclear power plant at the Bell Bend location. The site selection analysis included numerous environmental and public interest criteria.

The Applicant performed a thorough avoidance and minimization analysis on the Bell Bend site. Numerous iterations of the site layout were developed, each successive layout with fewer impacts to stream and wetland features. The unavoidable impacts

resulting from plant components were minimized to the fullest extent practicable. For a detailed description of the avoidance and minimization actions taken by the Applicant see the Alternatives Analysis in Section Q of this JPA. The BBNPP design, as presented in this application, is considered by the applicant to be the Least Environmentally Damaging Practical Alternative (LEDPA) in accordance with the 404(b)1 guidelines established by the U.S. Environmental Protection Agency.

3. Impacts to Jurisdictional Waters

Because the jurisdiction and classification of impacts differs slightly between the Pennsylvania Department of Environmental Protection (DEP) and the United States Army Corps of Engineers (ACOE), impact totals also differ by agency. Based on DEP standards, the proposed project will permanently impact 1.58 ac palustrine forested wetland (PFO), 0 ac of scrub shrub wetland (PSS), and 0.99 ac of emergent wetland (PEM). Temporary impacts from excavation and associated earth disturbance will impact 7.33 ac of wetland. Indirect wetland impacts resulting from tree clearing will affect 7.93 ac. Permanent stream impacts total 997 linear feet (LF). Based on ACOE standards the proposed project will permanently impact 0.51 ac PFO, 0 ac of PSS, and 0.74 ac of PEM. Temporary impacts from excavation and associated earth disturbance will impact 8.52 ac of wetland. Indirect wetland impacts resulting from tree clearing will affect 9.00 ac. Permanent stream impacts total 742 linear feet (LF). (See Section J, Enclosures D3 and D4)

The following proposed work will result in wetland or stream impacts to jurisdictional wetlands and watercourses associated with the construction of the BBNPP. Fill placement for the purpose of facility construction represents direct impacts to jurisdictional wetlands and waters. Fill placement within wetlands and stream channels is required for construction of the cooling water intake system (CWIS), grading around the power block, switchyard expansion, and bridge supports. Temporary wetland impacts result from bridge construction, excavation in wetlands to bury the intake and blowdown lines, as well as construction dewatering. Forest clearing needed to construct bridge and utility crossings will also result in indirect impacts due to the loss of wetland functions. Power plant components resulting in wetland and stream impacts are summarized below. Enclosure D of the Environmental Assessment in Section J of this JPA provides a complete description of project impacts. Wetland and watercourse

impact tables that provide a detailed breakdown of impact acreages by Jurisdiction (DEP or ACOE), wetland type PFO, PSS or PEM, and impact type (permanent, temporary, or indirect) are included as Enclosures D3 and D4. Each impact is identified by a letter which can be located on the Wetland and Watercourse Impact Map, Enclosures D1 and D2.

3.1 Cooling Systems

The Circulating Water System (CWS) and Essential Service Water System (ESWS) are the two major cooling systems used by the BBNPP. The planned CWS is a closed-cycle, wet cooling system using two natural draft cooling towers to dissipate waste heat during station operation. The ESWS is closed-loop and is used for normal operations, refueling, shutdown/cool down, anticipated operational events, design basis accidents and severe accidents. Make-up water for these systems is needed to compensate for evaporative losses, drift, and blowdown discharge. The NBSR will provide normal makeup to the CWS and ESWS system via the CWS Intake Structure. Makeup to the ESWS during design basis accidents and severe accidents is provided from an onsite pond. No makeup from the NBSR is required during these events. This use of NBSR water (both withdrawal and consumptive use) will be subject to separate regulatory review and approval by the Susquehanna River Basin Commission (SRBC).

3.1.1 Intake Structure Building and Access

The intake structure will be constructed to withdraw water from the NBSR. The structure will be located approximately 300 ft downstream of the existing SSES intake structure along the west bank of the NBSR. The building will be 124-feet long by 90-feet wide with three individual pump bays. In addition, an access drive and a parking lot are needed to access the intake structure. The intake structure was sited to utilize a large pool within the NBSR. Siting options for the intake structure were limited due to the location of the pool, wetlands, streams, cultural resources and existing SSES infrastructure adjacent to the NBSR. On-site avoidance and minimization was used to the fullest extent practicable to avoid these resources. See the Alternatives Analysis, Section Q of this JPA for a full description of the avoidance and minimization process.

Construction of the intake structure and associated access drive and parking lot (Impact K) will impact 617 LF of the North Branch Canal (NBC) outfall channel. Building

construction and associated grading will permanently fill 0.98 ac of wetland. This is the largest fill impact of the BBNPP project and is water dependent.

3.1.2 Intake Structure Dredging

As part of the intake structure construction, dredging of the NBSR will be required to create a forebay adjacent to the building where water intake will occur (Impact N). Dredging will involve installation of a circular cofferdam of interlocking sheet pile extending approximately 120 LF from the existing shoreline into the NBSR and approximately 220 LF measured parallel to the shoreline. The area within the cofferdam will be dewatered and dredged by hydraulic or mechanical methods, and the existing shoreline will be excavated to create an approximately 100-foot by 100-foot forebay. The total dredged area is expected to be 0.61 ac and will temporarily impact 220 LF of channel. After this work is completed the temporary cofferdam will be removed allowing the forebay area to flood. Periodic maintenance dredging of the NBSR will be required to maintain adequate depth of the forebay area.

It is expected that approximately 17,000 to 25,000 cubic yards (c.y.) of in-place NBSR bottom substrate will be removed to accommodate the proposed intake and blowdown in-water structures. A bulking factor of 1.4 is assumed to account for expansion of the silty gravel material following removal; producing a total estimated volume of material for disposal of 24,000 to 35,000 c.y. Testing was completed within the dredge envelope to determine suitability for disposal as clean fill. The results of this testing are presented in Appendix A, Items 30 and 31. Dredge material will be disposed of within the BBNPP site at one or more of the laydown areas to the north and southeast of the BBNPP power block, or on lands at the perimeter of the facility where it may be used as non-structural fill. The capacity of these areas is more than sufficient to accommodate the expected 24,000-35,000 c.y. volume. Additional information about the handling of dredged material is provided in Appendix A, Item 25. This is a water dependent impact.

3.1.3 Blowdown Structure River Dredging

The blowdown diffuser pipe will be 24 inch carbon steel, 24 inch RCP or 26 inch HDPE. It will have a series of 72 - 4” diameter portals spaced 1’6” on center. It will extend approximately 325 ft from the shoreline on a slight downstream angle. The diffuser portion will begin 203 ft as measured perpendicular to the shoreline. The pipe will be

anchored to a concrete pad 116.5 ft long by 7 ft wide set on the river bottom and covered with riprap. A temporary cofferdam confining an area approximately 50 feet wide by 350-foot long, extending into the river will be used during installation of the blowdown line to dewater the area and contain sediment. The planned dredged area is 0.46 ac and will temporarily impact 50 LF of channel (Impact O). The dredged material will be handled as described above and in Appendix A, Item 25. This is a water dependent impact.

3.1.4 Underground Intake and Blowdown Lines

Two intake systems and blowdown pipelines will carry water to and from the BBNPP for operation. The Raw Water Supply System (RWSS) intake will be 20 inch carbon steel pipe, the Circulating Water System Makeup Water Supply (CWSMWS) intake will be 32 inch carbon steel pipe and the blowdown line will be 26 inch HDPE. These lines will be combined into a single trench, along with associated communications and electrical conduits. These lines will cross wetlands and the NBC at the Riverlands property causing 0.78 ac of temporary wetland impact and 47 LF of temporary stream impacts (Impact M). These impacted areas will be restored to their original grade and seeded with native wetland vegetation immediately following backfilling of the trench. This is a water dependent impact.

3.1.5 Cooling Water Intake

A water intake is necessary for plant operation. It is estimated that the BBNPP CWSMWS and RWSS will withdraw 25,729 gallons per minute (gpm) on average from the NBSR to replace evaporative loss, drift, and blowdown. Maximum CWS and RWSS cooling water makeup demand is approximately 28,179 gpm. The CWSMWS provides water to the cooling towers and the RWSS provides treated water to the power plant and the normal makeup to the ESWS. The impacts caused by the consumptive use of the NBSR are regulated by the Susquehanna River Basin Commission (SRBC) (Impact S). PPL is actively working with the SRBC to obtain approval for the withdrawal and will plan for any necessary mitigation. This is a water dependent impact.

3.1.6 River Discharge (Blowdown Line)

Plant discharge will consist of blowdown from the CWS cooling towers. Blowdown water discharges to a Combined Waste Water Retention Pond allowing retention time for settling of suspended solids as well as additional cooling and chemical treatment of the wastewater, if required, prior to discharge to the NBSR. The concentrations of chemicals and suspended solids discharged will be in conformance with the National Pollutant Discharge Elimination System (NPDES). Blowdown from the cooling towers is returned to the NBSR through a submerged multi-port diffuser. The pipe will be 24 inch carbon steel, 24 inch RCP or 26 inch HDPE. Blowdown to the Susquehanna River will total approximately 8,665 gpm with a maximum discharge flow of 9,367 gpm (Impact T). This is a water dependent impact.

3.2 Bridges

All bridges are numbered on the plan set included in Section F of the JPA. Unless otherwise noted, the bridges will have concrete beam spans and concrete piers and abutments. All bridges will span the entire extent of the 100-year floodplain, existing wetlands, and in most cases have been designed to sustain an additional 50 ft buffer. Permanent wetland impacts resulting from the bridges will be limited to the pier footings and the “shadow” of the bridge deck over the wetlands. Bridge construction will also result in temporary impacts due to footing excavation, construction access, and temporary crane pads. Almost all bridges will cause indirect wetland impacts due to tree clearing necessary to accommodate construction and to protect the long-term integrity of the bridge structures.

A new vehicle bridge (Bridge 1, Impact F) will be constructed south of the BBNPP facility and east of Confers Lane and will span a large wetland complex. This bridge is necessary to provide access to the parking area from Route 11. The bridge will be 57 ft wide by 500 feet long and will span the entire width of the wetlands. Only the pier footing will directly impact the wetland. The design specifies 5 piers within the wetland with 85.5 ft spacing. The bridge piers will permanently impact 0.09 ac of wetland.

A new vehicle bridge and pipe bridge (Bridge 2 and Pipe Bridge 6, Impact D) will be constructed across the unnamed tributary to Walker Run southeast of the BBNPP facility (one structure serving two purposes). The bridge is necessary to convey the intake and

blowdown pipelines and provide vehicular access to the power plant from Route 11. The bridge is a total of 82 ft wide by 410 ft long and will span the entire width of the wetland, 100-year floodplain, and 50-ft exceptional value (EV) wetland buffer. Only the pier footings will directly impact the wetland. The bridge design specifies 3 piers within the wetland spaced approximately 103 feet apart. The bridge piers will permanently impact 0.08 ac of wetland.

A new vehicle bridge (Bridge 3, Impact B) will be constructed over the unnamed tributary to Walker Run directly south of the BBNPP facility. This bridge is necessary to access the parking areas and the power block from North Market Street and from Route 11. The bridge will be 57 ft wide by 408 ft long and will span the entire width of the wetlands, 100-year floodplain, and 50-ft EV wetland buffer. Only the pier footings will directly impact the wetland. The design specifies 2 piers within the wetland spaced at approximately 102 ft. The piers will permanently impact 0.02 ac of wetland.

A new railroad bridge (Bridge 5, Impact E) will be constructed over the unnamed tributary to Walker Run southeast of the BBNPP facility. This bridge is necessary to gain rail access to the BBNPP site. The bridge will be 25 ft wide by 535 ft long and will span the entire width of the wetlands, 100-year floodplain, and 50-ft EV wetland buffer. Only the pier footings will directly impact the wetland. The bridge design specifies 3 piers within the wetland spaced at 89 ft. The piers will permanently impact 0.03 ac.

A new vehicle bridge (Bridge 4, Impact A) will be constructed over Walker Run southeast of the facility. This bridge is necessary for access to the power plant and parking areas. The bridge is 400 ft long by 57 ft wide and will span the 100-year floodplain. No wetlands exist at this location therefore the piers will not cause any permanent wetland impacts.

A pipe bridge (Bridge 7, Impact C) will be constructed over the unnamed tributary to Walker Run. The crossing is needed for domestic water, sanitary sewer, and electrical lines. The bridge will be a four span pre-fabricated metal truss bridge. The bridge will be 8 ft wide by 340 ft long and will span the entire width of the wetlands, 100-year floodplain, and 50-ft EV wetland buffer. Only the pier footings will directly impact the wetland. The bridge design specifies 3 supports within the wetland with a spacing of 85 feet. The piers will permanently impact 0.01 acres of wetland.

A railroad culvert will be constructed over the unnamed tributary to Lake Took-A-While east of the SSES (Impact G). A 125 ft, 48-inch reinforced concrete culvert with concrete endwalls will be installed on a 4.32% grade to convey the stream under the proposed rail line. The pipe invert will be depressed six inches below the stream bed elevation. Rip-rap outfall protection is proposed to stabilize the outfall of the culvert. The culvert is necessary to gain rail access to the BBNPP site. The culvert crossing will impact 125 LF of stream.

3.3 Power Block

Clearing and grading will be necessary for the construction of the power block, including reactor, turbine and associated structures. Grading around the power block will impact 0.12 ac of isolated wetland (Impact I). This wetland is Waters of the Commonwealth but not Waters of the United States and is not EV. Significant plot plan changes were made throughout the design process to avoid EV wetland impacts within the Walker Run watershed from power block construction.

3.4 Switchyard Expansion

The existing SSES 500KV switchyard will be expanded to support the BBNPP. The northeast corner will be extended, filling 0.02 ac of isolated emergent wetlands (Waters of the Commonwealth) and an additional 0.04 ac of jurisdictional wetlands (Waters of the US and Waters of the Commonwealth) located adjacent to the existing switchyard for switchyard expansion and grading (Impact J).

3.5 Transmission Lines

Transmission line construction will be limited to the onsite construction area. No offsite transmission lines or corridors are needed. The BBNPP plant switchyard will be electrically interconnected to the 500 kV transmission system via two independent circuits. One circuit will connect the BBNPP plant switchyard to the existing Susquehanna 500 kV switchyard, and a separate circuit will connect to a new substation associated with the proposed Susquehanna-Roseland 500 kV Line, which is an independent project. Two 500 kV lines on individual towers will be constructed. The transmission lines are needed to convey electric power generated by the BBNPP power block to existing or proposed transmission lines that connect to the regional power grid.

Additionally, an existing 230 kV transmission line will be relocated on the site to make way for other plant structures.

Forested areas located in rights-of ways, or within 100 feet of a proposed line where new right-of-way is proposed, will be cleared of trees. 5.93 total acres of forested wetland will be indirectly impacted by clearing for transmission lines (Impacts P, Q, and R). These wetlands will be maintained permanently as scrub shrub or emergent cover.

3.6 Teardrop Wetland Outfall Culvert Replacement

A 428 ft long 36-inch diameter reinforced concrete pipe is proposed to convey the drainage from the teardrop wetland underneath formerly farmed agricultural fields (Impact H). The culvert and headwaters are Waters of the Commonwealth but not Waters of the United States. This structure is designed to replace an existing 567 ft, 8-inch PVC pipe and grassed swale that currently conveys the tile drain system underneath the adjacent fallow fields. This flow could not be daylighted due to the grading required to site the BBNPP infrastructure. The proposed structure is designed to convey the 100-year peak runoff. The pipe invert will be depressed twelve inches below the channel inverts at both ends and will outlet onto a rip-rap apron to prevent scour at the outfall. This structure is considered maintenance/modification of an existing culvert and is not included in the mitigation calculations.

3.7 ESWEMS Pond, Cooling Towers, and Power Block Dewatering

Dewatering is needed during excavation and fill placement for the power block, the essential service water emergency makeup system (ESWEMS) pond, and the cooling towers. These plant components are safety-related plant features and must have a foundation placed on competent bedrock. The excavation to bedrock and placement of structural fill to design elevations must be done in a dry condition, therefore, dewatering wells, sumps, and sump pumps will be used during foundation construction, which may extend up to two years. Groundwater flow models have indicated the potential for temporary groundwater drawdown in Wetlands 11 and 12 as a result of construction dewatering associated with the ESWEMS pond (Impact L). No other impacts are anticipated as a result of construction dewatering. Dewatering will cause about 6 ac of temporary wetland impacts. A plan to minimize these impacts and maintain existing

hydrologic conditions during construction has been developed and is presented in Section R of this JPA.

3.8 Stormwater Discharges

A post construction stormwater management (PCSM) plan has been developed for the BBNPP site. This plan calls for 20 level spreader discharges from stormwater basins (Impact U). These discharges will not directly impact jurisdictional waters, however many will be located adjacent to streams and wetlands. An additional 18 inch pipe will discharge into the NBSR near the intake structure at the Riverlands. BMPs are planned to minimize any potential physical, chemical or biological indirect impacts resulting from stormwater quantity and quality. Detailed stormwater management information is provided in Section M of the JPA and the Post Construction Stormwater Management Plan submitted with the NPDES stormwater permit application.

4. Additional Project Impacts

4.1 On-Site Project Impacts

BBNPP construction will require land cover alteration of non-jurisdictional upland features within the 2,055 acre Project Boundary. Table 1 provides an overview of the pre- and post-construction land use areas, generally conforming to United States Geologic Survey (USGS) cover type classifications.

Table 1: Land Alteration by Cover Type

Land Use Type	Pre-Construction Area (acres)	Post-Construction Area (acres)
Urban or Built-Up	220.8	859.6
Forest	1141.7	730.4
Barren	21.5	19.2
Wetlands	159.0	157.6
Water	71.9	71.8
Agricultural	440.0	216.3
Total Site Boundary	2054.9	2054.9

The BBNPP will occupy areas that currently include both farmland and forest. Structures and construction activities will be located to minimize impacts on the

remaining forest. A total of approximately 234 acres of forested habitat will be cleared, of which 224.5 acres are upland and 9.51 are wetland. Impacts from this activity include potential habitat disruption and loss of water quality, shading, and windbreak benefits supporting local wetland and upland habitat quality. The proposed clearing will increase the fragmentation of the existing forest cover. Forested buffers (50 foot minimum width) will be maintained adjacent to EV streams and wetlands, where possible, to protect these resources during construction and operation of the BBNPP, and to reduce the potential for any unintentional impacts.

The Indiana Bat is a federally endangered species with known hibernacula in the vicinity of the BBNPP site. No Indiana Bats were caught during bat mist surveys or acoustic monitoring completed within the project boundary. The Applicant is working with the U.S. Fish and Wildlife Service to minimize the risk of potential impacts and to develop a mitigation strategy. See Section E of this JPA for correspondence regarding the Indiana Bat.

Project impacts to the other protected species are expected to be minimal. Two protected mussel species were detected; one Green Floater was collected in the NBSR during macroinvertebrate studies and numerous Yellow Lampmussels were collected during a separate mussel survey. In addition, Pennsylvania Natural Diversity Index (PNDI) search results included two protected butterfly species which could be present within the project boundary. PPL has initiated dialogue with the appropriate State agencies to minimize and mitigate any potential impacts resulting from BBNPP construction and operation (see Section E).

Cultural resources on–site will be affected by extensive clearing and grading. In addition the NBC will be temporarily impacted by the intake and blowdown pipeline installations. PPL will continue to coordinate with the PHMC on cultural resource investigations. All cultural resource clearances will be obtained from PHMC prior to commencing work on BBNPP. See Section D of this JPA for correspondence to date regarding cultural resources. All Cultural Resource studies are provided in JPA Appendix C.

4.2 Off-Site Project Impacts

BBNPP has determined that it is possible for all excavated material to be utilized on-site in a balanced cut-fill design based on the current grading plan. No off-site excess fill disposal will be required

5. Proposed Mitigation

The following three on-site, in-kind mitigation projects are proposed to compensate for impacts to jurisdictional waters as part of the BBNPP mitigation strategy described in Section R of the JPA.

1. Implement a stream and floodplain restoration project on two reaches of Walker Run creating and enhancing wetlands, improving stream functions, and improving wild trout habitat as well as mitigating for permanent stream impacts.
2. Remove a section of Confers Lane, which is to be abandoned, creating additional wetlands and restoring a hydrologic connection between two EV wetlands.
3. Restore the North Branch Canal, enhance wetlands at the PPL Riverlands near the proposed intake structure, and extend the existing recreational trail system

As a result of these projects 6.8 ac of wetland will be enhanced, 8.23 ac of wetland will be created, and 2,213 ft of stream will be created or enhanced. The mitigation projects will also compensate for indirect impacts to wetland functions and values. Forested wetlands created or converted will total 14.60 ac, exceeding the amount cleared.

In addition PPL will mitigate for temporary impacts resulting from construction dewatering. Mitigation measures will include the introduction of water to affected wetlands from a storage reservoir constructed to store pumped groundwater. A temporary spray irrigation system will apply water to the wetlands as needed to maintain pre-construction hydrologic conditions. Daily wetland monitoring will be conducted during construction to allow real-time flow corrections to maintain conditions reflecting the established baseline.

A multi-faceted Indiana Bat mitigation plan is proposed to compensate for lost potential habitat resulting from the tree clearing needed to support facility construction and grading. The mitigation plan will focus on ways to create, improve, and protect on- and

off-site Indiana Bat habitat. The mitigation plan is being developed in conjunction with the U. S. Fish and Wildlife Service and other commenting agencies.

6. Public Benefit, Health, Safety, and Environment Summary

The proposed project will benefit the public within the PJM Market Area by providing an additional 1,600 MWe of baseload power to support a region with anticipated growth and projected power limitations. The project is considered by PPL to be the Least Environmentally Damaging Practical Alternative to meet the project purpose.

Locally, jobs and an increased tax base will result from construction and operation of the proposed power plant. All safety-related requirements will be met according to Nuclear Regulatory Commission regulations. All other requirements, including environmental requirements, of state and federal law will be met. The anticipated impacts to jurisdictional waters have been avoided and minimized to the fullest extent practicable and do not alter unique habitats. All impacted lands on the BBNPP site are similar in nature and function to non-impacted areas on the site and in the vicinity of the property. All impacts to jurisdictional waters will be mitigated on-site. Any potential actions affecting threatened, endangered, or rare species will be cleared by each respective agency and minimized and mitigated according to agency requirements. Impacts to cultural resources and any cumulative environmental impacts have been avoided to the fullest extent practicable.

The Applicant believes that the details described in this JPA demonstrate that impacts will be avoided, minimized, and mitigated to the fullest extent practicable, and that the public benefits of this project outweigh the impacts resulting from this project.