Environmental Assessment
Part 2 - Project Description
Enclosure D - Project Impacts

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

1. Introduction

As part of this project there will be unavoidable wetland and stream impacts that are under the jurisdiction of the DEP and the ACOE. This document will describe impacts to jurisdictional waters and is intended to meet the JPA requirements of the Environmental Assessment.

2. Special Designations

No impacts to Native American or military reservations, or any National parks, forests, recreation areas, natural landmarks, or wildlife refuges are proposed. No state parks, forests, recreation areas or gamelands will be permanently impacted by the project. Natural, wild, or wilderness areas will also not be impacted.

There is one environmental study area and wildlife sanctuary that is adjacent to and within a small portion of the Project Boundary. A portion of Susquehanna Riverlands property, which includes a Wetlands Nature Area, lies within the Project Boundary. The Wetlands Nature Area provides an area for nature study and educational programs and was designated an Urban Wildlife Sanctuary in 1988. The Susquehanna Riverlands property is also a recreational area for public use and environmental education. It is owned and operated by PPL.

The Susquehanna Riverlands is partially located within the BBNPP project boundary east of US 11 and will be impacted by construction of the proposed intake structure and associated infrastructure. It is the only recreational area open to the public within the BBNPP Project Boundary. Expected impacts to recreational use of the Susquehanna Riverlands area are discussed below.

The Pennsylvania Audubon Society designated a 2,111 ac Important Bird Area (IBA # 50), on both sides of the North Branch Susquehanna River (NBSR) and also spanning US 11. IBA #50 includes the majority of the Susquehanna Riverlands property as well

as a portion of the BBNPP project boundary. Except for impacts associated with the intake structure, discussed below, a large contiguous area of IBA # 50 east of US 11 will be unaffected. Greater impacts will occur west of US 11 where the majority of BBNPP infrastructure will be located. There is no recreational use within the BBNPP project boundary west of US 11. The IBA program in Pennsylvania confers no regulatory requirements or obligations on the part of the landowner, however, the Pennsylvania Audubon Society and PPL Electric Utilities are working together to manage power line rights-of-way to provide important bird habitat while maintaining consistency with PPL's vegetation management practices to support electric reliability.

The extensive clearing and grading needed to construct BBNPP has the potential to affect cultural resources. PPL has conducted cultural resource investigations at BBNPP including a Phase Ib archaeological survey, an architectural survey, a Supplemental Phase Ib cultural resources survey, Phase II National Register site evaluations, and a Second Supplemental Phase Ib cultural resources survey (supporting the movement of the plant footprint in 2010). PPL will continue to coordinate with the Pennsylvania Historical and Museum Commission (PHMC) on additional cultural resource investigations. All cultural resource clearances will be obtained from PHMC prior to commencing work on BBNPP. All cultural resource reports are provided in Appendix C of this JPA.

The Project Boundary contains three soil types designated as prime farmland according to the United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS). They are Braceville gravelly loam, Chenango gravelly loam, and Pope soils (USDA, 2004). The majority of the farmland or fallow farmland within the BBNPP project boundary is considered prime. Approximately 350 ac of prime farmland will be permanently impacted by BBNPP construction.

3. Wetland and Stream Impact Discussion

The Applicant has undergone a thorough wetland avoidance and minimization process during the course of the planning stages for the proposed BBNPP. This section will summarize the remaining wetland and stream impacts anticipated as a result of construction and operation of BBNPP. Impacts and mitigation will be evaluated quantitatively (disturbed acreage and stream length) and qualitatively (lost functions and values). Each impact is identified by a letter designation. Impact locations by letter

designation are shown on the "Wetland and Watercourse Impact Location Map" provided as Enclosure D1 (ACOE) and D2 (DEP). The tables "BBNPP Wetland and Watercourse Impacts and Mitigation" are included as Enclosure D3 (ACOE) and D4 (DEP) and provide a detailed characterization of each wetland impact including impact type, wetland type, and quantification of the affected area.

Permanent impacts are characterized by the placement of fill or grading in a wetland or any structure or activity which changes, expands or diminishes the course, current or cross-section of a watercourse, floodway or body of water (obstructions or encroachments). There are differences between DEP and ACOE wetland and stream jurisdiction within the Project Boundary. ACOE does not take jurisdiction over isolated wetlands; however, these wetlands are considered Waters of the Commonwealth and are regulated by DEP. In addition, DEP considers bridge spans a permanent wetland and stream impact while ACOE only considers structures placed within the wetland (pier footings) to be a permanent impact.

Temporary impacts result from disturbances necessary to perform work where the temporarily disturbed area will be restored to its original grade and hydrology. Because temporary impacts will be restored to their original grade, wetland replacement acreage is not required; however, these impacts must still be avoided and minimized to the greatest extent practicable. The acreage of DEP temporary project impacts is smaller than ACOE because the DEP designates the bridge spans as a permanent impact.

Indirect impacts result when there is no physical obstruction or encroachment, but changes to vegetation, hydrology, or other factors may alter the functions or values of a wetland. In these cases, the overall wetland location and acreage is not affected, but the lost functions and values must be considered and mitigated. A Functions and Values Assessment was performed to identify the existing functions and values of wetlands within the BBNPP project boundary and was used as a foundation to determine indirect wetland impacts. The "Functions and Values Assessment," (LandStudies, April 2011) is included in Appendix B of this JPA. Most indirect impacts caused by the construction of the BBNPP are related to habitat changes resulting from tree removal.

A complete discussion of each impacted area follows.

3.1 Project Impacts

Impact A is a vehicle bridge (Bridge # 4) over Walker Run's channel near the existing farm road crossing and directly west of the proposed facility. The bridge is necessary to access the proposed BBNPP facility. The bridge dimensions are 400 ft long by 57 ft wide. Wetlands are not present at the proposed crossing. DEP permanent stream impacts resulting from the shadow of the bridge span a total 65 LF and 0.03 ac.

As part of the mitigation for the BBNPP wetland impacts, this reach of Walker Run's stream channel and floodplain will be restored and wetlands will be created. The stream restoration design was prepared in conjunction with the bridge design, therefore, the proposed bridge will not negatively affect food chain production, general habitat, or habitat for threatened and endangered species in the created wetland.

The stream channel relocation and restoration, wetland creation, and a new bridge will improve hydrology. The proposed bridge structure will span the entire stream and floodplain, improving the conveyance in Walker Run. An anticipated reduction of the 100-year flood elevation will result from Walker Run mitigation, so upstream and downstream properties will be unaffected or positively affected. Created wetlands will improve groundwater recharge along Walker Run and alleviate flood flows. The created wetlands and stabilized stream channel will also improve Walker Run's water quality through more natural sediment conveyance patterns and improved filtration of sediments and nutrients.

Water quality will not be affected by bridge construction. Runoff from the bridge, potentially containing road salts and other pollutants will be directed away from the created wetlands to a water quality treatment BMP as described in the Post Construction Stormwater Management plan and will comply with NPDES requirements. Created wetlands will improve water filtration and create a forest buffer along Walker Run. In addition, bank stabilization will reduce sediment in Walker Run. Details regarding the Walker Run mitigation project are located in Section R of the JPA.

Impact B is a proposed vehicle bridge (Bridge #3) spanning the Unnamed Tributary to Walker Run (Tributary 1) and Wetlands 10 and 12. It is located directly south of the BBNPP facility. The bridge will be 408 ft long by 57 ft wide and will span the entire width of the wetland, 50 ft of EV wetland buffer, and the 100-year floodplain. The pier footings

for the bridge are permanent wetland impacts, totaling 0.02 ac of palustrine emergent wetland (PEM). The area of the bridge span over wetlands and streams is 0.16 ac. Temporary impacts include the construction of temporary 40 ft by 40 ft stone crane pads contained within the bridge span. Temporary impacts also extend approximately 15 ft beyond the bridge footings (and beyond the bridge span) to include over-excavation around bridge piers. The wetland areas temporarily impacted will be returned to their original grade with adequate topsoil and seeded with a mix consisting of native wetland species. Tree removal, an indirect impact, will affect approximately 0.09 ac.

The impacted area divides a large contiguous forest and emergent wetland complex along Tributary 1. Multiple potential roosting trees (PRTs) with high and medium summer roosting potential for the Indiana bat were identified within the forested edge to be cleared for bridge construction. A detailed discussion of tree clearing impacts on Indiana bats is provided in Section 5.2.2. Food chain production and general habitat functions including nesting, spawning, rearing, resting, migration, feeding, or escape cover will not be affected for other species. Habitat changes resulting from the conversion of 0.09 ac from Palustrine Forested wetland (PFO) to Palustrine Scrub Shrub wetland (PSS) will have a small affect on habitat within the overall PFO wetland complex.

Bridge construction will improve the natural drainage pattern of the wetland, and improve flushing characteristics. Currently, a small farm road and culvert crossing divide the wetland at the proposed impact location. In proposed conditions, the farm road and culvert will be removed and a bridge will span the entire width of the wetlands and 100-year floodplain. Current hydrology including groundwater discharge and recharge will not be affected.

The water quality of the existing wetland will not be impacted by the proposed bridge. Runoff from the bridge, potentially containing road salts and other pollutants will be directed away from the wetland to a water quality treatment BMP as described in the Post Construction Stormwater Management plan and will comply with NPDES requirements. The wetland will continue to filter sediments and nutrients from other surface water runoff. Culvert removal will diminish the existing backwater condition and reduce sediment deposition.

Upstream and downstream property will not be affected. The current backwater condition caused by the culvert crossing will be eliminated by the proposed bridge which will span the 100-year floodplain. The 100-year floodplain will not change with this impact. Therefore, the water surface elevation is not expected to increase as a result of Impact B (Flood Study Walker Run, LandStudies, 2011).

Impact C is a proposed bridge (Bridge #7) for domestic water and sanitary sewer lines spanning Wetland 12 and Tributary 1. It is located south of the BBNPP facility. The bridge will be 340 foot long by 18 ft wide and will span the entire width of the existing wetlands, 50 ft of EV wetland buffer, and the 100-year floodplain. The pier footings for the bridge are permanent wetland impacts, totaling 0.01 ac of PFO. The area of the bridge span over wetlands and streams is 0.05 ac. Temporary impacts include the construction of temporary 40 ft by 40 ft stone crane pads contained within the bridge span. Temporary impacts also extend approximately 15 ft beyond the bridge footings (and beyond the bridge span) to include over-excavation around bridge piers. The wetland areas temporarily impacted will be returned to their original grade with adequate topsoil and a seed mix consisting of native wetland species. Tree removal, an indirect impact, will affect 0.41 ac.

Tree removal totaling 0.42 ac (includes permanent and indirect impacts) may increase plant species diversity by creating a scrub shrub habitat pocket within the forested wetland. The impacted area is a small portion of a larger wetland complex. Therefore, any vegetation or habitat changes to the wetland resulting from the impact will have a small affect on habitat within the wetland complex. Indiana bats could potentially be affected by the forest clearing, although there were no PRTs identified within the wetland area to be cleared.

The hydrology, water quality and adjacent property will be unaffected by the impact. The 100-year floodplain will not change with this impact (Flood Study Walker Run, LandStudies, 2011). Flushing characteristics will not be affected. The wetland will continue to filter sediments and nutrients from other surface water runoff. Current hydrology including seasonal groundwater recharge and discharge will not be affected.

Impact D is a proposed vehicle bridge and adjoining pipe bridge (Bridge #2 and Pipe Bridge #6) spanning Tributary 1 and Wetland 12. It is located southeast of the BBNPP facility. The bridge will be 410 ft long by 82 ft wide and will span the entire width of the

wetland, the 100-year floodplain, and 50 ft of wetland buffer. The pier footings for the bridge are permanent wetland impacts, totaling 0.08 ac of PFO. The area of the bridge span over wetlands and streams is 0.50 ac. Temporary impacts include the construction of temporary 40 ft by 40 ft stone crane pads contained within the bridge span. Temporary impacts also extend approximately 15 ft beyond the bridge footings (and beyond the bridge span) to include over-excavation around bridge piers. The wetland areas temporarily impacted will be returned to their original grade with adequate topsoil and a seed mix consisting of native wetland species. Tree removal, an indirect impact, will affect 0.92 ac.

Multiple PRTs with high and medium summer roosting potential for the Indiana Bat were identified within the forested area to be cleared for bridge construction. A detailed discussion of tree clearing impacts on Indiana Bats is provided in Section 5.2.2. Food chain production and general habitat functions including nesting, spawning, rearing, resting, migration, feeding, or escape cover will not be affected for other species. Habitat changes resulting from the conversion of 1.0 ac (includes permanent and indirect impacts) from PFO wetland to PSS wetland will have a small affect on habitat within the overall PFO wetland complex. Tree removal may increase plant species diversity by creating a scrub shrub habitat pocket within the forested wetland.

Hydrology in the wetland will not be impacted by the addition of the bridge. The bridge will span the entire width of the wetland and it is anticipated that the 100-year floodplain will not change with this impact (Flood Study Walker Run, LandStudies, 2011). Drainage patterns will not be altered and the wetland will continue to store flood flows. Flushing capabilities will not be affected. Groundwater discharge and recharge will continue to seasonally occur.

Water quality will not be affected by bridge construction. Runoff from the bridge, potentially containing road salts and other pollutants will be directed away from the wetland to a water quality treatment BMP as described in the Post Construction Stormwater Management Plan and will comply with NPDES requirements. The wetland will continue to filter sediments and nutrients from other surface water runoff.

The upstream and downstream property will not be affected. The water surface elevation is not expected to increase as a result of Impact D (Flood Study Walker Run, LandStudies, 2011).

Impact E is a railroad bridge (Bridge #5) spanning Tributary 1 and Wetland 12. It is located southeast of the BBNPP facility at the 90˚ bend in Tributary 1. The proposed bridge is 535 ft long by 25 ft wide and will span the entire width of the wetland, 50 ft of EV wetland buffer, and the 100-year floodplain. The pier footings for the bridge are permanent wetland impacts, totaling 0.03 ac of PFO. The area of the bridge span over wetlands and streams is 0.17 ac. Temporary impacts include the construction of temporary 40 ft by 40 ft stone crane pads contained within the bridge span. Temporary impacts may also extend approximately 15 ft beyond the bridge footings (and beyond the bridge span) to include over-excavation around bridge piers. The wetland areas temporarily impacted will be returned to their original grade with adequate topsoil and a seed mix consisting of native wetland species. Tree removal, an indirect impact, will affect 0.60 ac.

Tree removal totaling 0.63 ac (includes permanent and indirect impacts) may increase plant species diversity by creating a scrub shrub habitat pocket within the forested wetland. General habitat functions will be reduced for species relying on forested cover, including the Indiana Bat. No PRTs were identified in the portion of this area surveyed. The impacted area is a small portion of a larger wetland complex; therefore, any changes to vegetation, habitat, or food production resulting from the impact will have a small affect within the entire wetland.

Hydrology in the wetland will not be impacted by the addition of a bridge. The 100-year floodplain will not change (Flood Study Walker Run, LandStudies, 2011). Drainage patterns will not be altered and the wetland will continue to store flood flows. Production export will not be affected. Groundwater discharge and recharge occur seasonally and will not be affected.

Water quality will not be affected by bridge construction. Runoff from the bridge, potentially containing road salts and other pollutants will be directed away from the wetland to a water quality treatment BMP as described in the Post Construction Stormwater Management Plan and will comply with NPDES requirements. The wetland will continue to filter sediments and nutrients.

Upstream and downstream properties will not be affected.

Impact F is a vehicle bridge (Bridge #1) spanning wetland 19. There is no stream associated with this crossing. The bridge is located on the south side of the BBNPP facility and east of Confers Lane. The wetland is part of a larger contiguous forest wetland complex extending outside the BBNPP Project Boundary, with 6.13 acres located within the Project Boundary. The proposed bridge is 500 ft long by 57 ft and will span the entire wetland. The pier footings for the bridge are permanent wetland impacts, totaling 0.09 ac of PFO. The area of the bridge span over the wetland is 0.55 ac. Temporary impacts include the construction of temporary 40 ft by 40 ft stone crane pads contained within the bridge span. Temporary impacts also extend approximately 15 ft beyond the bridge footings (and beyond the bridge span) to include over-excavation around bridge piers. The wetland areas temporarily impacted will be returned to their original grade with adequate topsoil and a seed mix consisting of native wetland species. Tree removal, an indirect impact, will affect 0.98 ac.

Multiple PRTs with high and medium summer roosting potential for the Indiana bat were identified within the forested area to be cleared for bridge construction. A detailed discussion of tree clearing impacts on Indiana bats is provided in Section 5.2.2. Food chain production and general habitat functions including nesting, spawning, rearing, resting, migration, feeding, or escape cover will not be affected for other species. Habitat changes resulting from the conversion of 1.07 ac (includes permanent and indirect impacts) from PFO to PSS wetland will have a small affect on habitat within the overall PFO wetland complex. Tree removal may increase plant species diversity by creating a scrub shrub habitat pocket within the forested wetland.

Hydrology in the wetland will not be impacted by the addition of a bridge; the drainage pattern towards the NBSR will be unaffected and the wetland will continue to store storm and floodwaters. Groundwater recharge and discharge functions will not be altered.

The water quality of the existing wetland will not be impacted by the proposed bridge. Runoff from the bridge, potentially containing road salts and other pollutants will be directed away from the wetland to a water quality treatment BMP as described in the Post Construction Stormwater Management Plan and will comply with NPDES requirements. The wetland will continue to filter sediments and nutrients from surface water runoff.

The upstream and downstream property will not be affected. The water surface elevation is not expected to increase as a result of Impact F.

Impact G affects the unnamed tributary to Lake Took-A-While, located east of Confers Lane. 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.

No wetland impacts will result from the railroad crossing; however, 125 LF (0.07 ac) of stream will be permanently impacted. The culvert crossing will eliminate benthic habitat within the 125 foot length of culvert. The culvert invert will be depressed six inches below the stream bed to facilitate fish movement and to allow for the deposition of native gravels within the pipe. Erosion and sediment control BMPs will be utilized to minimize potential pollution during installation of the crossing. There will be no changes in water quality. The 48 in. culvert has been sized to convey the 100-year peak runoff. This culvert may result in a localized backwater, but any increase in flood elevation will be limited to the area immediately upstream of the pipe entrance. Recreational opportunities and adjacent property owners will not be affected.

Impact H affects the teardrop wetland drainage and Unnamed Tributary 2 (Tributary 2) to Walker Run. This reach of Tributary 2 is designated Waters of the Commonwealth and not Waters of the United States. A 428 ft long, 36 in. reinforced concrete pipe is proposed to convey the teardrop wetland drainage underneath formerly farmed agricultural fields. This structure is designed to replace an existing 567 ft long by 8 in. diameter PVC pipe and tile drainage system which currently conveys the teardrop wetland drainage underneath adjacent fields. The proposed structure is designed to convey the 100-year peak runoff event. The pipe will outlet onto a rip-rap pad. The culvert invert will be depressed twelve inches below the stream bed to facilitate fish movement and to allow for the deposition of native gravels within the pipe. No wetlands will be impacted. Food chain and general habitat characteristics will remain the same. Increased pipe size will reduce restricted flow and improve flushing characteristics. Water quality will not change as a result of this impact. Downstream and upstream property will not be affected.

Impact I is the proposed fill of Wetland #5, an isolated wetland east of North Market Street and west of the BBNPP facility. This wetland is Waters of the Commonwealth but not Waters of the United States. Construction plans propose filling the entire wetland to grade around the power block. Permanent impacts total 0.12 ac of PEM wetland. Site utilization plans were drastically changed in 2009 to avoided greater acreages of wetland impact to EV wetlands adjacent to the Tributary 1.

This wetland does not perform any principal functions and values affecting habitat, hydrology, or water quality. The groundwater discharged from this wetland is reabsorbed into the landscape immediately downslope of the wetland. Since the wetland does not currently affect Walker Run flow conditions, the impact to the wetland will not impact Walker Run hydrology or its surrounding wetlands.

Adjacent property will not be affected by this impact.

Impact J affects Wetland 49A and 49B, located east of Confers Lane near the existing SSES Switchyard. The switchyard will be expanded and Wetland 49A and 49B will be filled to accommodate the expansion. Permanent impacts resulting from this fill total 0.06 acres. Wetland 49A is isolated; therefore ACOE only takes jurisdiction of 49B (0.04 ac of permanent wetland impacts).

The switchyard will be expanded to the east to avoid greater impacts to EV wetlands located west of the switchyard. This impact will not affect any wetland functions or values. These small wetland impacts do not affect habitat and food chain production. They also do not affect hydrology or water quality due to their small size. Adjacent property owners will not be affected by this impact.

Impact K is the construction of the intake structure, access roads, and parking lot. The intake structure building will be 124 feet long by 90 feet wide with three individual pump bays. The North Branch Canal (NBC) outfall channel and its adjacent wetlands (Wetlands 43 and 44 which are both classified as PFO/PEM wetlands) will be permanently impacted by the proposed intake structure and the subsequent grading that will occur in the area.

Clearing and grading for the intake structure will permanently impact 0.98 ac of wetland. The NBC outfall channel will be eliminated which equates to 617 LF (0.07 ac) of permanently impacted stream channel.

The general habitat characteristics provided by Wetlands 43 and 44 will be permanently lost. Of the 0.98 ac of wetland impacts, 0.30 ac will be a loss of PFO. These wetlands are not unique compared to other wetlands in the area. The aquatic habitat within the intermittent NBC outfall channel will also be eliminated.

The floodflow alteration function that Wetlands 43 and 44 provide will be reduced resulting from the reduced wetland size, however no rise in the 100-year flood elevation is expected (Flood Study Susquehanna River, LandStudies, 2011) and no change to the adjoining properties will occur. Existing drainage patterns will be altered. Currently, flow within the NBC outfall channel is controlled by a weir at the NBC. The outlet channel will be eliminated and the canal will be restored to its historic condition, offering benefits to both cultural and recreational functions. In the restored historic condition, water will be contained within the NBC, offering a more stable drainage pattern and improved water quality than under existing conditions. The NBC restoration and adjacent wetland enhancement is part of the Mitigation Plan found in Section R of the JPA.

The wetlands permanently impacted by intake structure construction are not easily accessible to the public by walking trail therefore wetland values such as recreation, education, uniqueness, and visual quality will be minimally affected by this permanent impact.

Impact L affects portions of Wetlands 11 and 12, as well as Tributary 1 and Tributary 2. Impact L is caused by dewatering necessary to construct the Essential Service Water Emergency Makeup System (ESWEMS) pond. Dewatering will be accomplished through the installation of an active extraction system of wells, collection trenches and sump pumps situated at the overburden/rock interface that will be installed and maintained for up to 24 months.

At a maximum, 60 ft of water-bearing sands and gravels (part of the highly permeable glacial overburden aquifer) will be excavated for the ESWEMS pond. Approximately 230 gallons per minute (gpm) will be pumped to keep the ESWEMS pond construction area dry (Sargent and Lundy, 2010). Based upon computer modeling of groundwater levels in the vicinity of the ESWEMS pond, without minimization or mitigation, a significant depression of groundwater levels will occur over the multi-year pumping period affecting nearby wetlands and streams.

This temporary impact cannot be avoided. The ESWEMS pond is safety-related; therefore the foundation for the structure must be placed on competent bedrock. The excavation and placement of clean structural fill on bedrock must be done under dry conditions. Suitable alternative locations for the ESWEMS pond do not exist. For security purposes the ESWEMS, nuclear island, and cooling towers must all be located in close proximity. In 2009 PPL made a significant plot plan change to avoid permanently impacting EV wetlands along Walker Run and Tributary 1. The current location of the ESWEMS pond was a result of that plot plan change. The location of the pond cannot be changed without causing additional permanent wetland impacts or creating unacceptable security concerns.

A bentonite slurry wall flow barrier will be constructed to minimize the extent of groundwater drawdown resulting from ESWEMS pond construction. The slurry wall will slow ground water movement into the excavation area, thereby reducing the extent of drawdown surrounding the ESWEMS pond construction site. With the slurry wall in place, modeling indicates drawdowns of approximately 5 ft extending no further than approximately 400 ft west of the ESWEMS pond. Based on groundwater modeling, dewatering will result in temporary impacts to approximately 5.56 ac of Wetlands 11 and 12 and 1,396 LF (0.30 ac) of Tributary 1 and Tributary 2. Absent additional mitigation, this level of drawdown is likely to have a negative impact on wetland vegetation, habitat, hydrology, overall wetland biochemistry, and would reduce the functions and values of the affected wetlands over the period of impact.

Impacts must be mitigated to maintain appropriate hydrologic conditions in affected wetlands during periods of intense groundwater withdrawal. Monitoring over the next two to three years will establish baseline hydrology for the area of effect. Mitigation measures will include an irrigation system to introduce water to affected wetlands from a storage reservoir constructed on the site to store pumped groundwater. Application of stored water will be completed by a sprinkler system as needed to sustain baseline conditions. With the proposed irrigation system, wetland hydrology and vegetation will be maintained and wetland habitat will not be affected. Water quality will not change because the surface water present within the wetlands is hydraulically connected to the groundwater; therefore, the water chemistry of the irrigated water is very similar. Slurry wall use will prevent impacts to adjacent property's well water supply. Once construction is complete, the bentonite barrier will be perforated to re-establish groundwater flow

through the permeable structural fill and natural hydrology is expected to return to the wetlands and streams. Mitigation can be extended post-construction to account for any lag time. Detailed mitigation plans, including a contingency plan, is described, in detail, in Section R of this JPA.

Impact M affects portions of Wetlands 37, 38, 43, 44 and the NBC. The underground Intake lines will be 20 inch carbon steel for the Raw Water Supply and 32 inch carbon steel for the Cooling Water System Makeup Water Supply. The Blowdown line will be 26 inch HDPE. These pipes will be combined into a single trench in all locations. These lines are routed through these wetlands and the NBC to the NBSR near the proposed intake structure. No permanent impacts will result from these pipe crossings. Temporary impacts from the installation of these utilities total 0.78 ac. Tree clearing, an indirect impact, will affect 0.07 ac.

The habitat, hydrology, water quality, recreation, scientific value, uniqueness, and visual quality of the wetlands will be temporarily affected, however, the site will be returned to existing conditions following installation. Adjacent property will be unaffected by the impact.

The wetland areas temporarily impacted as a result of construction will be returned to their original grade with adequate topsoil and a seed mix consisting of native wetland species.

Impact N is the required dredging within the NBSR to create a forebay adjacent to the Intake Structure where water will be withdrawn from the river. 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 for the intake structure. The dredged area of 0.61 ac will affect 220 LF of the NBSR.

The installation of sheet pile may create some suspended sediment and remove some benthic substrate. However, the river bed in this area is coarse sand and gravel and, and as a result, excess turbidity during construction activities will be limited. It is expected that approximately 17,000 to 25,000 cubic yards (c.y.) of in-place Susquehanna River bottom substrate will be removed to accommodate the proposed in-water structures (including blowdown line) included in BBNPP design. Dredged material

will be utilized as clean, non-structural fill and 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. The capacity of these areas is more than sufficient to accommodate the expected volume. Additional information about the handling of dredged material is provided in Appendix A, Item 25. Activities in navigable waters will conform to applicable Pennsylvania and ACOE regulations.

Impacts to aquatic macroinvertebrates from dredging will be negligible as previous studies conducted for SSES Units 1 and 2 indicate that the benthic organisms are similar at locations upstream and downstream of the BBNPP site and are not otherwise unique (Unistar, 2011). Upon removal of the cofferdams, the benthic substrate should stabilize, allowing benthic species to quickly re-colonize (Unistar, 2011).

The Yellow Lampmussel and Green Floater are state protected species that have been found in the NBSR within the vicinity of the BBNPP intake structure. The Yellow Lampmussel is widely distributed and will not be affected by the limited area of disturbance needed for intake structure dredging. The Pennsylvania DCNR website states, "The green floater is often found in small creeks and large rivers and sometimes canals. This species is intolerant of strong currents and occurs in pools and other calm water areas (NatureServe 2005, North Carolina Mussel Atlas, Strayer and Jirka 1997). Preferred substrate is gravel and sand in water depths of one to four feet. This species is more likely to be found in hydrologically stable streams, not those prone to flooding and drying. Good water quality is also important for this mussel species (North Carolina Mussel Atlas)." While the intake structure will be constructed in a calm pool, the depth and substrate in this area make impacts to Green Floater habitat unlikely. PPL is coordinating with the PA Fish and Boat Commission and will obtain clearance before dredging commences.

Recreation will not be affected by this temporary impact. Boating and swimming is not allowed in the NBSR in close proximity to the SSES intake structure. This reach of the NBSR is not a spawning area for key species of recreational value.

During utilization of the cofferdam, stream flow will be directed around the dredging area. Upon cofferdam removal NBSR hydrology will return to existing conditions. Upstream and downstream property owners will not be affected by this impact.

Impact O is the required dredging within the NBSR to install the blowdown line and diffuser pipe. 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 area within the cofferdam will be dewatered and dredged by hydraulic or mechanical method and the NBSR bottom will be excavated to bury the blowdown line and install the diffuser pipe, concrete pad, and associated riprap. The blowdown line will extend approximately 325 feet from the shoreline on a slight downstream angle with the diffuser portion starting 203 feet from the shoreline. The pipe will be either 24 inch carbon steel, 24 inch RCP or 26 inch HDPE. The pipe will be anchored to a concrete pad set on the river bottom and covered with riprap for protection.

Dredged 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 volume. Additional information about the handling of dredged material is provided in Appendix A, Item 25. Activities in navigable waters will conform to applicable Pennsylvania and ACOE regulations.

Impacts to aquatic habitat, water quantity and streamflow, water quality, recreation, and upstream and downstream property will be similar to those described for the intake structure.

Impact P covers the expanse of Wetland #11, the teardrop wetland. Proposed transmission lines will span the width of this wetland. No permanent or temporary impacts will result from the transmission lines; however indirect impacts totaling 3.46 acres will result from tree removal. The wildlife habitat function of this wetland will be affected by this impact.

Tree removal will change the vegetative composition within this wetland from forested to scrub shrub. Food sources will change supporting different wildlife communities. General habitat including nesting, rearing, resting, migration, feeding, and escape cover will be reduced for certain forest dependent species. Removing the over-story will reduce plant community structure diversity (trees, shrubs, and emergent plants) that currently form the wetland plant community.

Few Indiana bat PRTs were identified within the impacted area. A detailed discussion of tree clearing impacts on Indiana bats is provided in Section 5.2.2.

The hydrology functions the wetland performs will not be changed by the indirect wetland impact. Increased water temperatures may result from decreased canopy cover. Otherwise, water quality should remain unchanged. Production export, seasonal groundwater discharge and recharge as well as recreation and upstream and downstream properties will not be affected.

Impact Q represents three locations where overhead transmission lines will span Wetland 12. Indirect impacts totaling 1.72 ac of tree removal will result from these crossings and rights-of-way. General habitat will be reduced for certain species. Multiple Indiana bat PRTs are located within this impact area surrounding the Beaver Pond. A detailed discussion of tree clearing impacts on Indiana bats is provided in Section 5.2.2. Food chain production and general habitat functions including nesting, spawning, rearing, resting, migration, feeding, or escape cover will not be affected for other species. This impact will affect the types of vegetation and therefore the types of food available in this portion of the wetland.

The impacted area is a small portion of a larger wetland complex. Therefore, any vegetation or habitat changes to the wetland resulting from the impact will have a small affect on habitat within the wetland complex.

Hydrology, water quality, recreation, and adjacent property will be unaffected by the impact. Seasonal groundwater recharge and discharge will continue to occur.

Impact R is within Wetland 18, located southeast of the BBNPP facility and east of Confers Lane. A transmission line and right-of-way will indirectly impact 0.75 ac of forested wetland. No permanent or temporary impacts will result from this crossing. The proposed overhead wires and right-of-way will be maintained as scrub-shrub. Nesting and escape cover will be reduced for certain species. This impact will affect the types of vegetation and therefore the types of food available in this portion of the wetland. Hydrology, water quality, recreation and adjacent property will be unaffected by the impact. The impacted area is a portion of a larger forested wetland. PRTs were not evaluated within this impact area.

Impact S is the water withdrawal from the NBSR associated with the operation of the Circulating Water System (CWS) and Raw Water Supply System (RWSS). The CWS provides water to the cooling towers and the RWSS provides treated water to the power plant and the Essential Service Water System (ESWS). Impact S does not cause any wetland impacts. The Susquehanna River Basin Commission (SRBC) application will address the affects of this impact including water quantity and stream flow, water quality, aquatic habitat, as well as provisions for low flow conditions and consumptive use mitigation. A summary of these impacts is provided below.

Physical impacts of cooling system water withdrawal could include alteration of site hydrology in the immediate vicinity and downstream of the intake structure. It is estimated that the BBNPP CWS and Raw Water Supply System (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. BBNPP makeup water withdrawal rate during normal operations represents less than 1% of average annual Susquehanna River flow and approximately 5% of the 7Q10 low flow as measured at the USGS Wilkes-Barre Gage. Studies have been completed to determine if the new flow rates, based on BBNPP consumptive use, will have a negative effect on aquatic habitat, vulnerable aquatic species, and water quality, especially during drought or low flow conditions.

An Instream Flow Incremental Methodology (IFIM) Study has been completed on the NBSR (Normandeau, 2011). The purpose of this study is to determine the impact of a small change in NBSR flow on aquatic habitat. Various time-series analyses were performed using historical gage data from the USGS Wilkes-Barre stream gage on the Susquehanna River, alternative consumptive use and flow scenarios, and daily flows converted to weighted useable areas (WUAs) for eight fish species during various life stages. The NBSR flow, velocity, and depth information were analyzed to determine WUAs for the eight species. Seven life stages including four of the species showed no negative impact because decreases in flow represented increased weighted usable area. For 16 life stages involving eight species, small and infrequent negative impacts were detected. Negative impacts represented two to three percent of the weighted usable area and only occurred approximately ten percent of the time-series record. The greatest decreases on weighted usable habitat were for the Northern Hogsucker adult. The complete IFIM results are included in the report "Potential Effects of the Bell Bend

Project on Aquatic Resources and Downstream Users" (Normandeau, 2011, draft) provided in Appendix B of the JPA.

Water quality concerns relating to decreased River flow in relationship to the Nescopeck Creek abandoned mine drainage (AMD) plume at the confluence of the NBSR were also studied. Alkalinity, pH, temperature, and conductivity were measure to map the AMD plume within the NBSR. Results of the study demonstrate that AMD effects are only detectable on the south shoreline and dissipate with 0.6 miles of the confluence. The anticipated reduction in flow from BBNPP consumptive use will not change the plume behavior. Complete study results are included in the report, "Potential Effects of the Bell Bend Project on Aquatic Resources and Downstream Users" (Normandeau, 2011, draft) provided in Appendix B of the JPA.

The affect of summertime conditions in the NBSR including low flow and increased river temperatures may negatively affect spawning, fry emergence, rearing, and nursery habitat suitability for juvenile smallmouth bass. A study was conducted to continuously measure NBSR pH, dissolved oxygen levels and water temperature in backwater habitat areas used by young-of-year smallmouth bass. Water quality measurements were taken between June and September 2010. Based on historical NBSR flow data, measurements taken during summer 2010 represented near worst case flow conditions. The data was used to determine potential affect of BBNPP discharge on the water quality of the NBSR. Stressful water quality conditions are those which deviate from Pennsylvania's water quality standards for pH, dissolved oxygen, and water temperature. Data suggests that during the summer months associated with periods of significant low flow, incipient, or apparent drought similar to those recorded in 2005 and 2010, there are natural occurrences of water quality not meeting State standards. These naturally occurring variations from the Pennsylvania Water Quality Criteria in water temperature and dissolved oxygen were of short duration and were limited to the shallow and inshore locations. The consumptive water use of 43 cfs from the NBSR during average low flow summer periods would represent a small percentage reduction in flow (approx. 1%) which would not be expected to exacerbate naturally occurring variations from the standards. It may be surmised that these conditions will occur in the future with or without the proposed consumptive water use associated with the Bell Bend Project and that this project will not contribute in any appreciable way to the temporal or spatial increase of these occurrences. Complete study results are included in the report

"Potential Effects of the Bell Bend Project on Aquatic Resources and Downstream Users" (Normandeau, 2011, draft) provided in Appendix B of the JPA.

Aquatic impacts attributable to operation of the BBNPP intake structure and cooling water systems include impingement of organisms on the traveling screens and entrainment of fish eggs and larvae within the cooling system. Use of closed-cycle cooling systems at BBNPP will significantly reduce these impacts compared to power plants that operate open-cycle (once-through) cooling. In addition, BBNPP will incorporate NPDES design criteria to limit intake approach water velocities to less than 0.5 ft/sec.

The "Impingement and Entrainment Sampling for the Proposed Bell Bend Nuclear Power Plant at the SSES Circulating Water Supply System Intake Structure" (Normandeau, 2010) results found crayfish to be the dominant organism and bluegill the most abundant fish in the impingement samples. Other common fish species affected by impingement included rock bass, channel catfish, tessellated darter, and spotfin shiner. Fish size ranged from 40 mm to 381 mm. Cyprinidae was estimated to be the most abundant species affected by entrainment. Other common fish affected by entrainment include channel catfish, quillback, darter species, white sucker, and common carp. A majority (55.9%) of the entrained fish were larvae in the post yolk-sac life stage. No fish eggs were collected in entrainment sample. Impingement and entrainment will affect some recreationally important species such as channel catfish, smallmouth bass, walleye, rock bass, and yellow perch. Studies completed in the vicinity of the SSES intake structure have not shown measurable impacts on fish populations within the NBSR from entrainment.

It is unlikely that the Yellow Lampmussel or Green Floater mussels will be susceptible to impingement or entrainment. Mussels are burrowing, bottom oriented species and it is unlikely that these organisms would become entrained in the water column and enter the CWS Makeup Water Intake Structure. Neither of these species has been collected in impingement studies at SSES, Brunner Island Steam Electric Station, or Hunlock Power Station (Unistar, 2011). However, the small possibility does exist that fish that have been infected with glochidia (mussel larvae) could become entrained or impinged (Unistar, 2011). This occurrence could make the glochidia susceptible to both entrainment and impingement. The host fish species for larvae of Green Floater are

unknown. Yellow Lampmussel glochidia hosts include White perch and Yellow perch. No White perch were collected during impingement and entrainment sampling at SSES during 2008. Yellow perch was collected in low numbers in both entrainment (52 individuals) and impingement samples (3 individuals) at SSES during 2008 (Unistar, 2011, draft).

Recreation will be minimally impacted by consumptive water use. Small and infrequent impacts on game species of fish and non-game species of fish will occur. Boating, swimming, and other activities common upstream and downstream of the BBNPP will not be affected.

The BBNPP consumptive water use was also analyzed in relation to low flows and impacts on downstream water users. The study reviewed NPDES and SRBC withdrawal permits and the flow requirements of each user based on the range of flows throughout the stream reaches. Complete study results are included in "Potential Effects of the Bell Bend Project on Aquatic Resources and Downstream Users" (Normandeau, 2011 draft) provided in Appendix B of the JPA.

Consumptive water use will not increase flood elevation or frequency. See "Susquehanna River Flood Study" (LandStudies, 2011) for additional information.

PPL continues to discuss appropriate mitigation for water withdrawals with the SRBC. A conceptual mitigation plan is described in Section R of this JPA.

Impact T is the blowdown discharge into the NBSR through a submerged multi-port diffuser. The diffuser pipe will be either 24 inch carbon steel, 24 inch RCP or 26 inch HDPE. Blowdown from the cooling towers is stored in the 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. Under normal conditions approximately 8,665 gpm of blowdown water will be discharged. Maximum flow is anticipated to be 9,367 gpm. No aquatic impacts are expected to result from the blowdown water based on Ecology III studies of the SSES blowdown flow that began in 1983. SSES flow exceeds the projected BBNPP blowdown flow by approximately 8 million gallons per day (mgd). The BBNPP diffuser design is similar to the SSES diffuser. Temperature of this discharge will be less than two degrees above ambient creating a small thermal plume which quickly dissipates to

ambient river temperature. A discharge plume model was used to compute the size, configuration, and dilution rates of the thermal plume resulting from discharges into the NBSR. Modeling of this plume shows that its size and distribution will meet all state and federal water quality criteria and will be sufficiently small that it is unlikely to cause impacts to the Susquehanna River's benthic community or motile organisms in the area (ERM, 2008). Additional information is provided in Appendix A Item 34.

An additional study of the blowdown plume has been implemented at the request of the SRBC. The study modeled increases in NBSR temperature and decreases in dissolved oxygen resulting from the plume at various River flow scenarios, taking into account the consumptive use of BBNPP. Results from an EPA model were compared to actual observed field plume measurements for the SSES. The model results were field verified. The EPA model demonstrated similar small plumes for BBNPP blowdown under normal circumstances and extreme flow conditions. Complete study results are included in "Potential Effects of the Bell Bend Project on Aquatic Resources and Downstream Users" (Normandeau, 2011, draft) provided in Appendix B of the JPA.

Included in the blowdown discharge are residual chemicals used in biocide treatment and in plant process control. The concentrations discharged will be in conformance with NPDES permit conditions and applicable water quality criteria. Additionally, the amount of water being discharged from the closed-cycle system will be small compared to river flow, such that concentrations of chemicals discharged will rapidly disperse. Solids will be allowed time for settlement and chemical treatment, if required, in the Combined Waste Water Retention Pond. Water will be returned to the NBSR at velocities that will not cause riverbed materials to go into suspension.

Water quantity and adjacent property owners will not be affected by this impact.

Blowdown water will not affect recreational activities in the vicinity of the NBSR such as boating, swimming or fishing. Recreational activities are not currently permitted in the vicinity of SSES intake. SSES utilizes "No Trespassing" signs along the shoreline and around the structure. There is a sign on the intake structure telling boaters to stay back. Plant Security uses remote sensing technologies to enforce the warnings.

Impact U represents all of the storm sewer outfalls, most of which are level spreader stormwater discharges as shown on the plan sheets in Section F of the JPA. One 18

inch pipe outfall is proposed to provide drainage to the area impounded behind the intake structure fill. This impact will be in compliance with existing NPDES stormwater requirements.

The project involves substantial land alteration, implementation of BMPs throughout the site, and discharges of treated stormwater to on-site wetlands and the NBSR. The BBNPP plans to use appropriately designed and sited BMPs to minimize impacts that can result from stormwater discharges such as changes to watersheds, water temperatures, water chemistry or hydrologic cycles.

Subsurface infiltration is used extensively in BBNPP design to regulate temperature, water quality, and velocity of collected stormwater prior to reintroduction to wetlands and waterways at the site. Further, project design also incorporates capture, treatment, and return of stormwater in a manner which preserves existing water budgets and prevents disruption of hydrologic cycles which may impact wetland function.

Potential sources of thermal impact include runoff from the proposed access drives, parking lots and buildings. Runoff from the warm impervious areas will be mitigated by routing the stormwater through a series of grass-lined swales, rain gardens, and deep, low sloping pipes before draining into a series of subsurface infiltration/detention basins. The infiltration/detention basins and rain gardens areas will provide for permanent storage of the first flush storms, thus limiting the discharge of the warmer waters. Many of the basins will discharge via level spreaders to existing wetlands and other vegetated areas before entering the adjacent watercourses. These features will combine to mitigate any thermal impacts and allow the runoff to return to ambient temperature. Additional detail on BMPs and operation practices is provided in the referenced NPDES application as well as the BBNPP Post Construction Stormwater Management (PCSM) Plan.

3.2 Cumulative Loss of Forested Wetlands

Cumulatively, including permanent, temporary, and indirect impacts, 9.51 acres of forested wetland will be cleared. This cumulative impact will affect food chain production, general habitat functions including nesting, spawning, rearing, resting, migration, feeding, and escape cover. Specifically, potential Indiana Bat habitat will be affected. PFO clearing, generally occurs in small pockets. The change in cover will not

affect water quantity and stream flow, water quality, or upstream and downstream property. Most forest clearing is on project property therefore recreation will not be affected.

PFO will be replaced through the mitigation strategy described in Section R. In addition, 50 foot forested buffers will remain surrounding the majority of EV wetlands within the Project Boundary.

3.3 Additional Information

Additional information regarding the acreage of each proposed wetland impact, broken down by cover type is provided in the Wetland Impact Tables included in Enclosures D3 and D4.

Use of marsh mats will be limited to areas with permanent impacts and the areas under the proposed bridges, as described above. Site conditions may warrant additional use, however, marsh mat use will be limited to the greatest extent practicable.

The following additional project impact information is provided in Appendix A of the JPA.

1. The length and average width at the approximate ordinary high water mark of each stream proposed to be impacted (Item 20).
2. Description of invasive plant species monitoring and restoration in proposed work area (Item 32).
3. Additional descriptions, including whether an impacted wetland abuts, is adjacent to a stream or isolated is provided in the draft Approved JD forms (Item 37).

4. Upstream and Downstream Property

There will be no affect on upstream or downstream property.

5. Other Environmental Factors

5.1 Maintenance Impacts

5.1.1 Intake Structure

The BBNPP cooling water intake structure (CWIS) will require regular maintenance actions to ensure safe and efficient mechanical performance over the lifespan of the BBNPP facility.

The primary components of the CWIS are the intake bay itself, which is to be constructed on the west bank of the NBSR, a blowdown diffuser line constructed on the riverbed and extending downstream (south) of the intake bay, and the dredge envelope within the river. The BBNPP CWIS is physically similar to the existing SSES CWIS, and maintenance needs are anticipated to be effectively the same.

Intake Bay Cleaning - The BBNPP intake bay will be constructed with a 3 bay arrangement, with each bay being approximately 30 feet wide. It is expected that all 3 bays will be cleaned (de-mucked) every 18 to 36 months. Unlike the SSES intake, the intake bay for BBNPP is contiguous to the NBSR and will not be dewatered prior to cleaning, however the intake bay will be closed off from the river to the extent practical to prevent loss of sediment-laden water to the river.

Accumulated sediment (wet silt and debris) will be trucked to the BBNPP facility and stockpiled in an appropriate upland location. It is PPL's practice at SSES to use this sediment as fill material on an as-needed-basis, and this practice is proposed to be continued at BBNPP. It is expected that this practice would produce approximately 50 cubic yards of mud and debris (or less) during each cleaning event.

Maintenance Dredging - Maintenance dredging in the NBSR is proposed to be performed throughout the same dredge envelope and to the same depth (including overdredge) as proposed during initial construction. It is projected that this activity would be required every five to ten years, depending on Susquehanna River flow rates. Approximately 250 to 1,000 C.Y. of sediment is expected to be removed from the dredge envelope using mechanical dredge equipment and best management practices (BMPs) identical to those proposed to be used during initial dredging (described in Appendix A, Item 21). The dredged material is proposed to be used as clean fill at BBNPP, and handled in the same manner as described for the material removed from the intake bay. PPL requests that the ACOE and DEP include maintenance dredging in BBNPP project permits.

5.1.2 Diffuser Maintenance

The BBNPP blowdown diffuser will be constructed with a flap gate on its end to allow access by divers. Every 18 to 36 months, divers will access the diffuser pipe through a flap gate at its end and loosen accumulated material (silt and stones), which will be allowed to be flushed from the diffuser and from the riverbed area immediately adjacent to the flap gate. Less than 10 C.Y. of material is expected to be flushed into the Susquehanna River during each cleaning.

5.1.3 Transmission Line Maintenance

Forested areas within transmission line right-of-ways will be cleared initially for project construction. Post construction the vegetation in these areas will be maintained as scrub/shrub. The Pennsylvania Audubon Society and PPL Electric Utilities are working together to manage power line rights-of-way to provide important bird habitat while maintaining consistency with PPL's vegetation management practices to support electric reliability.

5.2 Cumulative Environmental Impacts

No other dams, water obstruction or encroachments will be needed in addition to those described in this application. A summary of stream and wetland cumulative environmental impacts is provided below. To determine cumulative effects at BBNPP, readily available environmental documentation regarding known current and past actions in the project area were reviewed. For the region of influence, specific emphasis was placed on projects in and adjacent to the Project Boundary and Luzerne and Columbia counties. Cumulative impacts include those that are incremental to past and ongoing activities on the site, along with those that are reasonably foreseeable in the future.

Construction impacts associated with BBNPP include grading and clearing, allocation of land to material lay-down and parking, use of ground and surface waters, equipment noise and emissions, increased traffic and use of public resources. These activities are consistent with those conducted during the construction of Susquehanna Steam Electric Station (SSES) Units 1 and 2. Many of the impacts will be temporary and most can be mitigated through the use of best management construction practices and stormwater pollution prevention planning required under State and Federal regulation.

A detailed description of all cumulative impacts resulting from BBNPP construction and operation that are not directly related to streams and wetlands are provided in Appendix

A of the JPA, Item 10. Cumulative impacts relating to surface and groundwater resources, aquatic and terrestrial organisms, recreation, and land use are described below.

5.2.1 Impacts to Groundwater, Surface Water, and Aquatic Organisms

The Project Boundary sits on an upland area, approximately 174 ft above the NBSR water level and approximately 1.6 mi north-northeast of the confluence of Walker Run and the NBSR. The proposed BBNPP CWS Makeup Water Intake Structure site is approximately 22 miles downstream of Wilkes-Barre, PA and 5 miles upstream of Berwick, PA (Unistar, 2011). The NBSR ultimately receives all surface water and groundwater that drains from the BBNPP site.

Impacts on wetlands, surface waters and groundwater resources may result from construction activities that change flow patterns such as construction of sedimentation impoundments, stormwater runoff and dewatering, or discharge of construction related waste effluents. Environmental controls will conform to applicable regulations and best management practices to minimize these effects. Examples include sediment control, stormwater retention, spill prevention, and control of construction debris. Efforts to reclaim areas not occupied by permanent structures or to provide offsetting habitat such as reforestation and constructed wetlands have also been planned.

Walker Run has been classified as a Wild Trout stream by the PA Fish and Boat Commission. Wetlands contiguous to Walker Run are consequently classified as EV per 25 PA Code Chapter 105. Additional attention was given to avoiding and minimizing impacts to Walker Run and the associated wetlands, and major design changes were made to this end at great expense to the applicant. No cumulative impacts to Walker Run are expected.

Preventative measures and corrective actions identified above and the short-term nature of construction activities should limit long-term cumulative impacts.

Minimal cumulative impacts to hydrology, water quality, and aquatic organisms are expected as a result of plant operation. Stormwater best management practices will limit long-term impacts to Walker Run, its tributaries, as well the NBSR. EV wetlands will be protected by 50-ft forested buffers to the greatest extent practicable. Cumulative impacts from water intake and blowdown will be small based on aquatic studies

performed for the proposed BBNPP as well as long-term monitoring of the affects of the SSES on the NBSR.

As a result, the cumulative impact on regional surface and groundwater from BBNPP construction in conjunction with the continued operation of SSES Units 1 and 2 should be small.

5.2.2 Land Use Impacts

The topography of the site is a gently rolling plateau with east-west trending ridges to the north. Grade elevations at the site range from 485 ft mean sea level at the NBSR to approximately 800 ft on the hill where the power block is located. The highest point of the proposed finished grade level is approximately 719 ft above sea level.

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. The majority of land use conversion will result from the footprint of the plant and vegetation clearing for transmission line rights-of-way.

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 were located to minimize impacts on the remaining

forest. 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. As part of mitigation activities an effort will be made to replant forested areas in strategic locations that will create forested corridors throughout the BBNPP property boundary. In addition, 50 foot (minimum) forested buffers will be maintained, to the greatest extent practicable, adjacent to EV streams and wetlands to protect these resources during construction and operation of the BBNPP and reduce the potential for any additional impacts. In addition, the extent of the forested buffers will be increased as part of the mitigation strategy and bat management strategy.

5.2.3 Impacts on Terrestrial Species of Concern

Through correspondence with state and federal agencies and in-field reconnaissance, the diverse upland habitats at the BBNPP site have been determined to potentially support several rare or protected terrestrial species, including the butterflies Baltimore Checkerspot (*Euphydryas phaeton*) and Mulberry Wing (*Poanes massasoit*), the Northern Cricket Frog (*Acris crepitans*), and the (state and federally listed) endangered Indiana bat (Myotis sodalis).

The state and federally protected Indiana bat is known to use hibernacula located within 10 miles of the BBNPP site. Based upon USFWS correspondence, the existence of these hibernacula, along with suitable habitat (wetlands, forests, and riparian areas), make the site suitable for use by this species. A Bat Roost Tree Survey confirmed suitable Indiana Bat habitat in areas proposed to be impacted by BBNPP construction. PPL is coordinating with the USFWS to ensure impacts to the Indiana bat are avoided through project design and provision of suitable on- and off-site mitigation.

Tree clearing will occur between November 15 and March 31 while bats are hibernating to avoid direct mortality during time periods when the bats could potentially be using the site. PPL will adopt design measures that are intended to avoid and minimize potential indirect impacts on Indiana bats due to habitat loss that may occur as a result of the construction of BBNPP. The effort to minimize habitat loss will be focused on wetland

and riparian areas, where roost trees are present in greater densities and Indiana bats also drink and often forage. Minimizing impacts to wetland and riparian areas includes retaining a 50-ft buffer around Walker Run and its tributaries and adjacent wetlands. These BMPs will minimize the indirect effects on Indiana Bats by reducing adverse impacts on aquatic insect populations and riparian and wetland foraging habitat. Minimal impacts to potential bat populations are expected as a result of plant operation. No impacts are expected as a result of plant maintenance since areas requiring maintenance will have been previously altered and will not contain any Indiana bat habitat.

The life cycle of the Baltimore Checkerspot is tied closely to its host plant, turtlehead (*Chelone glabra*). Turtlehead was not found in the wetlands at the BBNPP site. The Mulberry Wing butterfly prefers tall grass meadow and sedge meadow habitat. Neither of these butterfly species has been sighted within the BBNPP project boundary. For these reasons no significant impact is expected to occur to either butterfly species.

One Northern Cricket frog call was heard by Normandeau Associates during field surveys on the Bell Bend Nuclear Power plant site. The call was heard near the farm pond, which will not be impacted by project construction or operation. The Northern Cricket frog had not been heard prior and has not been heard since, near the farm pond or at any other location within the BBNPP project boundary. The Northern Cricket frog has also never been sighted within the BBNPP project boundary. Habitat preferences include sunny, shallow ponds with abundant vegetation in the water and on the shore and slow-moving, algae covered water courses with sunny banks (NYDEC, 2009). The BBNPP project will not affect the existing ponds on-site. In addition the planned mitigation on Walker Run should benefit any potential cricket frog populations through increasing the quantity and quality of wetlands adjacent to Walker Run. Details regarding the mitigation plans can be found in Section R of the JPA. In a letter dated March 11, 2011 the PA Fish and Boat Commission stated "According to our review of the wetland delineation report, the field survey of terrestrial fauna, and the proposed project plan, we do not anticipate adverse impacts from the proposed project to the Northern Cricket Frog, which has not been confirmed on the site." This letter is included in Section E of this JPA.

Clearance for proposed actions potentially affecting important species will be secured from each respective agency prior to commencing work on the proposed project.

6. References

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