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~~Appendix E. Resource Management Plan for Reforestation, Natural Succession and Habitat Conservation Lands~~

LIST OF ACRONYMS

BA - Biological Assessment

BBNPP - Bell Bend Nuclear Power Plant

BEMP - Biological Evaluation and Management Plan

BMPs - Best Management Practices

CFR - Code of Federal Regulations

COL - Combined License

CWS - Circulating Water System

EIS - Environmental Impact Statement

ESA - Endangered Species Act

ESWEMS - Essential Service Water Emergency Makeup System

ESWS - Essential Service Water System

FERC - Federal Energy Regulatory Commission

IBCF – Indiana Bat Conservation Fund

LOD – Limit of Disturbance

NBCT - North Branch Canal Trail

NPDES - National Pollutant Discharge Elimination System

NRC - Nuclear Regulatory Commission

NUREG - NRC Regulatory Guidance

PADEP - Pennsylvania Department of Environmental Protection

PDCNR - Pennsylvania Department of Conservation and Natural Resources

PFBC - Pennsylvania Fish and Boat Commission

PGC - Pennsylvania Game Commission

UniStar - UniStar Nuclear Energy, LLC

SACTI - Seasonal/Annual Cooling Tower Impact

SGL - State Game Lands

SSES - Susquehanna Steam Electric Station

USACE - U.S. Army Corps of Engineers

USEPA - U.S. Environmental Protection Agency

USEPR - U.S. Evolutionary Power Reactor

USFWS - U.S. Fish and Wildlife Service

WNS – White-Nose Syndrome

1. INTRODUCTION

1.1 Background

The Nuclear Regulatory Commission (NRC) is considering the combined operating license (COL) application of PPL Bell Bend, LLC (PPL) for the construction and operation of a new nuclear plant to be designated as the Bell Bend Nuclear Power Plant (BBNPP, or Project). BBNPP will be located in Salem Township, Luzerne County, Pennsylvania, adjacent to the existing Susquehanna Steam Electric Station (SSES) near the Susquehanna River. The BBNPP site is located approximately 5 miles (8 km) northeast of Berwick, Pennsylvania.

The NRC is the lead federal agency responsible for preparing an Environmental Impact Statement (EIS) in accordance with 10 CFR 51 for the construction and operation of the new unit that will be authorized by the COL. The decision to approve a license can only be made by the NRC upon the completion of the EIS. The U.S. Army Corps of Engineers (USACE) is serving as a cooperating agency in the development of the EIS with respect to the requirements of USACE regulations at 33 CFR 320 through 332, the federal Clean Water Act Section 404(b)(1) Guidelines, Section 10 of the Rivers and Harbors Act of 1899, and the USACE public interest review process.

Under Section 7 of the Endangered Species Act (ESA), all federal agencies participate in the conservation and recovery of listed threatened and endangered species. Section 7(a)(2) of the ESA requires that federal agencies ensure that any action they authorize, fund or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. Furthermore, Section 7 provides guidance for the consultation process and federal interagency cooperation to conserve federally listed species and designated critical habitats, including the development of a Biological Assessment (BA). A BA may be necessary if the information available to the lead federal agency and the U.S. Fish and Wildlife Service (USFWS) through the informal consultation process is insufficient to conclude that the proposed action is not likely to affect listed species or critical habitat that may be present in the Project Action Area.

As a part of the licensing process, the NRC requested comment, in a letter dated January 12, 2009, from the USFWS on the environmental scoping process and federally protected species within the area affected by the proposed construction of BBNPP. In response to the NRC request, the USFWS indicated in a letter dated July 10, 2009 (Appendix A) that the BBNPP project is located in proximity to three known hibernacula for the federally–listed, endangered Indiana bat (*Myotis sodalis*) and the Indiana bat may be adversely affected by the clearing of forested areas that support foraging, roosting or fall swarming habitat. In this same letter, the USFWS recommended that PPL implement avoidance, minimization, and compensatory mitigation measures to avoid adverse effects to the species (USFWS, 2009).

This Biological Evaluation and Management Plan (BEMP) has been prepared to provide the NRC with baseline information for the development of a BA, which would determine whether there would likely be any adverse effects from the Project on this federally protected species. Appendix A provides the consultation record for the project. Appendix B provides a sequence of maps illustrating the proposed phases of Project construction. Appendix C provides the results of the site-specific Indiana bat mist net and roost tree surveys conducted for this project, including the results of an updated mist net survey performed during 2013. Appendix D provides a calculation worksheet related to funding of the Indiana Bat Conservation Fund (IBCF) which is PPL's proposed Project mitigation alternative. ~~Appendix E provides a Resource Management Plan for Reforestation, Natural Succession and Habitat Conservation Lands which has been identified herein as an alternative mitigation option.~~

1.2 Purpose

The purpose of this BEMP is to assess potential effects of site preparation activities, the construction of support facilities, mitigation and restoration activities, and the construction, operation and maintenance of the BBNPP on the Indiana bat.

1.3 Proposed Action

PPL is planning to construct and operate the new BBNPP on property adjacent to the existing SSES Units 1 and 2. The purpose of the proposed new nuclear power plant is to generate electricity (baseload power) for sale. The construction and operation of BBNPP will be authorized by federal action resulting in the issuance of a COL by the Nuclear Regulatory Commission under 10 CFR 52. BBNPP will be constructed based on the U.S. Evolutionary Power Reactor (U.S. EPR™) reactor design. Structures and facilities associated with the construction and operation of the plant will include the main power block buildings, cooling towers, switchyards and on-site transmission lines, a water treatment building, a wastewater retention pond, an emergency water makeup pond, water intake and discharge structures, water intake and discharge pipelines, storm water infiltration basins, plant access roads, a rail spur, temporary and permanent parking areas, construction laydown areas and various temporary and permanent ancillary facilities.

1.4 Affected Species

The USFWS has determined that the Indiana bat may be present in the area affected by the Project, because of the proximity of the project site to several hibernacula, and it is therefore likely that suitable habitat that exists within the BBNPP project area is used by this species (Turner et al., 2009). The Indiana bat is federally listed as endangered and listed in the Commonwealth of Pennsylvania as endangered.

2. CONSULTATIONS AND SITE SURVEYS

In December 2007, PPL requested an environmental review of the BBNPP site and vicinity for the presence of rare, threatened and endangered species from the USFWS, Pennsylvania Game Commission (PGC), Pennsylvania Fish and Boat Commission (PFBC), and Pennsylvania Department of Conservation and Natural Resources (PDCNR). In the Commonwealth of Pennsylvania, jurisdiction for mammals, including the Indiana bat, falls under the purview of the PGC and the USFWS. Responses from all four agencies regarding the presence or absence of rare, threatened and endangered species within the vicinity of a project area were valid for one year[1].

In a letter dated January 18, 2008 (Appendix A), the USFWS indicated that the BBNPP site was within the range of the Indiana bat and requested that PPL provide additional information on forested areas that would be disturbed by the Project. The PGC, in a letter dated April 10, 2008 (Appendix A), indicated that the BBNPP site was within the range of two species of special concern: small-footed myotis (*Myotis leibii*), which is state threatened, and northern myotis (*Myotis septentrionalis*), which is a state candidate species. The Indiana bat was not included by the PGC as a species of concern that may occur in the vicinity of the BBNPP site.

PPL provided the information requested by the USFWS on March 26, 2008 (Appendix A). In response, in a communication dated April 21, 2008 (Appendix A) the USFWS requested that a bat survey of the project area be completed between May 15 and August 15 and that any caves or mine openings on the site be identified.

As a result of this letter, a survey was completed to determine if the Indiana bat was present on the BBNPP site. This investigation was conducted by Dr. Karen Campbell, a USFWS-approved Qualified Indiana Bat Surveyor, between June 7 and July 11, 2008 following the USFWS Bat Mist Netting Guidelines. Study techniques included mist net sampling, acoustic (echolocation) monitoring using hand-held AnaBat ultrasonic detectors, and a survey for cave and mine openings that could indicate the potential presence of hibernacula on-site. The primary purpose of surveys conducted under these guidelines was to identify the presence or probable absence of maternity colonies.

No Indiana bats were collected during the 2008 mist net survey and none were detected by acoustic monitoring. In addition, no potential hibernacula were identified within the BBNPP Project Boundary.

Although no Indiana bats were collected during the mist net survey, four northern myotis (*Myotis septentrionalis*), eight little brown bats (*Myotis lucifugus*), and four big brown bats (*Eptesicus*

[1] Effective July 2, 2012 PNDI receipts and clearance letters issued by the jurisdictional agencies are valid for two years.

fuscus) were captured, tagged and released. Results of acoustic monitoring were consistent with the echolocation signatures for big brown bats and the *Myotis* species captured during mist netting. The little brown and big brown specimens included reproductively active females, and adult or juvenile males, while the northern myotis specimens were all adult males. These findings suggest that northern myotis use of the site may be limited to roosting only, while the other two bat species use the site for both roosting and maternity colonies (AREVA, 2010b). The little brown bat (Kunz et al., 2010) and northern myotis (USFWS, 2011a) have the potential to be listed by the USFWS in the near future.

Results of the investigation were included as part of the COL application Environmental Report submitted to the NRC in October, 2008 (UniStar, 2010). As previously discussed, the NRC subsequently requested comment, in a letter dated January 12, 2009, from the USFWS on the environmental scoping process and federally protected species within the area affected by the proposed construction of BBNPP.

The USFWS indicated in its July 10, 2009 response to the NRC (Appendix A) that the Service could not conclude that either summer habitat for Indiana bat males or maternity colonies would not be affected by the BBNPP Project, due to the mist netting survey area that was selected, and it should be assumed that suitable forested areas on the site could potentially be used by Indiana bats for fall foraging, roosting and swarming habitat, because BBNPP is located within 10 miles of a hibernaculum.

On February 9, 2010 a meeting was held at USFWS Offices in State College, PA with representatives of NRC, USACE and USFWS. The original topic of the meeting was to discuss avoidance and minimization activities to protect the Indiana bat; however, USFWS also discussed the need to perform a Biological Assessment (BA) for Indiana bats to fulfill ESA Section 7 requirements relative to documentation of potential significant impact to the Indiana bat. Discussion with the agencies also included lead agency designation and the scope of the BA.

Representatives of the USFWS, NRC, USACE and PPL discussed the conclusions of the USFWS response letter on June 1, 2010 (Normandeau, 2010a). Following the discussion, the USFWS and USACE also inspected forested areas on the BBNPP site. As an outcome of the discussion, the NRC determined that it should prepare a BA for the Indiana bat.

In September 2010, PPL requested environmental reviews for the presence of rare, threatened and endangered species from the USFWS, PGC, PFBC, and PDCNR for a study area encompassing the BBNPP Project Boundary and a surrounding 0.5 mile buffer. These environmental reviews were needed to cover the expanded project area and because agency responses to the initial project review were more than one year old and no longer valid.

The PGC, in a letter dated December 28, 2010 (Appendix A), responded that potential impacts to the Indiana bat may be associated with the Project. However, in contrast to the agency's April 21, 2008 response discussed above, no other potential species impacts were noted. Furthermore, PGC stated that it would defer to the USFWS on potential project impacts, since the Indiana bat is a federally-listed endangered species. No letter of response has been received yet from the USFWS.

The USFWS, in a letter dated May 7, 2012 to the NRC (Appendix A), provided comments on the draft Indiana Bat Biological Evaluation and Management Plan for the Proposed Bell Bend Nuclear Power Plant Project Site (Draft BEMP), November, 2011. The Draft BEMP included reforestation, natural succession, and conservation of certain existing forested lands as proposed mitigation. The USFWS letter requested additional information on forest cover within 10 miles of the BBNPP project site; a reanalysis of forest fragmentation as a result of construction activities, revised language regarding "danger tree" removal between April 1 and November 15; development of a Resource Management Plan for habitat conservation, reforestation and natural succession lands proposed for mitigation; a request to start natural succession and reforestation, and clarification on who will hold the conservation easement for the mitigation lands, and commitment to a new mist net survey of the BBNPP project site in 2013. In addition, the USFWS in their May 7, 2012 letter noted a requirement for a new mist net survey in 2013.

The PGC in a letter dated August 29, 2012 (Appendix A) noted potential impacts to the Indiana bat and state treathened Eastern Small-footed Myotis and state species of concern Northern Myotis. Via this letter the PGC again deferred comments regarding potential impacts to the Indiana bat to the USFWS.

On November 29, 2012 the USFWS provided a response to an additional PPL PNDI request and again noted the Indiana bat as the only federal species of concern (Appendix A).

A revised BEMP (Rev. 0) was prepared to address the above comments and circulated for further ageny review. This revision provided a schedule and maps of construction phases as Appendix B, and included as Appendix D a calculation sheet in support of funding the IBCF, and also included a Resource Management Plan for Reforestation, Natural Succession, and Habitat Conservation Lands as Appendix E that PPL was proposing only as an alternative to payment to the IBCF.

The USFWS provided comments on BEMP, Rev 0 in a letter dated March 29, 2013 (Appendix A). In this letter the USFWS concluded that certain forest fragments were sufficiently removed from work activities to conclude that they would not be expected to be adversely affected by project activities, and that mitigation funding to the IBCF could be accordingly adjusted. USFWS also noted that in the NRC prepared BA that the final proposed mitigation plan (IBCF or on-site mitigation) would need to be specified.

New guidance for the conduct of Indiana bat summer surveys was issued by the USFWS in May 2013 (USFWS, 2013). A study plan for a 2013 mist net survey was subsequently developed in consultation with the USFWS and PGC. These studies were subsequently undertaken from May 19 to June 5, 2013. A report summarizing the results of the 2013 survey is contained in Appendix C. In summary, 12 mist net locations were surveyed at the Bell Bend site. Although no Indiana bats were collected during the mist net survey, 29 big brown bats, four eastern red bats (*Lasiurus borealis*), two tri-colored bats (*Perimyotis subflavus*), and one northern myotis (*Myotis septentrionalis*), were captured, measured and released. The big brown and eastern red specimens included reproductively active females, and adult or juvenile males, the tri-colored specimens were pregnant females, and the northern myotis specimen was a lactating female. These findings suggest that all four bat species use the site for both roosting and maternity colonies (Normandeau, 2013).

This final BEMP, Rev 1 addresses the above comments and updated field survey results.

3. PROJECT DESCRIPTION

The BBNPP Project Boundary encompasses 2,055 acres (831.6 hectares [ha]) of land in an area of open deciduous woodlands interspersed with grasslands, previously cultivated fields, and orchards that support a variety of habitats as well as the facilities for the existing SSES Units 1 and 2 (Figure 1). The limit of disturbance (LOD) boundary associated with BBNPP encompasses 687 acres, of which 677 acres (274 ha) will actually be disturbed by site preparation and construction. Furthermore, 457 acres (185 ha) would be permanently dedicated to BBNPP and its supporting facilities and converted to structures, pavement, or other intensively-maintained exterior grounds, or from forested land to scrub/shrub vegetation within transmission line and vehicle, rail and utility bridge corridors (UniStar, 2010). Impacts to natural resources are expected to originate primarily from the site preparation activities and construction phases of the Project, but will also result from the operation and maintenance of the new unit.

Construction, operation and maintenance activities that could potentially affect the Indiana bat are described below.

3.1 Construction

The area of construction disturbance within the BBNPP Project Boundary is illustrated in Figure 2. Of the total acreage to be disturbed, approximately 623 acres (252 ha) of impacts would occur to areas that are not currently developed. Clearing and grubbing would result in temporary and permanent conversions of various habitat types including forest, agricultural, wetland, and scrub/shrub habitats.

Approximately 369.4 acres (149.5 ha) of undeveloped land would be permanently converted to structures, pavement, or other intensively-maintained exterior grounds. These facilities will include the proposed power block, switchyards, cooling towers, Essential Service Water

Emergency Makeup System (ESWEMS) Retention Pond, wastewater retention pond, water treatment building, permanent parking and laydown areas, access roads, rail spur, and BBNPP Intake Structure.

Approximately 220.3 acres (89.2 ha) of undeveloped land would only be temporarily converted - to accommodate the concrete batch plant, temporary sedimentation pond, dredge dewatering basin, topsoil stockpiles and temporary offices, warehouses, parking and laydown areas. Temporary wetland losses associated with the installation of water intake and discharge pipelines will be 0.71 acres (0.29 ha). Acreage not containing permanent structures would be restored by grading and revegetating to the extent practicable and certain portions may be designated for wetland or other habitat mitigation.

Approximately 33.0 acres (13.4 ha) would be permanently converted to accommodate transmission lines and vehicle, rail and utility pipeline bridge corridors. These areas include both forested upland and forested wetland areas that will require forest clearing for transmission line rights-of-way and bridges. Transmission line corridors and areas under and adjacent to bridges will be permanently maintained as scrub/shrub habitats in accordance with PPL vegetation management programs.

Wetlands comprise approximately 1.25 acres (0.51 ha) of permanently lost terrestrial habitat. Additionally, 742 linear feet (226 m) of stream channel outside of the wetlands areas will be permanently filled.

Construction of the surface water CWS Makeup Water Intake Structure and blowdown diffuser structure will involve very minor impacts of 0.61 acres (0.25 ha) and 0.46 acres (0.19 ha), respectively, within the Susquehanna River. The remaining disturbed area of approximately 0.1 acres (0.04 ha) will be only temporarily disturbed to accommodate cofferdams, necessary excavation work and other construction activities within the river.

Total temporary and permanent losses of forested cover will include 222.2 acres (89.9 ha) of upland deciduous forest and 11.3 acres (4.6 ha) of palustrine forested wetland. In addition to the cleared forested areas, between 2.8 to 82.0 acres (1.1 to 33.2 ha) of forest will be fragmented and isolated based on input from the USFWS and depending on criteria applied to determine fragmentation as discussed below, and therefore effectively lost temporarily or permanently as viable Indiana bat habitat.

With respect to potential forest fragmentation and isolation impacts, most research has shown that Indiana bats predominantly forage, roost and travel within wooded habitats and are reluctant to cross large open areas (USFWS, 2007). Murray and Kurta (2004) found that Indiana bats consistently use tree-lined corridors and have been observed to increase commuting distances by 55 percent rather than cross large agricultural fields. Similarly, a study of radio-tagged bats in Missouri found that heavily forested areas, riparian corridors and forest edges were the primary

areas of activity with no bats recorded in the open areas interspersed throughout the research area (Ecology and Environment, Inc., 2009).

However, some research contradicts these findings as Brack (2006) documented an Indiana bat maternity roost in an isolated 1.7 acre (0.7 ha) woodlot that was 525 feet (160 m) away from a brushy fencerow of small trees. Although the distance traveled from the forest edge and over non-forested habitats is unknown, Indiana bats from a maternity colony located in an agricultural landscape in Ohio were often observed crossing open areas greater than 3,281 feet (1 km) in length (Kniowski, 2011). Few studies have provided specific data on "capture distances from the forest edge," but a study by Stantec et al. (2010) has shown that of the 1,124 foraging telemetry points from 21 radio-tagged Indiana bats, 75 percent of the points were within 400 feet (122 m) of forest edge and 97 percent were within 1,000 feet (305 m) of the forest edge.

Although Indiana bats have been documented to cross open areas greater than 3,281 feet (1 km) in length, it is reasonable to conclude that Indiana bats are unlikely to utilize isolated forest fragments located more than 1,000 feet (305 m) from forested habitat. Therefore, isolated forest fragments on the BBNPP project site that are less than 1.7 acres (0.7 ha) and greater than 1,000 feet (305 m) from forested habitat could be considered effectively lost as viable Indiana bat habitat. Based on these criteria and projected forest clearing of the BBNPP project site, as little as 2.8 acres (1.1 ha) of viable Indiana bat habitat could be permanently lost due to physical separation from suitable habitat (Figure 3).

With respect to permanent or temporary loss of Indiana bat habitat related to construction, adverse impacts could be attributable to the presence of workers, machinery and lights during both day and night in close proximity to forest blocks otherwise suitable as Indiana bat habitat. Construction is scheduled to occur in ten phases and over seven years; a schedule and maps of construction phases 1 through 10 is provided in Appendix B. Excluding the northeast area of the project where the USFWS has concluding that forest fragments are sufficiently removed from construction activities to be impacted, if one assumes that all remaining potentially suitable forest blocks located in the central area of the proposed power plant site are likely to be at least temporarily rendered unsuitable as Indiana bat habitat, then construction activities and impacts could result in the temporary or permanent loss of up to 82.0 acres (33.2 ha) (Figure 4). Some of these areas of potential Indiana bat habitat may be lost during construction, but return as suitable and viable habitat after construction. Regardless, the mitigation actions proposed in this plan (Section 7.0) are designed to compensate for this loss.

In summary, with respect to habitat lost temporarily or permanently to isolation, fragmentation or construction, we judge that during and immediately after construction as much as 82.0 acres (33.2 ha) could be lost in both scenarios (Figures 3 and 4) but depending on the criteria applied with respect to isolation and fragmentation, post-construction losses will vary from 82.0 acres (33.2 ha) to 2.8 acres (1.1 ha) of forested habitat.

The majority of both the upland and wetland forest cover that would be cleared is composed of well-developed overstory and understory strata. Other vegetation losses from both permanent and temporary disturbances will include approximately 63.4 acres (25.7 ha) of upland scrub/shrub vegetation; 168.2 acres (68.1 ha) of old field vegetation and former agricultural land including an abandoned orchard, 148.2 acres (60.0 ha) of agricultural land, and 7.2 acres (2.9 ha) of palustrine emergent vegetation.

3.1.1 Transmission System Modifications

A new switchyard (Susquehanna 500 kV Yard 2) will need to be constructed, as well as the additional transmission line work within the project boundary, to connect the BBNPP 500 kV switchyard to the new Susquehanna 500 kV Yard 2. Design enhancements have been utilized to minimize the footprints of both switchyards.

Although certain sections of two off-site transmission lines will need to be reconductored to avoid network overloads during peak usage periods, no new off-site transmission corridors or other off-site land use would be required to connect the new reactor unit to the existing electrical grid (UniStar, 2010). Numerous breaker upgrades and associated modifications will be required at existing off-site substations and switchyards, but all of the modifications would be implemented within the existing substations and switchyards.

The 230kV transmission line currently passing through the BBNPP site will be relocated north of Beach Grove Road to provide a buffer from the CWS cooling towers and to provide additional areas for location of plant-related structures. This disturbance is estimated to be about 19 acres of upland tree removal and is part of the approximately 33.0 acres (13.4 ha) that would be permanently converted to accommodate transmission lines and vehicle, rail and utility pipeline, and bridge corridors within the project boundary.

3.1.2 Wetland Mitigation Activities

A description of potential wetland mitigation activities that may be undertaken at the BBNPP site is presented below. Mitigation measures for the Indiana bat are discussed in Section 7.

Wetland mitigation in Pennsylvania is driven primarily by conditions established by the USACE and Pennsylvania Department of Environmental Protection (PADEP) in permits issued under Section 404 of the Clean Water Act and Chapter 105 Dam Safety and Waterway Management Regulations. Wetland mitigation follows a sequencing process requiring avoidance of wetland impacts, minimization of unavoidable wetland impacts, and compensatory mitigation to offset impacts not able to be avoided or minimized. The proposed facilities have been sited and the proposed construction has been configured to avoid encroaching into wetlands to the extent possible.

Several measures are proposed to minimize unavoidable adverse effects to wetlands. The use of silt fences, temporary and permanent vegetative stabilization, and other soil erosion and sediment

control practices will reduce the risk of sediment runoff into intact wetlands adjacent to disturbed areas, as well as wetlands located downstream of the project area. Infiltration beds will be constructed on the periphery of the power block, laydown, cooling tower, parking areas and switchyard areas to collect and treat surface runoff and prevent degradation of adjoining terrestrial and aquatic habitats. These and other BMPs are important in minimizing the changes in hydrologic conditions from facility construction and operation.

Commonly used forms of compensatory wetland mitigation include restoration or enhancement of degraded wetlands, creating (constructing) wetlands in areas that are not wetland, and preserving areas of intact wetlands. The proposed wetland impacts would be permanent; hence, restoring the filled wetlands after completion of construction activities would not be possible.

The following compensatory wetland and water body mitigation for the BBNPP site has been proposed:

- Re-creating the same type of habitats as are lost.
- Creating wetlands in the same watershed as the permanently affected wetlands and aquatic features disturbed by BBNPP construction, and in most cases in the same sub-watershed.
- Replacing lost wetland habitat functions and values; selection and design of mitigation measures for BBNPP will rely upon a site-specific functions and values analysis, which identifies the important characteristics provided by those wetlands to be altered or lost as a result of BBNPP construction.
- Providing mitigation at a ratio of wetlands replaced to wetlands lost that is greater than the actual amount of sensitive resources affected to mitigate for temporal losses of functions and values during the period of mitigation area maturation.
- Enhancing existing unaffected habitats on the BBNPP site so as to improve the physical integrity, functions and values of riparian and wetland buffer zones.

While proposed compensatory wetland mitigation for BBNPP has been designed to meet these guiding principles, the ultimate determination of the areal requirements for mitigation will be based upon the Project's unavoidable impacts. Based on US Army Corps of Engineer's criteria, construction of the BBNPP Project would permanently impact approximately 1.25 acres (0.51 ha) of wetlands. In addition, 9.0 acres (3.6 ha) of palustrine forested wetlands located within proposed transmission line rights-of-way and vehicle, rail and utility pipeline bridge corridors will be permanently converted to scrub-shrub and emergent wetland types. This conversion will produce temporary and indirect impacts. Also, the installation of water intake and discharge pipelines will result in additional minor temporary wetland impacts of 0.71 acres (0.29 ha). The

total mitigation proposed for BBNPP would result in a substantially greater area of compensatory wetlands than that impacted by construction.

While direct impacts to waterways are limited, restoration and enhancement of degraded waterways on and near the BBNPP site have been included in the BBNPP wetlands mitigation design as actions to reduce impacts to streams and wetlands. In addition, a limited program of invasive species control, replanting of native tree and shrub species, installation of stabilization measures and incorporation of physical in-stream habitat enhancements is proposed at waterways within the BBNPP Project Boundary. Reforestation of wetlands and riparian areas totaling 10 acres (4.0 ha) would be expected to benefit Indiana bats as these areas are primary foraging habitats.

A comprehensive ~~10-year~~ monitoring and corrective action plan has been proposed for implementation following the construction of BBNPP mitigation features. The plan will ensure the original design goals are met, provide an active feedback mechanism allowing for identification and correction of areas of concern within the mitigation areas, and meet applicable regulatory agencies' requirements for annual reporting of the condition of the mitigation areas.

Specific wetlands mitigation plans have been developed and are provided in the Joint Permit Application, Rev 1, filed with the USACE and DEP on November 21, 2011. Additional specific detail on project impacts, compliance with regulatory standards and mitigation is provided in this document.

3.2 Operation

BBNPP will produce approximately 1,600 megawatts of electricity that would be sold into the regional market. This facility will consist of a four loop, pressurized water reactor with a Reactor Coolant System composed of a reactor pressure vessel containing fuel assemblies; a pressurizer, including ancillary systems to maintain system pressure; a reactor coolant pump and a steam generator for each loop; associated piping, and related control and protection systems. Operation of this facility will be regulated by the NRC.

BBNPP will use closed-cycle, wet cooling systems. Two natural draft cooling towers will be used to dissipate heat from the CWS that serves the main steam turbine condenser. There will also be four smaller Essential Service Water System (ESWS) cooling towers to dissipate heat from the Component Cooling Water System heat exchangers and the heat exchangers of the Emergency Diesel Generators. Each of these four safety-related trains uses a two-cell mechanical draft cooling tower to dissipate heat. Makeup water for all of the cooling towers will be drawn from the North Branch of the Susquehanna River to replace losses from evaporation, blowdown, and drift (UniStar, 2010).

Impacts from fogging, icing, shadowing, and drift deposition were modeled using the Electric Power Research Institute's Seasonal/Annual Cooling Tower Impact (SACTI) prediction code.

This code incorporates the modeling concepts which were endorsed by the NRC Standard Review Plans for Environmental Reviews for Nuclear Power Plants (NUREG-1555) (NRC, 1999). The model provides predictions of seasonal, monthly, and annual cooling tower impacts from mechanical or natural draft cooling towers. It predicts average plume length, rise, drift deposition, fogging, icing, and shadowing, providing results that have been validated with experimental data (UniStar, 2010). No ground-level fogging and icing would occur for the Bell Bend natural draft cooling towers, since ground-level impacts are not possible for plumes from tall natural draft cooling towers.

The maximum predicted salt deposition from the cooling towers is well below the NUREG-1555, Section 5.3.3.2 (NRC, 1999) significance level for possible vegetation damage of 8.9 pounds per acre per month (10 kg per ha per month) in all directions from the cooling tower during each season and annually. The maximum predicted salt deposition is less than 0.1 kg/ha per month. Therefore, no impacts to vegetation from the salt deposition would be expected for both on-site and off-site locations (UniStar, 2010).

Quantitative studies of vegetation and plant diseases were conducted for SSES from 1977 through 1994. Significant changes detected in plant community composition over this time were attributed to normal vegetation dynamics such as succession and animal interaction, and not to SSES operation (Ecology III, 1995). In addition, findings for plant diseases were similar for preoperational (1977-1982) and post-operational (1983-1994) study periods. No effects of salt drift from SSES were detected.

The principal noise sources associated with normal operation of the BBNPP cooling water system are the CWS and ESWS cooling towers. Noise generated from cooling towers is more specific to mechanical draft cooling towers, which use numerous fans to aid in heat dissipation. Noise levels from natural draft cooling towers (i.e. no use of fans) are expected to be insignificant. Noise surveys were conducted in the vicinity of SSES in February and March 2008 and June 2010, to measure ambient environmental community noise levels to establish a baseline noise level in the presence of the existing two-unit SSES. Measured ambient sound levels during operation of SSES could be attributed to normal, current environmental sources, such as traffic noise, high wind and rain and were not related to the existing plant (UniStar, 2010).

Noise generated by the CWS and ESWS cooling towers is unlikely to have any deleterious effects on wildlife. Wildlife is generally more sensitive to sudden and random noise events, which can induce a startle response similar to that induced by a predator, than to the steady continuous noise produced by operation of a cooling tower (USFWS, 1988).

The proposed cooling towers would not be expected to cause substantially elevated bird mortality due to collisions. Although infrequent bird collisions with the proposed cooling towers are possible, the overall mortality potentially resulting from bird collisions with cooling towers

are reported to have only minor impacts on bird species populations (NRC, 1999). Similar to PPL Electric Utilities, BBNPP plans to follow the Edison Electric Institute's (EEI) *Suggested Practices for Avian Protection on Power Lines* and the *Avian Protection Plan Guidelines* developed by EEI in conjunction with USFWS in this short transmission right-of-way. These policies are considered protective of all regulated avian species, including migratory birds.

There are no major sources of air pollution in the vicinity of the BBNPP site. Existing diesel generators and boilers at SSES Units 1 and 2 operate for limited periods. Diesel generators that are associated with BBNPP will also operate for limited periods. Interactions between pollutants emitted from these sources and the plumes from the cooling towers for SSES Units 1 and 2 are sufficient distances apart that they would not have a significant impact on air quality (UniStar, 2010).

The water intake for BBNPP will be located just downstream of the existing intake structure for SSES on the Susquehanna River. The discharge outfall will enter the river downstream of the existing SSES discharge system through a buried pipe that will be connected to a multi-port diffuser positioned perpendicular to the river flow. Because the discharge stream volume will be small relative to the volume of the river, concentrations of solids and chemicals used in cooling tower water treatment will rapidly dilute and approach ambient concentrations in the river after exiting the discharge pipe. The operation of BBNPP will comply with a PADEP-issued National Pollutant Discharge Elimination System (NPDES) permit, and the applicable state water quality standards. All biocides or chemical additives in the discharge will be among those approved by the U.S. Environmental Protection Agency (USEPA) and the Commonwealth of Pennsylvania as safe for humans and the environment (UniStar, 2010).

The NPDES permit will also require a Post-Construction Stormwater Management (PCSM) Plan, which prevents or minimizes the discharge of potential pollutants with the storm water discharge, to reflect the addition of new paved areas and facilities and changes in drainage patterns. To help intercept surface runoff and prevent degradation of adjoining terrestrial and aquatic habitats, storm water infiltration beds will be constructed on the periphery of the power block, laydown, cooling towers, parking areas and switchyard areas. These beds will be important in minimizing the changes in hydrologic conditions after construction is completed. Infiltration beds serve several storm water functions including volume reduction, groundwater recharge, control of peak runoff rates, and maintenance of water quality. Routing of runoff from the plant site through infiltration beds will help maintain the temperature of the water being discharged into the wetlands and minimize sediment transport to the wetlands.

Various types of waste would be generated by the operation of BBNPP. Wastes are classified as; non-hazardous waste, sanitary waste, hazardous waste, mixed waste, and nuclear waste. BBNPP will recycle, recover, or send off-site for disposal all solid waste other than spent fuel in accordance with applicable state and federal regulatory programs.

3.3 Maintenance

Grounds maintenance activities for areas within the immediate vicinity of the power block and CWS cooling towers will result in an intensively managed and permanently maintained landscape with limited vegetative cover. Other areas on-site that are adjacent to and/or occupied by transmission lines and switchyards, vehicle and rail access ways, storm water management facilities, utility pipeline corridors, and ancillary plant facilities will also be subject to ongoing maintenance activities that allow for only limited vegetative cover. These areas include both forested upland and wetland areas that will be cleared for transmission line rights-of-way and bridges. Transmission line corridors and areas under and adjacent to bridges that were previously forested will be permanently maintained as scrub/shrub habitat in accordance with PPL vegetative management programs.

In the Susquehanna River periodic sediment removal via dredging may be required to maintain the depth of the area immediately in front of the entrance to the BBNPP intake structure. Based on the current frequency of dredging at the SSES intake structure, it is anticipated that maintenance dredging at the BBNPP intake would take place approximately once every 5 to 10 years. No impacts to Indiana bat would be expected from this periodic sediment removal activity.

4. ACTION AREA

4.1 Background

The ESA Consultation Handbook defines the Action Area as encompassing all areas to be affected directly or indirectly by the federal action and is not limited to the immediate area involved in the action (USFWS and NMFS, 1998). Direct effects are defined as the immediate effects resulting from the agency action on the species and/or its habitats, including the effects of interrelated actions and interdependent actions. Interrelated activities are part of, and justified by, the proposed action. Interdependent activities have no independent utility apart from the action under consultation. Indirect effects are caused by or result from the proposed action, are later in time, are reasonably certain to occur and may occur outside of the area directly affected by the action (USFWS and NMFS, 1998). In addition, the Proposed Action includes mitigation measures that are proposed to be undertaken to benefit the species under review. Therefore, the Action Area should include the vicinities in which these proposed mitigation measures would be implemented.

4.2 BBNPP Action Area

The BBNPP Action Area encompasses all lands that potentially serve as Indiana bat habitat which will be affected in some manner by the Proposed Action through direct, interrelated, interdependent and indirect activities as described above. Direct effects relate to the area of

disturbance within the BBNPP Project Boundary where nearly all activities for construction of BBNPP facilities (Section 3.1) will take place, as well as a 200-foot buffer around the construction area to account for potential off-site construction-related noise effects on Indiana bats (Section 6.0). Figure 2 identifies the Action Area with respect to direct effects.

Interrelated activities will consist of several off-site roadway intersection improvements to mitigate traffic congestion associated with the construction workforce and the delivery of construction materials, as well as the extension of potable water and sewer lines by the Pennsylvania American Water Company and the Berwick Area Joint Sewer Authority, respectively, to the BBNPP site (Figure 2). ~~In addition, the Action Area with respect to interrelated activities includes any on-site and off-site lands where Indiana bat mitigation measures are being considered as discussed below and in Section 7.0.~~

~~Reforestation is being considered to take place on suitable BBNPP site lands as well as on adjacent non-forested PPL-owned land (approximately 58 acres [23 ha] in total). PPL is also considering allowing natural succession to take place on dedicated on-site and off-site agricultural land (approximately 137 acres [48 ha] in total). The conservation of additional PPL-owned lands is also being considered to conserve and enhance Indiana bat habitat and would be implemented on on-site and off-site parcels of existing forest (approximately 386 acres [156 ha] in total). On-site and off-site land parcels for reforestation, natural succession, and conservation of existing forest have been identified and are included in the determination of the Action Area.~~

At this time, there are no known or foreseeable interdependent activities that should be integrated into the Action Area. The proposed Susquehanna to Roseland transmission line project is intended to satisfy an increased demand for electric power and enhance the reliability of the electric grid in the northeastern portion of the PJM Interconnection region, and will be connected to SSES Units 1 and 2. Although the transmission line will also provide an outlet for electric power generated by BBNPP, it has independent utility, i.e., it is being constructed independently of the BBNPP Project and its viability is not dependent upon the final outcome of the Project.

Indirect effects that are certain to occur will result from operation and maintenance of BBNPP facilities as discussed in Sections 3.2 and 3.3, respectively. However, as noted, these activities will be confined largely to the project site.

4.2.1 Physical Conditions

As discussed in Section 3.0, the 2,055-acre (831.6-ha) BBNPP Project Boundary consists largely of deciduous forest and fallow agricultural land in various stages of secondary succession. Current land use supports a variety of habitats as well as facilities for the existing SSES Units 1 and 2 (Figure 1). Forested land comprises approximately 885 acres (358 ha) or 43 percent of the land cover and consists of uplands and wetlands cover types. Upland forest (772 acres [312 ha]) is dominated by red maple (*Acer rubrum*), and to a lesser degree by red oak (*Quercus rubra*), white oak (*Quercus alba*), and sweet birch (*Betula lenta*). Black cherry (*Prunus serotina*) and

black oak (*Quercus velutina*) are also relatively common. Forested wetlands (113 acres [46 ha]) are also largely comprised of red maple and to a lesser degree pin oak (*Quercus palustris*), silver maple (*Acer saccharinum*), tulip poplar (*Liriodendron tulipfera*), and black locust (*Robinia pseudoacacia*). Black cherry, black walnut (*Juglans nigra*), and river birch (*Betula lenta*) are also relatively common (AREVA, 2010a).

Most of the mature trees on-site are between 40 and 70 years old, and the oldest trees are located primarily in wetlands, on steep slopes, or in generally inaccessible areas that were not farmed historically. Approximately 233.5 acres (94.5 ha) of forested land will be cleared for construction of the BBNPP, of which 222.2 acres (89.9 ha) are upland and 11.3 acres (4.6 ha) are wetland. In addition to the cleared forested areas, between 2.8 to 129.3 acres (1.1 to 52.3 ha) of forest will be fragmented and isolated (see Section 3.1), effectively lost temporarily or permanently as viable Indiana bat habitat (Figures 3 and 4). Additional minor temporary impacts to forested wetlands associated with the installation of water intake and blowdown pipelines total 0.71 acres (0.29 ha).

4.2.2 Biological Conditions

Detailed surveys were completed in October 2010 and July 2011 to characterize the forested areas that will be cleared for the BBNPP. The surveys focused on the suitability of the forest areas as roosting habitat for Indiana bats and specifically addressed roosting habitat for males during the summer and for both sexes during the time of fall swarming. Both the interior sections and edges of these forest areas were surveyed for potential roost trees (PRTs) and the results are presented in a report entitled *Indiana Bat Roost Tree Study Report for the Proposed Bell Bend Nuclear Power Plant Site Luzerne County, Pennsylvania*, which is included in Appendix C and summarized below.

The forested habitat on the BBNPP site was found to provide abundant foraging opportunities for bats in general, including the Indiana bat. Bats often forage over water and wetlands, and along forest edges. Standing water is present in most of the wetlands on the BBNPP site, depending on time of year and precipitation received. In normal years, many of the wetlands on the BBNPP site contain standing water year-round.

Forest Areas of approximately 2 acres (0.8 ha) or greater (18 of 33 total) that were proposed for clearing were surveyed for PRTs. Total forest area surveyed encompassed 46.2 acres (18.7 ha) consisting of 41.7 upland acres (16.9 ha) and 4.5 wetland acres (1.8 ha). Out of the 255 PRTs in the combined interior forest survey area, 118 were live, 114 were dead, and 23 were partially dead. The average diameter-at-breast height (dbh) for all PRTs observed in the forest interior was 14 inches (36 centimeters). In regards to roost type, 252 PRTs offered potential roost sites in the form of exfoliating or defoliating bark, 13 PRTs had suitable crevices, and 5 PRTs had suitable cavities. PRTs may have more than one roost tree characteristic present.

Approximately 75,581 feet (23,035 meters) of forest edge along the forest areas were surveyed for the presence of PRTs. Out of the 286 PRTs identified, 192 were live, 77 were dead, and 17 were partially dead. Similar to forest interiors, the average dbh for PRTs observed on the forest edge was also 14 inches (36 centimeters). In regards to roost type, 285 PRTs offered potential roost sites in the form of exfoliating or defoliating bark, 4 PRTs had a crevice suitable for roosting, and 1 PRT had a cavity suitable for roosting.

PRT densities were compared to U.S. Department of the Interior (USDOI) standards for suitable Indiana bat summer habitat which recommend a minimum of 6 PRTs/acre (14.8 PRTs/ha) for interior forest and 1 PRT/500 feet (1 PRT/152 meters) for forest edges (USDOI, 2009). Interior forest as a whole, and when subdivided into wetlands and uplands, essentially met or exceeded the recommended 6 PRTs/acre (14.8 PRTs/ha) for suitable Indiana bat summer roosting habitat. Wetlands, averaging 8.1 PRTs/acre (19.9 PRTs/ha), exceeded the threshold, and interior forest as a whole (5.5 PRTs/acre [13.6 PRTs/ha]) and uplands (5.2 PRTs/acre [13.0 PRTs/ha]) were slightly below the threshold. Forest area edges also provide PRTs at densities suitable for Indiana bat summer roosting habitat. Forest edges as a whole, at 1.9 PRTs/500 feet (1.9 PRTs/152 meters) also exceeded the USDOI recommended 1 PRT/500 feet (1 PRT/152 meters). Detailed results by forest area are presented in the Indiana Bat Roost Tree Survey Report (Revision 2) provided in Appendix C.

PRT quality for the site was evaluated based on the density of "high," "moderate," or "low" roost trees as determined by the USFWS PRT ranking system (See Appendix C). Interior forest as a whole yielded an estimate of 1.7 high PRTs/acre (4.2 high PRTs/ha), 2.4 medium PRTs/acre (5.9 medium PRTs/ha), and 1.4 low PRTs/acre (3.5 low PRTs/ha). Subdividing the interior forest into wetlands and uplands indicated that wetlands provided higher densities of high PRTs (4.0 high PRTs/acre [9.9 high PRTs/ha] versus 1.4 high PRTs/acre [3.6 high PRTs/ha]), similar densities of medium PRTs (2.5 medium PRTs/acre [6.1 medium PRTs/ha] versus 2.4 medium PRTs/acre [5.9 medium PRTs/ha]) and similar densities of low PRTs (1.6 low PRTs/acre [3.9 low PRTs/ha] versus 1.4 low PRTs/acre [3.5 low PRTs/ha]). The forest edges as a whole yielded an estimate of 0.6 high PRTs/500 feet (0.6 high PRTs/152 meters), 0.8 medium PRTs/500 feet (0.8 medium PRTs/152 meters), and 0.5 low PRTs/500 feet (0.5 low PRTs/152 meters). Detailed results by forest area are presented in the report enclosed in Appendix C.

The roost tree study concluded that some of the surveyed interior forest and many of the surveyed forest edges provided densities of PRTs suitable for Indiana bat roosting habitat based on USDOI criteria. Additionally, based on the USDOI and USFWS criteria, forested wetlands provide higher quality roosting habitat than forested uplands at the site. Forested wetlands had higher overall densities of interior forest PRTs and higher overall densities of high PRTs than upland forests.

5. SPECIES AND HABITAT DESCRIPTION

5.1 Range and Population Level

The historic range of the Indiana bat includes much of the eastern United States, extending west to Iowa and the Ozarks of eastern Oklahoma, north to Michigan, east to the Connecticut River Valley and northern New Jersey, and south to northern Alabama and Arkansas. The species has disappeared from, or greatly declined in, most of its former range in the northeastern United States (Nature Serve, 2010). Range-wide, the total population of Indiana bats was estimated to be about 425,000 in 2011. This population estimate is based on surveys of known over-wintering sites (hibernacula) where Indiana bats gather and roost communally (USFWS, 2012).

The Indiana bat is found in low numbers throughout most of its range. The 2009 population estimate is less than half as many as when the species was listed as federally endangered in 1967. Fifty-two percent of the population occurs in Indiana, with less than one percent of the total population estimated to be present in Pennsylvania (USFWS, 2012). Based on recent surveys conducted by PGC biologists, the USFWS estimates that about 500 Indiana bats hibernate in Pennsylvania. As of 2012, there are nine Pennsylvania counties with known Indiana bat maternity colonies that have been detected through mist net captures or migration telemetry from hibernacula (Butchkoski, 2012).

Winter hibernacula have been documented at 19 locations in ten Pennsylvania counties, including Luzerne County (Figure 5; Turner 2012). Luzerne County has three known bat hibernacula within a 10-mile radius of the BBNPP site, the Glen Lyon Anthracite Mine, Dogtown Mine, and the Penn Wind Hazleton 09 site ~~(Figure 6)~~. All three of these hibernacula occur in abandoned anthracite mines and no interior bat counts have been possible due to safety concerns. Instead, the total population of all species combined is estimated based on fall swarming activity near the mine entrances (Turner et al., 2012). The total hibernating population for all bat species at the Glen Lyon hibernaculum is estimated at 50,000 to 100,000 individuals, and the Indiana bat component could range from dozens to more than 100 individuals (Normandeau 2010b). Unpublished information indicates that bat abundance at Glen Lyon mine~~s~~ has decreased substantially since the introduction of White-nose Syndrome (WNS). No population estimates are available for either the Dogtown Mine hibernaculum or the Penn Wind Hazleton 09 hibernaculum.

Indiana bat hibernacula are assigned priority numbers ranging from Priority 1 (highest) to Priority 4 (lowest) based on the number of Indiana bats present (USFWS, 2007). All three hibernacula in the vicinity of the BBNPP site are designated as Priority 4 sites, which are least important to recovery and long-term conservation of Indiana bats, and have current or observed historic populations of fewer than 50 bats (Turner, 2012). However, the Glen Lyon hibernaculum may qualify as a Priority 3 site, defined as having current or observed historic populations of 50 to 1,000 bats (Normandeau, 2010b).

Summer maternity sites for Indiana bats have been documented through mist netting or telemetry studies at nine locations in seven Pennsylvania counties, consisting of Adams, Armstrong, Berks, Bedford, Blair, Green and York counties (Butchkoski, 2010; 2012). Based on range-wide population estimates for the United States derived from winter hibernacula surveys, it is believed that only a fraction of the existing maternity colonies have been found as they are widely dispersed during the summer and difficult to locate. Although additional Indiana bat maternity colonies may exist in Pennsylvania and elsewhere, they appear to be relatively less common in the mid-eastern United States than in the Midwest, which is the more central portion of this species range (USFWS, 2007).

As discussed in Section 2, there are no hibernacula located on-site, and a survey following the USFWS Bat Mist Netting Guidelines (USFWS, 2007) conducted on the BBNPP site between June 7 and July 11, 2008, and again between May 19 and June 5, 2013 did not identify any Indiana bats on-site. In 2008, three other species, the northern myotis, little brown bat, and big brown bats were captured, tagged and released (AREVA, 2010b). In 2013 four other species, the big brown bat, red bat, tri-colored bat, and northern myotis were captured, tagged, and released (Normandeau, 2013). During the 2008 mist netting survey of the project area, Dr. Karen Campbell reviewed the entire site topography and forest cover, using both aerial photography and by walking on the ground to choose both appropriate mist netting locations and to identify the location of any potential Indiana bat hibernacula within the BBNPP project boundary. One small area of rock outcrop (41.085082° latitude, -76.160127° longitude) was found to the southeast of the apple orchard and was thoroughly inspected by Dr. Campbell for attributes consistent with a potential Indiana bat hibernaculum; none were found.

Additionally, Normandeau biologists conducted year-long field studies to identify and enumerate birds, mammals, reptiles, amphibians, plants, plant communities, wetlands and stream boundaries, fish, aquatic macro invertebrates, terrestrial insects and potential Indiana bat roost trees on the entire BBNPP project site over a several year period beginning in late summer 2007 with subsequent studies conducted on new parcels in later years. These long-duration, site-wide field surveys afforded Normandeau biologists an opportunity to walk over or observe at close range virtually the entire project site, often repeatedly. The field biologists were instructed to mark the location of any potential cave, mine opening or rock outcrop that could be a potential Indiana bat hibernaculum within the BBNPP project boundary. None were found.

Normandeau biologists contacted Calvin Butchkoski of the PGC, Carole Copeyon of the USFWS and several biologists on the USFWS Qualified Indiana Bat Surveyor list to determine if they were aware of any known or potential Indiana bat hibernacula within the BBNPP project boundary. None were identified.

Lastly Normandeau accessed the PADEP Bureau of Abandoned Mine Reclamation's Abandoned Mine Land Inventory System database and overlaid that information on the BBNPP site aerial photography to locate any potential hibernacula on the site that field and remote sending efforts

might have missed. Figure 7 indicates that the closest known abandoned mine openings are approximately 3 miles north of the BBNPP project site.

5.2 Threats

Significant threats to the Indiana bat include human induced disturbance and alterations at hibernation sites, loss of summer habitat, contaminants, and WNS. Wind power development also poses a threat, and vandalism and indiscriminant killing have also been a problem at some caves (Butchkoski, E., 2010; USFWS, 2010a).

Disturbance within over-wintering caves causes bats to arouse, deplete their energy reserves, and potentially increases over-winter mortality. Sources of disturbance include informal recreational activities and commercialization of caves. Alteration of conditions at a hibernaculum can render it unsuitable for over-wintering bats or exclude bats from entering. Exclusion of bats can occur due to poorly designed barriers to human access or by gates installed for other reasons. Additionally, improperly constructed gates can alter the air flow, trap debris, and block the entrance by not allowing enough flight space. Altered exchange of air with the outside environment can cause significant changes in cave temperature and humidity and may cause the bats to abandon the cave. Changes in cave temperatures can also be induced by opening additional entrances. Improperly constructed gates may also subject the bats to severe predation as they attempt to pass through the gates (Nature Serve, 2010).

In response to these issues, most known, major over-wintering sites are currently protected in some way. Despite protection at over-wintering sites, populations continue to decrease in several portions of their range, suggesting that the species is being negatively affected by disturbance or loss of summer habitat. Loss and degradation of summer habitat and roost sites due to impoundment, stream channelization, housing development, clear cutting for agricultural use, mining, or incompatible forest management practices that result in a shortage of the microhabitats used for maternity roosts may be the primary factors in recent population declines (Nature Serve, 2010).

BBNPP is located within the swarming area of three Indiana bat hibernacula, and development of the BBNPP site would be expected to remove forest habitat for Indiana bats associated with these hibernacula. To determine the effects of forest loss on a landscape scale, recent aerial photographs were assessed to determine how much of the landscape within 10 miles of the BBNPP site are currently in hardwood and mixed-hardwood forest cover (see Figure 6). It is conservatively expected that up to 315.5 acres (127.7 ha) of forest cover (total of cleared forest and forest considered lost due to fragmentation and isolation) would be lost due to development of the BBNPP site, or 0.003% of the 119,335 acres of palustrine wetland, deciduous and mixed-deciduous forest cover within 10 miles of the BBNPP site.

Pesticides and environmental contaminants may also affect all bats, including Indiana bats, through two mechanisms. In local areas, insects may not be plentiful because of pesticide use, reducing the food base of these species. Pesticide use may affect the quality as well as the quantity of the bats' food supply. Environmental contaminants may also have health consequences for bats, and they have the potential to absorb relatively high contaminant loads by eating contaminated insects, drinking contaminated water, or absorbing the chemicals while feeding in areas that have been recently treated (USFWS, 2010a).

WNS is an emerging threat to all species of hibernating bats, including the Indiana bat. WNS was first observed in February 2006, west of Albany, New York, and more than a million hibernating bats have died since then (USFWS, 2011b). Affected bats usually have white fungus on their muzzles and other parts of their bodies, and frequently lack adequate body fat to survive until spring. These bats may exhibit uncharacteristic behavior such as moving to cold parts of the hibernaculum, and flying during the day and during cold winter weather when the insects they feed upon are not available. Since the disease emerged in 2006, bats displaying the symptoms of WNS have been observed in and around caves and mines from Maine and New Hampshire south to North Carolina and Tennessee and in the Canadian provinces of Ontario, Quebec, New Brunswick and Nova Scotia. WNS is suspected in states as far west as Oklahoma, and has been confirmed in Pennsylvania (USFWS, 2011b). Ninety to 100 percent mortality has been documented in some hibernacula and there is an emerging consensus that the mode of transmissions is from bat to bat. This puts a highly colonial hibernator like the Indiana bat at particular risk (USFWS, 2010c).

Bat fatalities at wind energy facilities have been recorded for a wide variety of bat species in North America, including at least three Indiana bats (Baerwald et al., 2008; USFWS, 2010d,). Both direct collision trauma and barotrauma have been reported as the proximate cause of these fatalities. Barotrauma is a rapid pressure change that results in internal injuries to the thoracic and abdominal cavities (Baerwald et al., 2008), Fatalities happen primarily during the migration period (Arnett et al., 2008). The reason that migrating bats appear to be more susceptible to collisions is unclear (Cryan and Barclay, 2009) but may be tied to specific behaviors associated with the fall mating season. Indiana bats may migrate considerable distance between their summer habitats and their hibernacula. Twelve female Indiana bats (the majority of which were reproductive females) from maternity colonies in Michigan migrated an average of 477 km (296 mi) to their hibernacula in Indiana and Kentucky, with a maximum migration of 575 km (357 mi) (Winhold and Kurta, 2006). Recent radio-telemetry studies of 130 spring emerging Indiana bats (primarily females) from six New York hibernacula found that 75 percent of these bats were later detected and all migrated less than 68 km (42 mi) to their summer habitat (Butchkoski et al., 2008).

5.3 Species Description – Morphology and Behavior

The Indiana bat is a small insectivorous bat, with a very fine and fluffy, dull grayish chestnut pelage above and pinkish white under parts. The wing membranes and ears are blackish-brown and its total body length is 2.9 – 4.0 inches (75-102 mm); wingspan is 9.5 – 10.5 inches (241-267 mm). It is similar in appearance to other myotids and makes a similar call. The ecology of the Indiana bat is however, distinct.

The Indiana bat is a true hibernator, entering hibernation in the fall and surviving on stored fat until spring. In Pennsylvania, this species begins to enter hibernacula in mid-September, and begins hibernating by early November. Before going into hibernation, and again during the spring emergence, bats swarm around entrances to hibernation sites and rely on nearby surface habitat to forage for insects. Northern breeding populations may migrate south and in some cases, winter and summer habitats may be as much as 278 miles (480 km) apart. Migrants leave hibernation sites in late March and April. Females generally leave earlier than do males, with the greatest exodus in mid- to late April. Some males migrate while most remain in the general geographic vicinity of the hibernaculum throughout the summer (Nature Serve, 2010).

This species is notably gregarious during hibernation. In the center of its range, hibernating individuals characteristically form large, compact clusters of as many as 5,000 bats, averaging 500 to 1,000 individuals per cluster (Nature Serve, 2010). In Pennsylvania, where the population of Indiana bats is lower, this species often mixes with little brown bats (Butchkoski, E., 2010). Clusters form in the same area in a cave each year, with more than one cluster possible in a particular cave. Clustering may have certain benefits, including protecting the central individuals from temperature changes, reducing the sensitivity of most bats to external disturbance, or rapid arousal and escape from predators (Nature Serve, 2010).

Mating occurs in fall, when Indiana bats assemble at cave entrances at dusk and dawn in late August and September. This swarming behavior appears to facilitate breeding and reduce the chances of inbreeding in small summer colonies. Males arrive first at the swarming areas, and the number of bats and the proportion of females rises to a maximum in early September. Females store sperm through the winter, fertilization occurs in spring and a single pup is born in June-July. The rate of development in the young is dependent on weather, particularly the temperature, and mothers have been observed moving non-volant young to warmer roost spots. Typically, the young first fly at 25-37 days of age (Nature Serve, 2010).

Reproductive female Indiana bats migrate from the hibernacula to summer roosting habitat, and have shown strong site fidelity to their traditional summer roosting and foraging areas. They form maternity colonies after arriving at their summer range (late March to mid-May) and cluster in maternity roosts with suitable microclimates that facilitate roost temperatures favorable for prenatal and postnatal development. Maternity colonies most commonly consist of 60 to 100 adult females but may be larger, and may include females from more than one hibernaculum. Composition of

the colony is fluid with females moving between as many as 10 to 20 different maternity roost trees. The majority of female bats use one to three primary maternity roost trees, while the rest of the trees are alternate or secondary maternity roosts. These alternate or secondary roosts are intermittently used by small numbers of females throughout the summer, or on only a few days, or as temporary night roosts. Maternity colonies may occupy maternity roost trees for a number of years; however all maternity roost trees are ephemeral and become unusable by losing important structural characteristics such as bark, by falling to the ground, or due to competition with other animals. The use of alternate maternity roost trees is thought to be a behavioral mechanism that enables bats to evaluate new trees for use as future primary maternity roosts (USFWS, 2007).

The location of summer roosting habitat for non-reproductive female Indiana bats is less well known. They may remain close to their hibernaculum or migrate to summer habitat where they roost individually or in small numbers. Typically, non-reproductive females do not roost in colonies but may be present in the same trees as reproductive females. Males are most commonly found in the vicinity of their hibernaculum but may also disperse throughout the summer range and roost individually or in small groups (USFWS, 2007).

In an Indiana bat population, the observed rate of mortality between birth and weaning was about eight percent. Female survivorship in this same population was 76 percent for ages 1 to 6 years, and 66 percent for ages 6 to 10 years. Male survivorship was 70 percent for ages 1 to 6 years and 36 percent for ages 6 to 10 years. Maximum ages of banded individuals were 15 years for females and 14 years for males (Nature Serve, 2010).

5.4 Species Description – Habitat Requirements

Indiana bat hibernation sites have stringent requirements, including noticeable airflow and the lowest non-freezing temperatures possible. Only a small percentage of available hibernacula provide these temperatures. Indiana bat sites usually also have some standing or flowing water (Butchkoski, E., 2010; Nature Serve, 2010). Roost sites within caves may shift such that bats remain in the coldest area, and individuals may move from a location deeper in the cave to a site nearer the entrance as the cold season progresses. Relative humidity in occupied caves ranges from 66 to 95% and averages 87% throughout the year (Nature Serve, 2010).

In summer and fall, Indiana bats primarily use wooded or semi-wooded habitats, usually near water. Foraging is often focused on riparian areas, ponds, and wetlands, but also takes place in upland forests and fields. Flying insects are the Indiana bat's typical prey items, and diet composition reflects prey present in available foraging habitat (Nature Serve, 2010). Generally, Indiana bats roost under the exfoliating bark of trees and occasionally in longitudinal crevices within trees. They rarely use cavities created by rot or woodpeckers, and are only infrequently found using man-made structures (USFWS, 2007). However, most studies of roost characteristics have focused on maternity roosts (described in detail below) and a more limited amount of data suggests that roost preferences may be less strict for males and non-reproductive females.

For maternity roosts (primary and alternate), females prefer dead or nearly dead trees, or dead parts of living trees such as dead trunks of trees with multiple trunks. They are occasionally found on living trees with loose, peeling bark; however, these trees are thought to be used primarily as alternate maternity roosts during exceptionally warm or wet weather. A wide variety of tree species are used for maternity roosts and use is primarily related to local availability of trees with suitable structure rather than a preference for a particular species. In addition, regional differences in maternity roost tree characteristics may result from influencing factors such as weather and altitude. Maternity roost trees are typically found in areas with high solar exposure such as openings within a forest, in a fence line, or along a wooded edge. Higher solar exposure creates warmer roosting sites and, thereby, facilitates faster prenatal and postnatal development of young bats. Female Indiana bats may use structurally suitable trees in more interior sections of forest as maternity roosts during exceptionally warm or wet weather (USFWS, 2007).

Maternity roost trees vary in size, although larger diameter trees are preferred and may provide advantages for thermoregulation, as well as more roosting spaces. The average range-wide diameter of primary maternity roost trees is 18 inches (45.7 cm) dbh. However, average diameters of primary and alternate maternity roost trees in several Midwestern states ranged from 16 to 24 inches (40.6 – 60.9 cm) dbh, and an alternate maternity roost tree in Pennsylvania had a diameter of only 11 inches. The minimum height of maternity roost trees is typically greater than 10 feet (3.0 m), although the absolute height of maternity roost trees is thought to be less important than height and position relative to surrounding trees, which can affect the amount of solar exposure received by a tree (USFWS, 2007).

Male Indiana bats are more flexible in their preferred summer roosting habitat. They roost in the same types of structurally suitable trees as females but not necessarily in areas with high solar exposure. In addition, male bats are more likely to roost in living trees and trees that are smaller. The average range wide diameter of male roost trees is 13 inches (33 cm) dbh (USFWS, 2007).

Beginning in the late summer and into the fall, Indiana bats return to the vicinity of their hibernacula and engage in swarming behavior, which peaks in September and early October. This behavior is characterized by large numbers of bats moving in and out of hibernacula at night but with few roosting inside during daylight hours. Instead, the bats tend to roost individually in surrounding forests. The characteristics of these roosting trees are not well known (USFWS, 2007).

5.5 Similar Species Description

Two bat species with habitat affinities similar to Indiana bat have the potential to be listed by the USFWS in the near future: little brown bat (Kunz et al., 2010) and northern myotis (USFWS, 2011a). Both species were captured during mist netting at BBNPP in 2008 and northern myotis only was captured during mist netting at BBNPP in 2013 (see Section 2 and Appendix C).

Little brown bats are typically found mixed in summer roosts and among hibernating clusters with the less common Indiana bat. It is believed that the low statewide numbers of Indiana bats may cause them to use little brown bats as surrogate roosting partners. Based on these two species similar ecologies, biologists have used little brown bats as surrogates for Indiana bats to sample traveling behavior from roosts to foraging areas (Steele et al. 2010). However, primary foraging cores differ between the two species with little brown bats foraging on or adjacent to major bodies of water (rivers and lakes) and Indiana bats focusing on intermittent streams and dry forested hillsides (Butchkoski et al., 2005).

Northern myotis are found throughout Pennsylvania but never in large numbers, even during hibernation. Forested upland areas appear to be the primary summer foraging habitat for this species containing larger and older trees with cavities and exfoliating bark, similar roost tree characteristics as those utilized by Indiana bat. It typically forages only 1-3 meters above the ground, flying among and above the understory shrubs. They frequently feed by gleaning, taking insects off the ground or vegetation and then carrying them to perches for consumption (Steele et al. 2010). This behavior is thought to allow them to eat larger prey than other *Myotis* species, and one study of diet analysis found that this species consumes more orthopterans and large beetles than little brown bats or Indiana bats (Lee and McCracken 2004).

6. EFFECTS OF PROJECT ACTIONS

6.1 Construction

The construction of BBNPP and all associated facilities will require the removal of 233.5 acres (94.5 ha) of forest, 222.2 acres (89.9 ha) of which are upland forest and 11.3 acres (4.6 ha) of which are forested wetlands. Based on available research (see Section 3.1), between 2.8 to 82.0 acres (1.1 to 33.2 ha) of forest will be fragmented and isolated, effectively lost as viable Indiana bat habitat in addition to the area of forest clearing (Figures 3 and 4). With the exception of danger tree removal discussed below, tree clearing will occur from November 16 to March 31 only, when Indiana bats are hibernating, to avoid direct impacts (direct mortality) to bats that may be roosting on-site during the period of spring emergence through fall swarming. However, seasonal restrictions on tree clearing will not avoid the potential for an indirect but permanent impact on Indiana bats due to the loss of potential roost trees and foraging opportunities.

To the extent practicable, PPL has adopted 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. These actions are further discussed below and summarized in Section 7.1. These measures include adjustments to the overall layout of the Project to minimize the project footprint, minimize habitat fragmentation, retain forested travel corridors, and to avoid higher-value habitats. The effort to minimize habitat loss was focused on wetland and riparian areas, where roost trees are present in greater densities (AREVA, 2010a) and where

Indiana bats also drink and often forage. Minimization of impacts to wetland and riparian areas included retaining a 50-foot (15.2-meter) buffer around Walker Run and its tributaries and adjacent wetlands. When impacts to streams and wetlands could not be avoided, silt fences, temporary and permanent vegetative stabilization, and other soil erosion and sediment control practices are proposed to reduce the risk of sediment runoff into intact wetlands and water bodies adjoining the areas of disturbance, as well as wetlands and water bodies located downstream of the project area. These BMPs will minimize the indirect effects on Indiana bats by reducing adverse impacts on aquatic insect populations and riparian and wetland foraging habitat.

The proposed compensatory wetland and water body mitigation described in Section 3.1.2 is not expected as a whole to result in adverse direct impacts to the Indiana bat. Any tree removal associated with construction of compensatory wetlands will be conducted between November 16 and March 31. The long term impacts of compensatory wetland and water body mitigation will be positive, as the overall wetland acreage in the vicinity of BBNPP will increase thereby providing Indiana bats with additional foraging opportunities. Reforestation and wetland creation and enhancement will be designed to provide Indiana bat habitat in the restored riparian corridor.

Additional minimization and avoidance measures include the following:

- The use of pesticides and herbicides will be avoided or minimized during construction and operation of BBNPP to avoid adverse effects to Indiana bats associated with ingestion of contaminated insects and reduction in local insect populations.

- The following policy will be followed during construction and operation within the BBNPP project boundary. It provides for the removal of trees that present a hazard to property and workers undertaking activities near forested areas and may be implemented at any time of the year. This policy is designed to comply with the Occupational Safety and Health Administration's (OSHA) "Danger Tree Rule" found at 29 CFR 1910.266(h)(1)(vi). Section 7 of the Endangered Species Act (ESA) also provides for removal of Danger Trees, and this policy is also meant to comply with the ESA. Implementation of this policy will only occur in the rare instance that removal needs to occur outside the November 16 to March 31 construction removal window.

  "Danger Trees" are defined as trees with significant defects and the potential to fall, causing harm to workers or property. "Defects" include a wide variety of symptoms not limited to damage cause by insects, lightning, ice/hail, overmaturity, disease, or from impacts with adjacent falling trees/limbs. Dead standing trees or partly dead trees which are stable and not exhibiting imminent danger of falling are not considered danger trees, and will not be managed as such.

Potential danger trees that are greater than 5 inches dbh within the project boundary will be evaluated as defined below. Potential danger trees that are less than 5 inches dbh may be immediately removed without evaluation. Evaluation criteria employed for danger trees greater than 5 inches dbh are contained in the 2008 United States Department of Agriculture Forest Service publication "Field Guide for Danger Tree Identification and Response," R6-NR-FP-PR-01-08.

Upon identification of danger tree(s) of 5 inches dbh or greater requiring removal the tree(s) will be marked, documented with color photographs, and evaluated by a qualified individual (biologist) before being professionally felled and removed.

- A qualified Indiana bat surveyor will observe the tree for bat emergence beginning at least 30 minutes before sunset.
- If any bats are observed, the USFWS will be consulted prior to the cutting of the tree.
- If no bats are observed emerging from the tree and no bats are heard on the tree, the tree will be cut that evening immediately following the emergence survey. A record of this determination will be maintained for 5 years. While lighting may be necessary to safely fell the tree, no lighting will be used until after the emergence survey is completed.
- When removing a danger tree, care will be taken to avoid damage to adjacent trees or other environmental resources. Mechanized land clearing equipment such as skidders will not be employed in danger tree removal.
- Records of routine vegetation management will be maintained for a period of 5 years.

Potential temporary impacts associated with construction of BBNPP consist of disturbance created by noise, visual impacts, and increased night-lighting during night construction. Noise will be generated by construction activities (i.e., movement of people, equipment, and vehicles on-site) and vehicles bringing people and supplies to and from the construction site. Noises that are sudden, loud, and occur unpredictably have the potential to have the greatest impacts. However, all noise is expected to attenuate below the 80 to 85 decibel (dBA) threshold at which wildlife behavior is most affected (as discussed in Section 4) within 158 feet (48 meters) of the active construction area. Noise impacts in the 200-foot (61-meter) buffer around the construction zone may deny Indiana bats use of that habitat during construction. However, this area is relatively small compared to the amount of habitat available in the vicinity of BBNPP.

Impacts which are perceived visually will be attenuated by the forest vegetation that surrounds the site. Lighting used during night construction may have a temporary positive impact on bat

species that forage preferentially on the insects attracted by lights. However, lighting may also have a temporary negative impact on bat species that avoid light. No current research indicates if Indiana bats are included in either species group.

6.2 Operations

Impacts to the Indiana bat are anticipated to be small as a result of BBNPP operations. All operational activities will occur within the portion of the property that has been altered by construction, and bats are unlikely to be present due to the lack of suitable habitat, except as discussed in Section 6.3. Noise, cooling tower vapor plumes, miscellaneous air emissions, and cooling water and wastewater blowdown will emanate or be discharged from this disturbed area, and generated wastes, except for spent fuel, will be recycled, recovered, or sent off-site for disposal. However, these effects of plant operation will have no or minimal impact, as discussed in Section 3.2.

Any increases in the volume or concentrations of pollutants in storm water discharges from BBNPP will be minimized by implementation of BMPs described in the PCSM plan. The BMPs will minimize the indirect effects on Indiana bats by reducing adverse impacts on aquatic insect populations and riparian and wetland foraging habitat.

Other than denial of foraging habitat through their footprint accounted for above, the CWS cooling towers are unlikely to create disturbance or mortality of Indiana bats through collision with the towers. The cooling towers are large, immobile objects that should be avoidable by the bats, which are known to generally avoid stationary objects. Studies of bird and bat mortality attributable to collision with the cooling towers at the adjacent SSES between 1984 and 1986 found eight dead bats of three species and did not include Indiana bat (NRC, 1996).

Lighting used for safety and security purposes at night will be incrementally greater than the lighting present from SSES. This lighting may have a positive impact on bat species that forage preferentially on the insects attracted by lights. However, lighting may have a negative impact on bat species that avoid light. No current research indicates if Indiana bats are included in either species group.

No other activities that may disturb Indiana bats on the remainder of the property or in surrounding habitats will occur as a result of plant operations.

6.3 Maintenance

Impacts to the Indiana bat are anticipated to be small as a result of BBNPP maintenance activities. All maintenance activities will occur within the portion of the property that has been altered by construction and therefore provides no habitat for this species.

The use of pesticides and herbicides during BBNPP operations will be avoided or minimized as previously discussed in Section 6.1 as they may have direct adverse effects on Indiana bats through ingestion of contaminated insects and indirect adverse effects on Indiana bats by impacting insect populations.

With the exception discussed in Section 6.1, any tree clearing during the operation of BBNPP will occur from November 16 to March 31 only, when Indiana bats are hibernating, to avoid direct impacts (direct mortality) to bats that may be roosting on-site during the period of spring emergence through fall swarming.

The periodic dredging of river sediment will not impact the habitat of the Indiana bat, and no other activities that may disturb Indiana bats on the remainder of the property or in surrounding habitats will occur as a result of plant maintenance.

7. PROPOSED INDIANA BAT MITIGATION

7.1 Avoidance and Minimization Approach

The *USFWS Guidance on Developing and Implementing an Indiana Bat Conservation Plan* provides a list of avoidance and minimization measures that have or will be implemented for the proposed project. These are discussed above and summarized as follows:

1. To the maximum extent practicable, adjustments have been made to the overall layout of the BBNPP Project to minimize the project footprint, minimize habitat fragmentation, retain forested travel corridors, and to avoid higher-value habitats. The effort to minimize habitat loss was focused on wetland and riparian areas, where roost trees are present in greater densities and where Indiana bats also drink and often forage.
2. Minimization of impacts to wetland and riparian areas included retaining a 50-foot (15.2-meter) buffer around Walker Run and its tributaries and adjacent wetlands.
3. To the maximum extent practicable, Project features were co-located (*e.g.*, roads and utility lines) and clustered (*e.g.*, structures) to reduce forest clearing.
4. The BBNPP Project occurs in potential Indiana bat swarming habitat (near hibernacula), so seasonal tree restrictions will be adhered to (trees will only be cut between November 15 and March 31).
5. The detailed sequence of construction activities will not be known until construction contracts are awarded, however, tree clearing in support of the BBNPP Project is expected to generally occur in ten construction phases over a period of approximately seven years (see Schedule and Maps of Construction Phases 1 through 10 in Appendix B of the BEMP).

6. PPL will reforest approximately 10 acres to mitigate for wetlands lost along Walker Run during the BBNPP project. Measures will be taken to ensure that soils are not compacted to allow for successful tree establishment in these areas. The Walker Run mitigation will be reforested with tree species preferred by Indiana bats, however, this planting is not being counted by PPL as Indiana bat compensatory mitigation. ~~(see Resource Management Plan for Reforestation, Natural Succession and Habitat Conservation Lands in Appendix E of the BEMP)~~.
7. Only native plant species will be used when re-foresting and stabilizing soils in the Walker Run wetland mitigation area.
8. When impacts to streams and wetlands cannot be avoided, silt fences, temporary and permanent vegetative stabilization, and other soil erosion and sediment control practices are proposed to reduce the risk of sediment runoff into intact wetlands and water bodies adjoining the areas of disturbance, as well as wetlands and water bodies located downstream of the project area. These best management practices (BMPs) will minimize the indirect effects on Indiana bats by reducing adverse impacts on aquatic insect populations and riparian and wetland foraging habitat.
9. A pollution prevention plan will be developed and implemented to ensure hazardous materials (*e.g.,* oils, lubricants, *etc.*) do not contaminate soils, wetlands, or waterways.

7.2 Development of Mitigation Alternatives

Development of the mitigation alternatives as described herein was based primarily on the following inputs:

- Written communication from USFWS to NRC in July 2009 and March 2013;
- A meeting held among state and federal agencies and PPL representatives on June 1, 2010;
- A meeting held among state and federal agencies and PPL representatives on October 20, 2011;
- The Indiana Bat Range Wide Protection and Enhancement Plan (Range-wide PEP) for surface mining (USDOI, 2009);
- Recent information from USFWS revised in May 2012 which provides the basis for calculation of funding to the Indiana Bat Conservation Fund as a suitable mitigation alternative, and
- The *USFWS Guidance on Developing and Implementing an Indiana Bat Conservation Plan*

(www.fws.gov/northeast/pafo/pdf/IBAT_conservation_plan_guidance_PAFO_07262011.pdf)

7.3 Proposed Mitigation Option

Not counting the 10 acres of wetlands reforestation discussed above, the proposed concept for Indiana bat compensatory mitigation for the BBNPP project is to fund the Indiana Bat Conservation Fund (IBCF). PPL would place these monies in escrow prior to any on-site tree disturbance. The amount has been computed using the USFWS Calculation Sheet for Indiana Bat Habitat Conservation (revised 5/17/12) provided in Appendix D. The BBNPP Project will result in the loss of 236.3 to 315.5 acres (95.6 to 127.7 ha). PPL would offer an in-lieu-fee contribution to the (IBCF) in the amount of $1,172,398.00 to compensate for the short- and long-term habitat needs of the Indiana bat[2]. This funding would permit the permanent conservation of off-site forested lands in areas that may be more valuable than the preservation of on-site forested areas. In addition, due to similar habitat requirements and behavioral ecologies, these land conservation actions would be expected to provide viable habitat for little brown bat and northern myotis.

PPL would also provide the following public outreach as a component of its proposed mitigation. A module on the life history, importance and protection of Indiana bats would be included in ongoing environmental education programs conducted by PPL naturalists at the Susquehanna Riverlands Environmental Preserve. Information on WNS, as well as efforts by PPL to avoid, minimize and mitigate potential impacts to Indiana bat habitat within the BBNPP project area would be added to the existing year-round environmental education programs provided at the Susquehanna Energy Information Center. This program would seek to foster an appreciation by the general public for the environmental challenges facing both Indiana bats and bats in general, as well as programs to protect bats and conserve bat habitat.

[Note: Reforestation Option deleted]

7.4 Mitigation Measures Evaluated but Not Selected for Implementation

Reforestation, Natural Succession and Habitat Conservation of PPL-owned Lands

Information on required mitigation ratios and other factors relevant to the development of a suitable on-site mitigation plan is contained in the Range-wide PEP, and stems from the reference discussions with the USFWS. An on-site mitigation alternative consisting of reforestation, natural succession and habitat conservation to meet these required mitigation

[2] The final amount would be subject to change based on the results of the planned 2013 mist net surveys.

ratios, and focusing principally on stream corridor lands was developed by PPL. This alternative was subsequently not selected by PPL due to a USFWS expressed interest to impose a permanent conservation easement upon mitigation lands, and due to an expressed USFWS interest in their March 29, 2013 correspondence to optimize the location of conserved lands via use of the IBCF.

White-Nose Syndrome (WNS) Research Funding

Because PPL is able to provide funding to the IBCF, no additional mitigation via funding of WNS research is proposed. However, information on Indiana bat life history, importance and threats (including WNS) would be included in the ongoing environmental education programs at PPL's Susquehanna Riverlands Environmental Information Center.

Hibernacula Gates

USFWS has recommended that PPL consider the installation of bat friendly gates on hibernacula that are known or likely to support Indiana bats (USFWS, 2009). There are no known Indiana bat hibernacula within 10 miles of the BBNPP site that are both not gated and suitable for gating. The installation of bat friendly gates on hibernacula beyond a 10-mile radius from the project may be feasible. In any event, because PPL is able to provide ~~either~~ funding of the IBCF ~~or reforestation, natural succession and habitat conservation land that would compensate for cleared forested habitat at a ratio of at least 1.6:1~~, this alternative mitigation option is not being proposed.

8. CUMULATIVE EFFECTS ANALYSIS

As defined in the Consultation Handbook (USFWS and NMFS, 1998) cumulative effects include "the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area" of the project under consideration. The analysis does not include future Federal actions unrelated to the proposed action, because they require separate consultation.

As discussed in Section 4, the BBNPP Action Area encompasses the area of disturbance within the BBNPP Project Boundary (where nearly all construction activities will take place), as well as a 200-foot (61-meter) buffer around the area of disturbance to account for potential construction-related noise effects on Indiana bats both within and outside the construction zone (Figure 2). Additionally, the Action Area includes several off-site roadway intersections which will be improved, and the extension of potable water and sewer lines from US 11 to the BBNPP site~~, and areas where Indiana bat conservation measures may be undertaken on PPL-owned off-site lands.~~

State, tribal, local or private actions that are reasonably certain to occur for the above defined action areas are discussed in the following sections.

8.1 Area of Disturbance

Cumulative effects within the Action Area (BBNPP area of disturbance and surrounding 200-foot buffer ~~plus mitigation areas~~) that are reasonably certain to occur are limited to development activities related to the Susquehanna Greenway Project. Several other effects that are unlikely to occur are also addressed in this section to ensure a comprehensive analysis. These additional effects encompass timber harvesting, surface mines and development of Marcellus shale natural gas resources on the small areas of adjacent private land that overlap with the construction noise buffer (Figure 2).

Susquehanna Greenway Project

The Susquehanna Greenway Project is an ambitious long-term plan to extend a greenway along the entire length of the river. A major focus of the greenway plan is the development of a network of recreation trails to link municipalities along the river corridor with parks and other recreational areas, historic sites and other points of interest. The goal is to provide economic and environmental benefits, as well as to connect people to the culture, nature, and beauty of the Susquehanna River (SEDA-COG, 2009).

The North Branch Canal Trail (NBCT) is part of the larger greenway and is located along the Middle Susquehanna River in Montour and Columbia Counties. A demonstration project for the NBCT is currently underway for a 12-mile reach of the former canal towpath between Danville and Berwick which is located several miles south of the BBNPP area of disturbance. The canal and towpath also extend through the PPL Susquehanna Riverlands which already has an extensive trail system. The demonstration project was initiated in 2010 and has a planned completion date of 2016 (SEDA-COG, 2009).

PPL Corporation, generally through its subsidiary companies has a long history of providing and/or supporting recreational and other projects that benefit local communities within its service area. In support of the Susquehanna Greenway Project, PPL Holtwood, LLC, a PPL Bell Bend, LLC affiliate, is already in the process of transferring up to 3,500 acres (1,414 ha) of company-owned land along the lower Susquehanna River in Lancaster County and York County to private conservation groups (Susquehanna Greenway Partnership, 2008). Therefore, there is a high likelihood that the NBCT will be extended north through the PPL Susquehanna Riverlands in the near future. Impacts from this project will be small as existing PPL Susquehanna Riverlands recreational trails are well maintained and already suitable for this use. A short section of NBC will be restored near the BBNPP intake structure as part of the overall site mitigation. Tree cutting for trail or other improvements, if necessary, will be minimized and conducted during the allowed November 16 through March 31 period when Indiana bats are hibernating. Cutting of potential roost trees as defined by USFWS (AREVA, 2010a) will be avoided if possible.

Timber Harvesting

Pennsylvania is a leading producer of forest products, particularly black cherry (*Prunus serotina*). Black cherry and other valuable timber species of marketable size are common within the BBNPP area of disturbance and, therefore, these trees are likely to be present on adjacent private lands that overlap with the construction noise buffer. The impact to Indiana bat roosting habitat by selective timbering or even clear cutting of forests on these lands would be small as forested land within this area is very limited in size. Indiana bats could move to suitable roosting habitat in the much larger forested tracts surrounding the project site and located throughout the region.

Surface Mines

Quarries that produce gravel and larger river stone materials are common in the BBNPP locale due to past glacial activity, and the BBNPP area of disturbance includes two former surface mines. Adjacent private lands that overlap with the construction noise buffer could potentially be developed for this purpose. However, similar to timber harvesting, the impact of surface mines on Indiana bat habitat would be small due to the relatively limited overall size of these lands and the ability of the bats to move to suitable habitat surrounding the project site.

Natural Gas Development

The Marcellus shale formation underlies much of Pennsylvania and is the focus of intensive natural gas development activity including well drilling and pipeline construction. However, very little well drilling is occurring in Luzerne County at this time and the few wells that have been installed are not located near any section of the BBNPP Action Area (PADEP, 2010). Additional gas well development in Luzerne County may be limited as recent test wells did not yield gas in commercially developable quantities (Hughes, 2010). Gas pipeline construction is likely to occur in Luzerne County but almost certainly will not occur within the Action Area.

Furthermore, no new intrastate natural gas transmission pipelines are known to be currently proposed in the immediate vicinity of the BBNPP area of disturbance, and there is no information regarding any potential upgrades to the existing pipeline that runs through the northeastern portion of the BBNPP Project Boundary. Intrastate gas pipelines, only, are considered in this cumulative effects analysis as interstate pipelines are regulated by the Federal Energy Regulatory Commission (FERC) and would go through a separate project specific ESA Section 7 consultation process with USFWS. Therefore, the impact of Marcellus shale gas development is considered small at this time.

8.2 Intersection Improvements

The Action Area includes several off-site roadway intersections which will be improved to mitigate traffic congestion associated with the construction workforce and the delivery of

construction materials. This effect will be insignificant as most improvements will occur within the existing roadway footprint and, therefore, will not impact Indiana bat habitat. There are no non-Federal actions that are likely to be associated with these highway improvements.

8.3 Potable Water and Sewer Lines

The extension of potable water and sewer lines by the Pennsylvania American Water Company and the Berwick Area Joint Sewer Authority, respectively, to the BBNPP site is also included within the BBNPP Action Area, and is enclosed by a 200-foot (61-meter) construction noise buffer along each side of the right-of-way corridor (Figure 2). The impacts from pipeline construction will be small as forest clearing necessary for this Project will be limited to a narrow right-of-way immediately adjacent to the western side of Confers Lane.

Cumulative effects associated with this part of the Action Area are limited to the potential for small amounts of additional forest clearing resulting potential minor residential development within the noise buffer along Confers Lane, which could be facilitated by the new water and sewer lines. The impact from this effect would be small since most of the developable land along this reach of Confers Lane is already in residential use and largely cleared. Most of the undeveloped land consists of regulated wetland that is unsuitable for most residential uses. In addition, PPL is proposing to close Confers Lane just north of existing development areas.

8.4 Conservation Actions

Funding of the IBCF would be expected to have a high cumulative and beneficial effect on Indiana bats as well as little brown bat and northern myotis. ~~Alternatively, reforestation, if implemented by PPL would provide future Indiana bat habitat as compensation for lost Indiana bat habitat (Section 7.3) and would involve planting select species of trees on 10 acres (4 ha) of land within the BBNPP site that has been cleared during construction as well as on 48 acres (19 ha) of adjacent non-forested PPL-owned land (Figure 8). Natural succession would provide future Indiana bat habitat as compensation for lost Indiana bat habitat (Section 7.3) and would involve allowing 137 acres (55 ha) of PPL-owned agricultural lands to naturally convert to forest. Indiana bat habitat conservation and management on 386 acres (156 ha) of currently forested land would involve implementing select Indiana bat-specific forest management practices to conserve and enhance Indiana bat habitat (Section 7.4). No cumulative effects are expected from these activities. The reforestation, natural succession, and habitat conservation and management alternative would also have a high and beneficial effect on Indiana bats as well as little brown bat and northern myotis.~~

9. CONCLUSION

In spite of the implementation of the avoidance and minimization measures described in Section 6, the construction of the BBNPP is likely to adversely affect the Indiana bat due to the loss of potential roost trees and foraging habitat. Where possible, impacts to Indiana bats will be avoided and minimized. Mitigation would be provided for the unavoidable impacts to 236.3 to 315.5 acres (95.6 to 127.7 ha) of forested land that will be temporarily or permanently impacted within the BBNPP Action Area as detailed in Section 7. The exact acreage of unavoidable impacts depends on the research criteria applied to determine how much forest habitat is lost to fragmentation and isolation.

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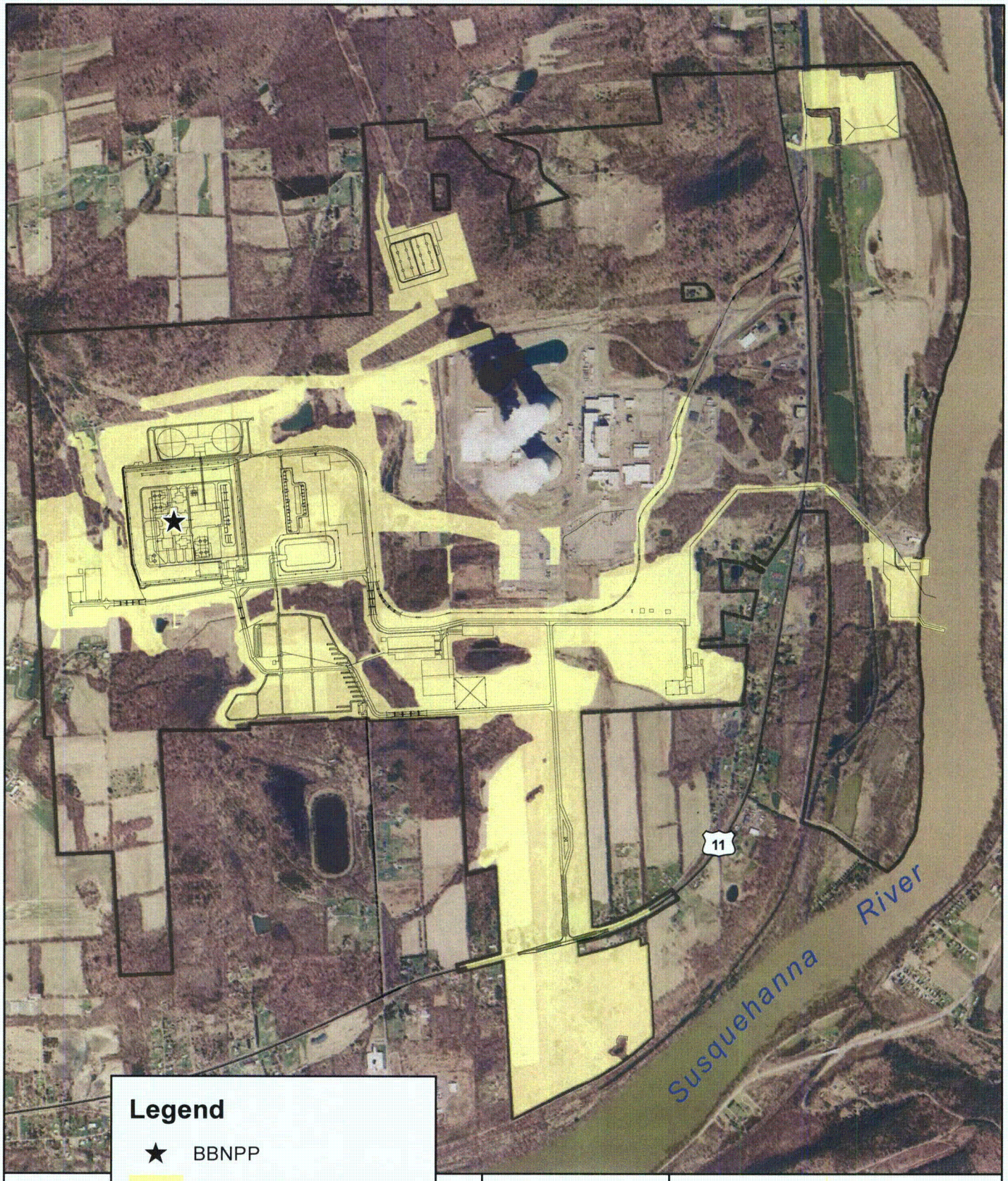

Legend

- ★ BBNPP
- Area of Disturbance
- BBNPP Project Boundary

N

0 0.125 0.25 0.5 Miles

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Figure 1.
BBNPP Site Location Map

Date: 7/30/2013	Revised:	400 Old Reading Pike Bldg A Suite 101 Stowe, PA 19464
		PREPARED FOR: CJR PROJECT: 22932.001 PREPARED BY: SAS

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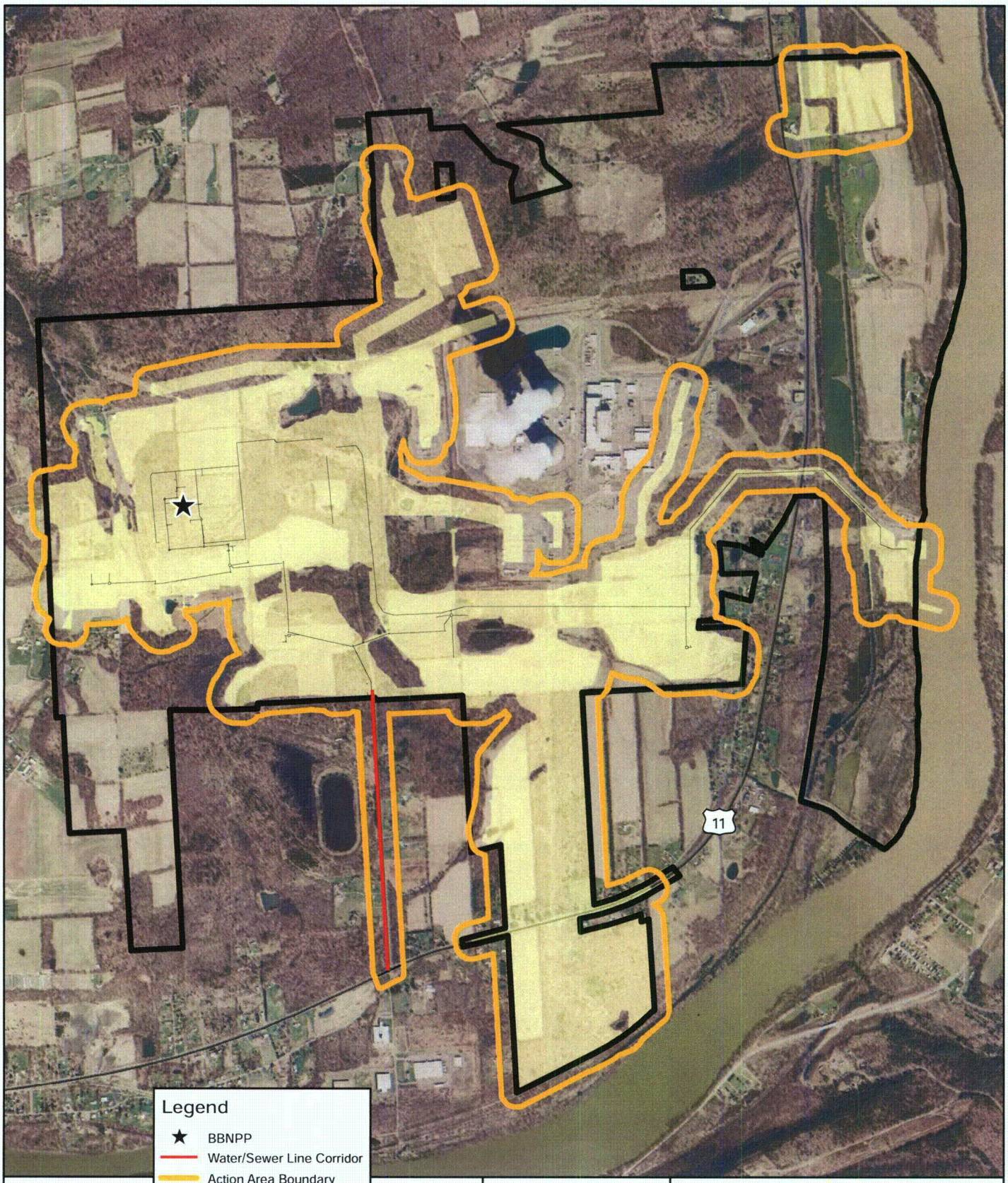

Legend

- ★ BBNPP
- Water/Sewer Line Corridor
- Action Area Boundary
- Area of Disturbance
- BBNPP Project Boundary

N

0 0.125 0.25 0.5 Miles

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Figure 2.
BBNPP Action Area

Date: 7/30/2013	Revised:	400 Old Reading Pike Bldg A Suite 101 Stowe, PA 19464
		PREPARED FOR: CJR PROJECT: 22932.001 PREPARED BY: SAS

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Figure 3.
BBNPP Isolated Forest Fragments, Scenario 1.

Date: 7/30/2013	Revised:	400 Old Reading Pike Bldg A Suite 101 Stowe, PA 19464
		PREPARED FOR: CJR PROJECT: 22932.001 PREPARED BY: SAS

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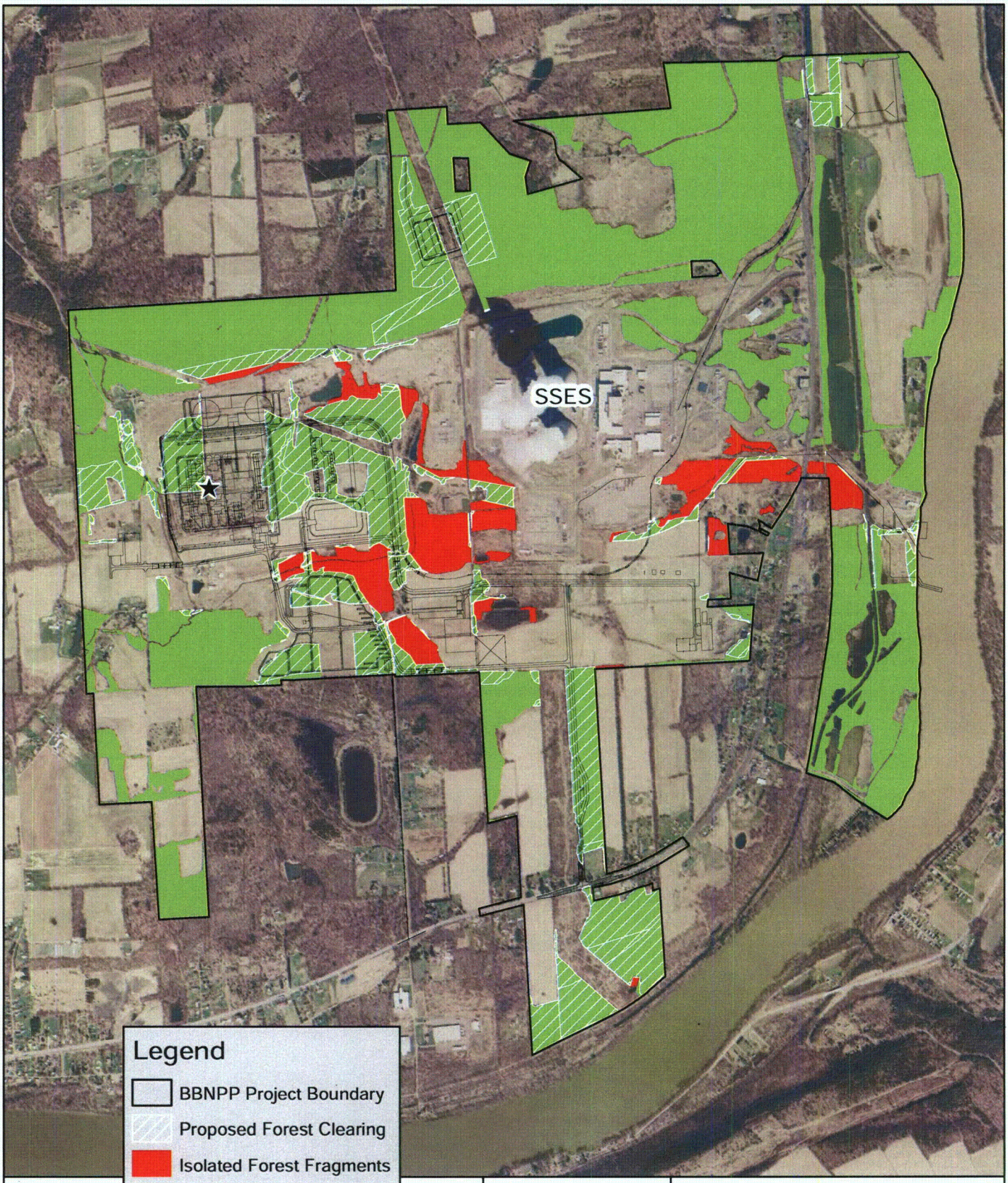

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Figure 4.
BBNPP
Isolated Forest Fragments, Scenario 2

Date: 7/30/2013	Revised:	400 Old Reading Pike Bldg A Suite 101 Stowe, PA 19464
		PREPARED FOR: CJR PROJECT: 22932.001 PREPARED BY: SAS

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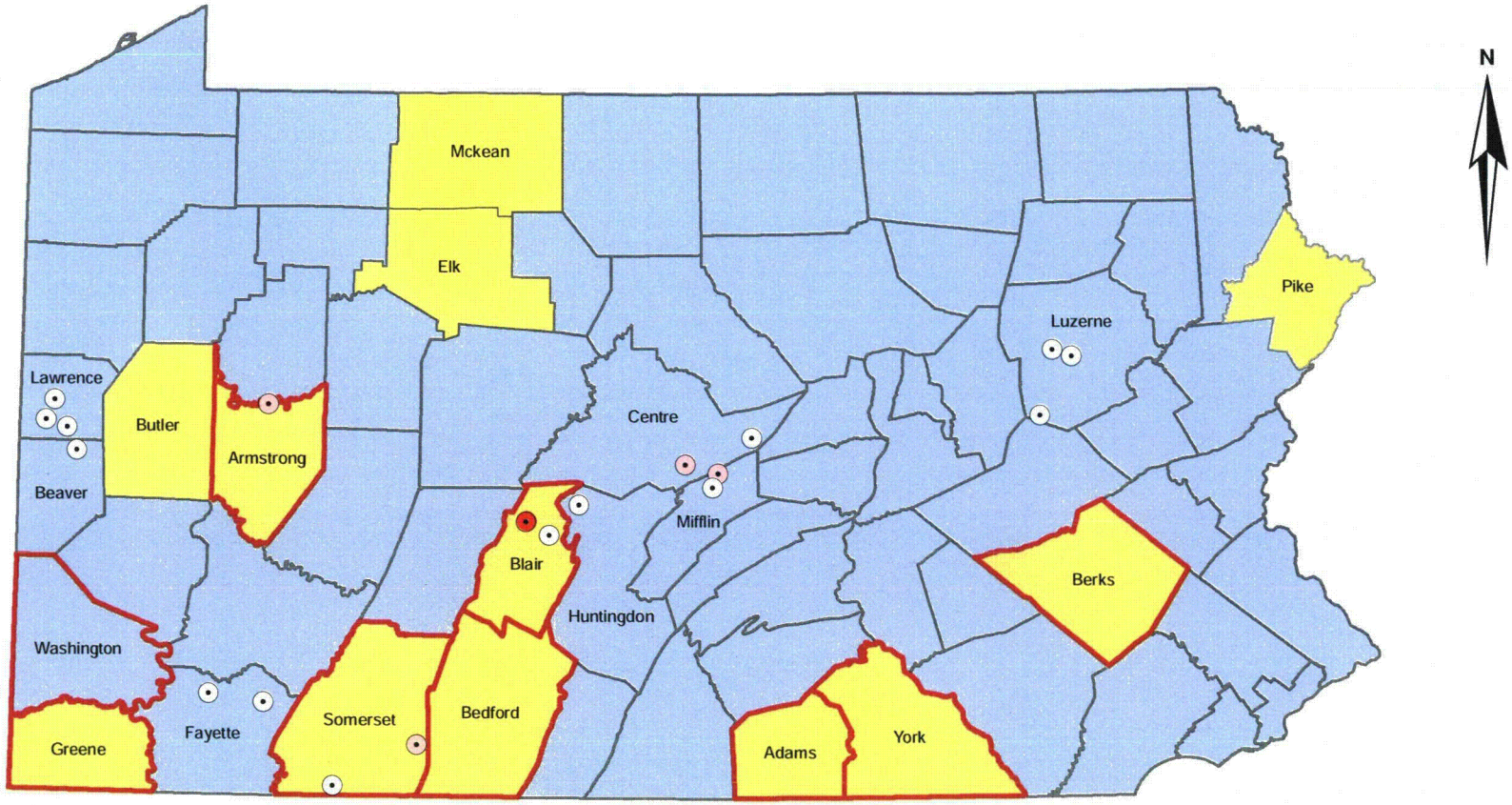

Legend

- Priority 2 Hibernaculum
- Priority 3 Hibernaculum
- Priority 4 Hibernaculum
- Summer Live Captures
- Maternity Colonies

0 20 40 80 Miles

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Turner, G. 2012. Indiana Bat Hibernacula Surveys, 2011-2012. Pennsylvania Game Commission, Harrisburg, Pennsylvania. 24 p.

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Figure 5.
Indiana Bat
Pennsylvania Range

Date: 7/31/2013	Revised:	400 Old Reading Pike Bldg A Suite 101 Stowe, PA 19464
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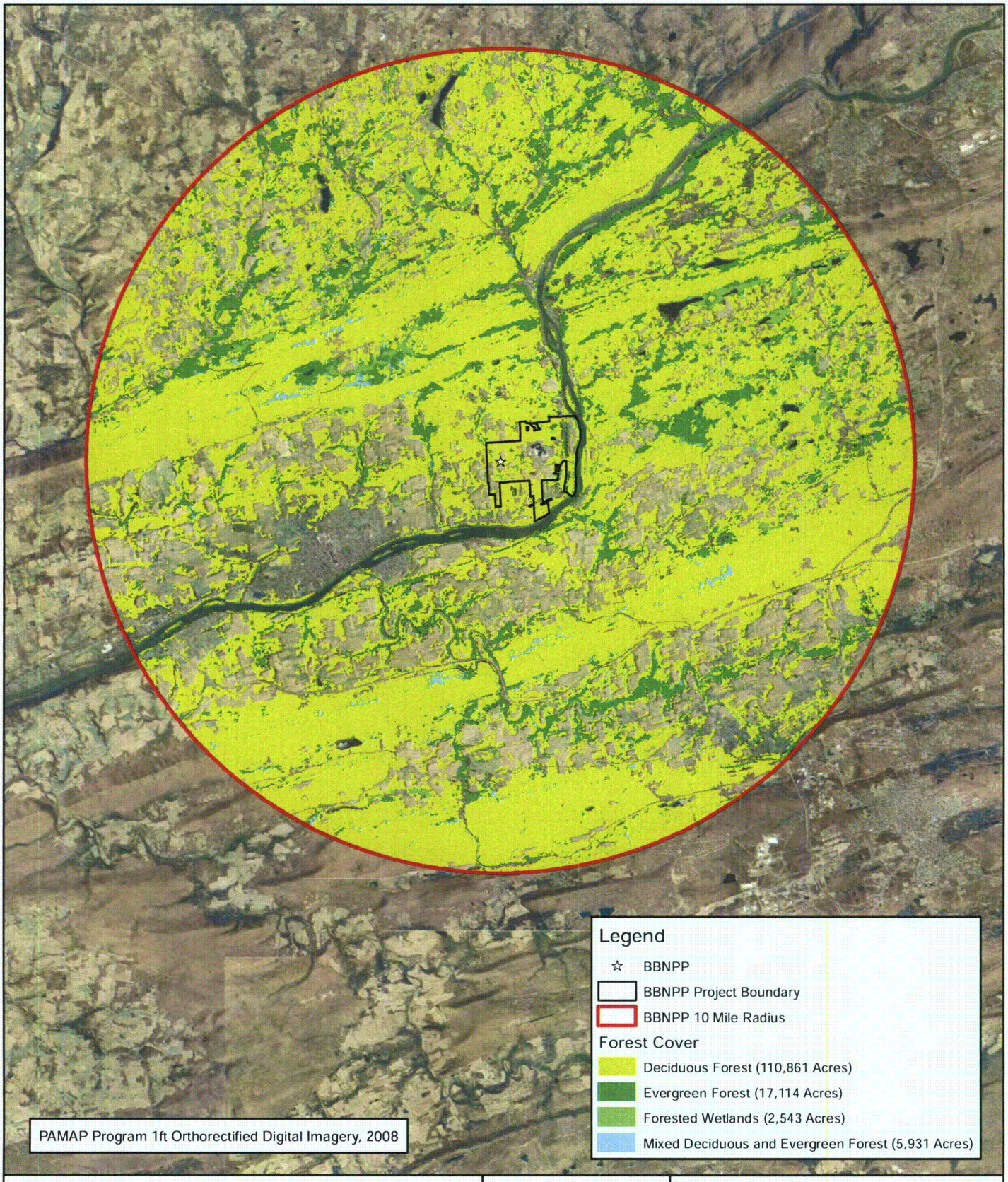

N

0 1.25 2.5 5 Miles

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Figure 6.
Forest Cover within
10 Miles of BBNPP Project Site

Date: 7/30/2013	Revised:	400 Old Reading Pike Bldg A Suite 101 Stowe, PA 19464
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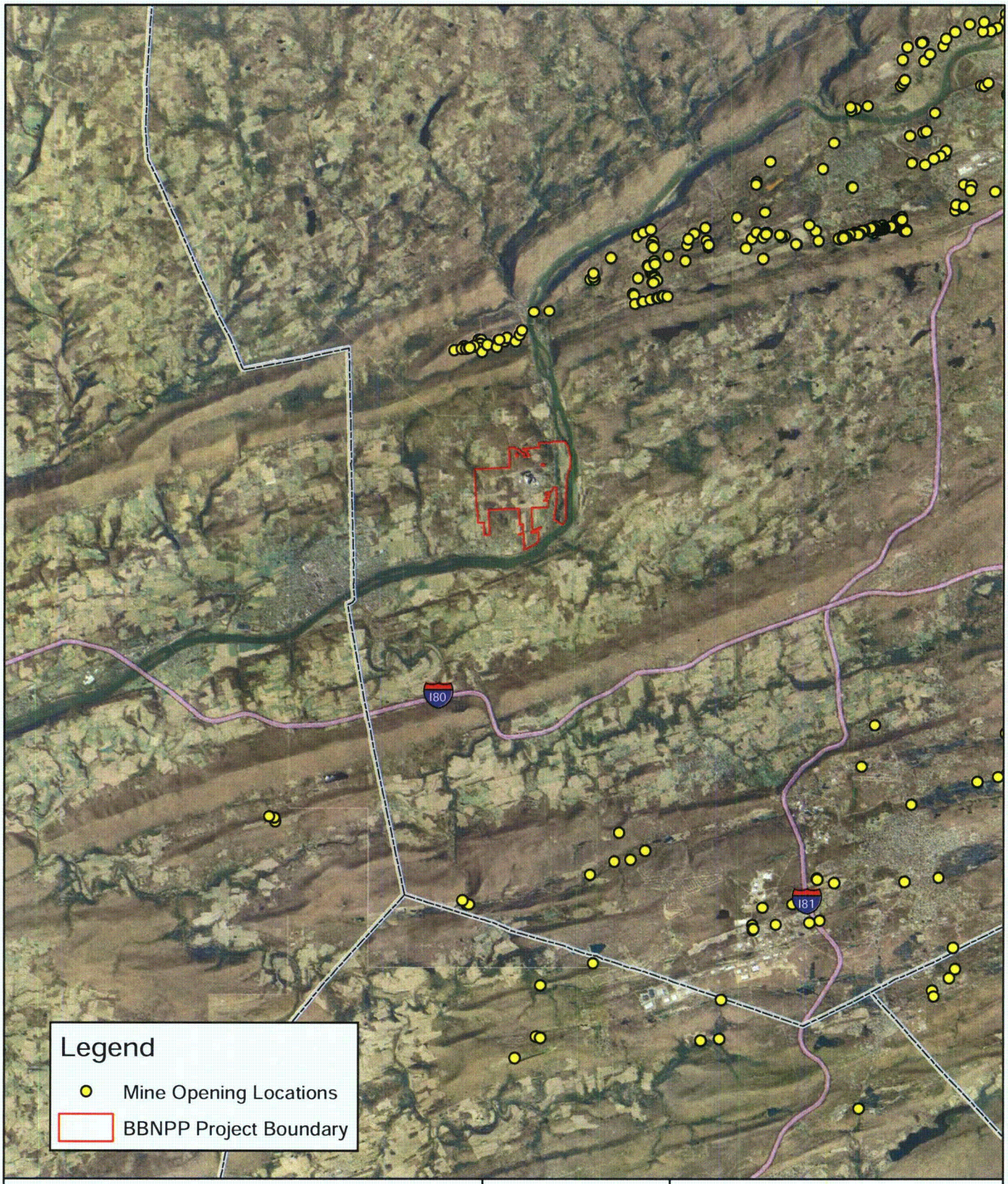

N

Abandoned Mine Land Inventory System (AMLIS)
PA DEP Bureau of Abandoned Mine Reclamation, 2012

0 1.5 3 6 Miles

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Figure 7.
BBNPP Site Location Map
with Mine Opening Locations

Date: 7/31/2013	Revised:	400 Old Reading Pike Bldg A Suite 101 Stowe, PA 19464
		PREPARED FOR: CJR PROJECT: 22932.001 PREPARED BY: SAS

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