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November 25, 2009

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

BELL BEND NUCLEAR POWER PLANT
ENVIRONMENTAL REPORT SECTION 9.3,
ALTERNATIVE SITES
BNP-2009-371 Docket No. 52-039

Reference: 1) Letter from R.R. Sgarro (PPL) to U.S. NRC Document Control Desk, "Bell Bend Nuclear Power Plant Alternative Site Evaluation," dated September 9, 2009.

The purpose of this letter is to satisfy the commitment made in our letter (Reference 1) related to the revised Bell Bend Nuclear Power Plant (BBNPP) alternative site analysis. The commitment was to revise ER Section 9.3 to the BBNPP COLA to reflect the Bell Bend Nuclear Power Plant Alternative Site Evaluation, Rev. 0, September 2009, as transmitted by Reference 1. The enclosed rewrite of ER Section 9.3 is presented "clean," without revisions noted. It is intended to replace the existing section in its entirety. ER Section 10.4 is provided with revisions shown in strike-out and underline. Enclosure 1 provides the BBNPP revised ER Section 9.3. Associated changes to ER Section 10.4 are provided in Enclosure 2.

The commitment contained in this submittal is the future revision of the COLA as indicated in Enclosures 1 and 2. There is no proprietary or sensitive information contained in this transmittal.

If you have any questions, please contact the undersigned at 570-802-8102.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on November 25, 2009

Respectfully,

Rocco R. Sgarro

RRS/nj

Enclosures: 1) Bell Bend Nuclear Power Plant ER Section 9.3 Alternative Sites

2) Bell Bend Nuclear Power Plant ER Section 10.4 Benefit Cost Balance

D079
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Enclosure 1

Bell Bend Nuclear Power Plant
ER Section 9.3 Alternative Sites

9.3 ALTERNATIVE SITES

This section identifies and evaluates a set of alternative site locations to the Bell Bend Nuclear Power Plant (BBNPP) site. The object of this evaluation is to identify reasonable *Alternative Sites* and to demonstrate that there are no *Alternative Sites* that have environmental preference (i.e., "Environmentally Preferred") to the *Proposed Site.* If environmental preference is established, then a second tier of evaluations is conducted based on other factors, including commercial and financial criteria, to demonstrate that there are no *Alternative Sites* that are "Obviously Superior" to the *Proposed Site*.

The underlying assessment (UniStar, 2009) evaluated other candidate sites based on the guidance provided in NUREG-1555, Environmental Standard Review Plan (U.S. Nuclear Regulatory Commission [NRC], 2007), Regulatory Guide 4.2, Preparation of Environmental Reports for Nuclear Power Stations (NRC, 1976), Regulatory Guide 4.7, General Site Suitability for Nuclear Power Stations (NRC, 1998), and the Electric Power Research Institute (EPRI) Siting Guide: Site Selection and Evaluation Criteria for an Early Siting Permit Application Final Report (EPRI, 2002). The results of that assessment are provided in this section.

Siting new units at existing nuclear sites has provided another option to the way alternatives are reviewed and selected. Existing sites offer decades of environmental and operational information about the impact of a nuclear plant on the environment. Because these sites are licensed nuclear facilities, the NRC has already found them to be acceptable relative to other undeveloped sites in the region of interest. The NRC recognizes in NUREG-1555, Section 9.3 (III) (NRC, 2007), that proposed sites may not be selected as a result of a systematic review:

> *Recognize that there will be special cases in which the proposed site was not selected based on a systematic site selection process. Examples include plants proposed to be constructed on the site of an existing nuclear power plant previously found acceptable on the basis of a NEPA review and/or demonstrated to be environmentally satisfactorily on the basis of operating experience, and sites assigned or allocated to an applicant by a State government from a list of State-approved power-plant sites. For such cases, the reviewer should analyze the applicant's site-selection process only as it applies to candidate sites other than the proposed site, and the site-comparison process may be restricted to a site-by-site comparison of these candidates with the proposed site. The site selection process is the same for this case except for the fact that the proposed site is not selected from among the candidate sites based on a site-by-site comparison.*

The information provided in this section is consistent with the special case noted in NUREG-1555, Section 9.3 (III), (NRC, 2007). This section provides a description of the evaluation of a set of alternative locations for the *Proposed Site* that includes direct comparisons of their environmental suitability to the environmental suitability of the *Proposed Site*. The objective of this assessment is to confirm that no site is "Environmentally Preferred" and thus not "Obviously Superior" to the proposed location of BBNPP. This section evaluates the characteristics of existing nuclear generation stations, existing power generating stations, greenfield sites that are located adjacent to existing nuclear and power generating stations and brownfields. The sites were evaluated based on building and operating a merchant U.S. Evolutionary Power Reactor (EPR). This provides a realistic, consistent basis for evaluating

environmental site conditions against site requirements for a nuclear power generating station design.

9.3.1 SITE SELECTION PROCESS

The site selection process focuses on identifying and evaluating locations that represent a range of reasonable *Alternative Sites* to the *Proposed Site*.

The primary objective of the site-selection process is to determine if any *Alternative Site* is "Environmentally Preferred" and, if so, "Obviously Superior" to the *Proposed Site* for eventual construction and operation of the proposed reactor unit. The basic constraints and limitations applicable to the site-selection process are the currently implemented rules, regulations, and laws within the federal, state, and local agency levels. These provide a comprehensive basis and an objective rationale under which this selection process is performed. As stated in NUREG-1555, Section 9.3 (I) (NRC, 2007):

> *"Region of interest" (ROI) is the geographic area considered in searching for potential and candidate sites... "Candidate sites" are those potential sites (at least four) that are within the ROI and that are considered in the comparative evaluation of sites to be among the best that can reasonably be found for the siting of a nuclear power plant...The "proposed site" is the candidate site submitted to the NRC by the applicant as the proposed location for a nuclear power plant. "Alternative sites" are those candidate sites that are compared to the proposed site to determine if there is an obviously superior site. An "environmentally preferred" alternative site is a site for which the environmental impacts are sufficiently less than for the proposed site so that environmental preference for the alternative site can be established.*

The evaluation process follows NUREG-1555 utilizing elements of the EPRI siting guide (EPRI, 2002). The alternative site evaluation process is shown on Figure 9.3-13 and is summarized as follows:

- Establish the ROI
  - Establish the basis for the ROI and define the ROI
  - Develop the basis for establishing a pool of sites to evaluate
  - Establish an initial base pool of sites to evaluate
- Determine Candidate *Areas* within the ROI
  - Establish exclusionary criteria (e.g., population density)
  - Apply the exclusionary criteria to the ROI
- Identify list of *Potential Sites*
  - Establish de-select criteria (e.g., <420 acres [ac] [170 hectares (ha)])
  - Apply de-select criteria to sites located within *Candidate Areas* to establish *Potential Sites*
- Identify list of *Candidate Sites*
  - Confirm *Potential Sites* are licensable and otherwise viable sites for constructing a new nuclear power station to establish *Candidate Sites*

- Identify list of *Alternative Sites*
  - Score *Candidate Sites* based on non-commercial weighted criteria (i.e., environmental basis)
    - Establish scoring criteria and basis
    - Establish weighting criteria and basis
    - Score *Candidate Sites*
  - Select the top 3 to 5 ranked *Candidate Sites* as *Alternative Sites*
- Compare *Alternative Sites* to *Proposed Site*
  - Apply weighted scoring to *Proposed Site*
  - Evaluate if any *Alternative Sites* are "Environmentally Preferred" to the *Proposed Site*
  - If one or more of the *Alternative Sites* is significantly higher, then apply commercial scoring criteria to evaluate whether an *Alternative Site* is "Obviously Superior" to *Proposed Site*

9.3.1.1 Region of Interest

The first step in the alternative site selection process was to define and identify the ROI. As defined in NUREG-1555 Section 9.3 (NRC, 2007), the ROI is the largest area considered and is the geographic area within which sites suitable for the size and type of nuclear power generating facility proposed by the applicant are evaluated. This section contains a description of the ROI, including the following elements:

- Major centers of population
- Areas predicted to be deficient in power
- Available bodies of water (for cooling)
- Railroads, highways, and waterways (existing and planned)
- Topographic features
- Major land use classifications (for example, residential and agricultural) and areas reserved for specific uses
- Location and description of existing and planned primary electrical generating facilities
- Existing and planned transmission network
- Transmission interconnections with other utilities
- Natural and man made features (for example, zones of seismic activity, unusual geologic features, and military installations) constituting potential hazards to construction or operation of a nuclear power generating facility

As stated in Environmental Report (ER) Section 1.1, Proposed Action:

> *The purpose of the proposed new nuclear power plant is to generate electricity (baseload power) for sale.*

As discussed in ER Chapter 8, the BBNPP would be developed as a merchant facility, owned by PPL. A merchant facility is one that sells or conveys its capacity and electricity in competitive markets. As a merchant facility, the primary market area is based on PPL's fundamental

business decisions on the economic viability of a nuclear power generating facility, the market for the facility's output, and the general geographic area where the facility should be deployed to serve the market.

The geographic scope or primary market area for the BBNPP is generally defined as the eastern part of the Pennsylvania-New Jersey-Maryland Interconnection, LLC (PJM) classic market area. This area is closely approximated by the service territories for the electric delivery companies identified and depicted on Figure 9.3-1. The PJM classic market area is a sub-set of the entire PJM area.

NUREG-1555, Section 9.3, Site Selection Process (NRC, 2007) states:

> *The ROI is typically selected based on geographic boundaries (e.g., the State in which the proposed site is located) or the relevant service area for the proposed plant.*

Based on the aforementioned, the ROI is defined as the eastern part of the PJM classic market area. The ROI and the primary market area for the BBNPP are one in the same.

For PPL Corporation and its marketing entity, PPL Energy Plus, the key drivers for selection of this defined ROI/primary market area include:

- Fit with the marketing plan: Assets and locations in the primary PJM east area fit well with the PPL Energy Plus marketing plan.
- Regulatory environment: A thorough understanding of state regulatory issues is one of the most important considerations in development of a new generating facility. States within the ROI, and particularly Pennsylvania, are well understood from a regulatory perspective.
- Market operations (regional transmission organization [RTO], independent system operator [ISO]: PJM is a mature, well-functioning market that can readily fulfill PPL Corporation's marketing objectives.
- Electric transmission concerns: The eastern part of the PJM classic market area provides access to several key market areas and is not subject to some of the problems other areas have historically experienced in moving power to these markets.
- Probability of success/competitive advantages: Assets for which competition is expected to be less and where PPL has a competitive advantage rank highest. The eastern part of the PJM classic market area, particularly where PPL Corporation already has assets, scores high in these considerations.

Reflecting historical power flows and constraints on the PJM transmission system, the ROI closely approximates the regulated service territory boundaries shown on Figure 9.3-1. This recognizes the advantages of situating the proposed facility east of PJM's Western Interface, which is often a point of constraint to the delivery of energy from western areas of PJM to eastern Pennsylvania, New Jersey, the Delmarva Peninsula, and the Washington/Baltimore metropolitan area. Such placement would allow PJM to dispatch more cost-effective generation located east of this interface to meet load demands, including periods when such constraints are experienced. (PJM, 2008a)

Since the deregulation of electric utilities in Pennsylvania, the Commonwealth of Pennsylvania is not mandated to develop a comprehensive need-for-power analysis. In addition, the Commonwealth does not have a State Siting Board, State Power Planning board, or similar process. The Commonwealth does provide strategic direction and policy guidance for the electric power industry, but does not currently have an integrated plan for existing and future facilities to address the need for power.

In 1999, the State of Maryland restructured the manner in which it regulated the state's utilities by allowing for customer choice of electricity suppliers and by deregulating the price of electric supply. With the restructuring of the electric power industry in Maryland, generation of electricity is now provided in competitive marketplace (transmission and distribution remain regulated monopolies). Prices for power supply are determined by a competitive electric power supply market rather than by the Maryland Public Service Commission (MPSC) in a regulated environment. Despite the deregulation of the price of electric supply and generation in Maryland, electric power generators must obtain a "Certificate of Public Convenience and Necessity" (CPCN) from MPSC to build or modify power facilities and transmission lines in the state. The CPCN is a single, comprehensive licensing process for the State. The CPCN encompasses the requirements of the Clean Air Act (CAA), including the Prevention of Significant Deterioration (PSD) approval, which MPSC, on behalf of Maryland, has been authorized by the U.S. Environmental Protection Agency (USEPA) to issue to power developers.

In 1999, the Delaware General Assembly passed legislation restructuring the electricity industry in Delaware. Prior to restructuring, the generation, transmission, and distribution of electric power by investor-owned utilities was fully regulated by the Delaware Public Service Commission (DPSC). With restructuring, the generation of electric power became deregulated, leaving only distribution services under the regulatory control of DPSC. In 2006, faced with significantly increased energy costs, the Delaware General Assembly passed a revision to the restructuring legislation entitled "The Electric Utilities Retail Supply Act of 2006." The Act provides that electric distribution companies subject to the jurisdiction of DPSC would be designated as the standard offer service supplier and returning customer service supplier in their respective territories. The Act provided further opportunity for distribution companies to enter into long- and short-term supply contracts, own and operate generation facilities, build generation and transmission facilities, make investments in demand-side resources, and take any other DPSC-approved action to diversify their retail load supply. Additionally, generation companies are required to conduct Integrated Resource Planning (IRP) for a forward-looking 10-year timeframe and to file such plans with DPSC, the state Controller General, the state Director of the Office of Management and Budget, and the Energy Office every 2 years starting with December 1, 2006.

In 1999, the New Jersey Board of Public Utilities (NJBPU), the governing body for electric, oil, and natural gas services in New Jersey, introduced a bill to deregulate the state's energy industry for residential customers. The goal of the Electric Discount and Energy Competition Act (EDECA) was to enable New Jersey energy consumers to shop around and choose the energy provider that best suited their budget and service requirements. The free-market rationale hinged on the prediction that enough healthy competition between generation companies would likely keep prices down, while offering better service and reliability to customers. Under the auspices of the federal U.S. Department of Energy (DOE), New Jersey took measures to safeguard free market competition for electricity and gas, including the requirement for NJBPU to "unplug" power facilities with higher costs than other available energy sources.

The task of evaluating the region's power supply lies with the PJM RTO and the regional electric reliability organization Reliability*First* Corporation (RFC). PJM has projected continuing load growth in the primary PJM east area. The DOE has identified New Jersey, Delaware, eastern Pennsylvania, and eastern Maryland as a Critical Congestion Area. PJM expects expanded exports of power into New York, further exacerbating the situation. Limitations in the east-west transmission of energy across the Allegheny Mountains and the growing demand for baseload power at load centers along the east coast were factors in selecting the eastern part of PJM's primary market area as the ROI.

One of PJM's objectives is to provide a transmission system that can accommodate power needs in required areas while maintaining a reliable network. The existing PJM high-voltage backbone transmission network provides lines appropriate for use by an EPR facility (500-kilovolt [kV] or 345-kV). In June 2007, PJM authorized a new 500-kV line connecting the existing Susquehanna 500-kV substation with the Roseland substation in northern New Jersey. This Susquehanna-Roseland line is being added independent of the proposals to construct BBNPP or other generating facilities. Planned to be in service by 2012, this will become part of the "existing" transmission network for the BBNPP.

The Susquehanna-Roseland project addresses numerous overloads projected to occur on critical 230-kV circuits across eastern Pennsylvania and northern New Jersey, with multiple lines projected to exceed their conductor rating as early as 2013. (PJM, 2008a) PJM regularly reviews performance issues associated with specific transmission facility overloads and outages as experienced in actual operations. This new circuit was justified on the basis of reliability as identified by reliability criteria violation tests in PJM's regional transmission extension plan (RTEP) process deliverability studies. From an economic perspective, the line was not proposed to facilitate access of specific new generation proposals, even though this additional backbone capability can present economic opportunities for them. The ability of each generation request to interconnect safely and reliably is addressed in specific RTEP interconnection process studies.

PJM also documents the retirement of numerous older generating facilities in the PJM east area. As stated in ER Section 8.4, reserve margins of 15% in the RFC are expected to remain adequate through 2010. Assuming no new capacity additions are made and a projected reduction of 1,000 megawatts (MW) of existing capacity occurs, existing generation would be sufficient to maintain a 15% reserve margin through 2010. Since there are more than 3,000 MW of new capacity planned for completion by 2010, it is unlikely that the reserve margins will drop below 15% before 2011. The amount of new capacity needed to satisfy a 15% reserve margin through 2010 is about 500 MW. If forecasted new capacity goes in service as projected and the existing energy-only and uncommitted capacity are available to supply regional demand, then the reserve margins will remain greater than a 15% benchmark through 2012. Excluding energy-only and uncommitted capacity, and assuming no new capacity addition, there is sufficient capacity to maintain a 15% reserve margin through 2010. Based on existing resources, projected retirements and capability changes through summer 2016, the reserve margins based on the summer peak net internal demand (NID) are projected to decline from a high of 18.8% in 2008, to a low of 5.1% in 2016. The projected reserve margins for the summer peak NID based on existing and planned capacity plus existing uncommitted and energy-only resources decline over the period from 22.4% in 2008 (compared with 23.3% in 2007) to 9.6% in 2016. (RFC, 2007) As a result, there is a need for power from the BBNPP and other new generating capacity.

The ROI covers approximately 31,296 square miles (mi^2) (81,056 square kilometers (km^2)) and encompasses the major population centers of the cities of Wilmington, Delaware; Allentown/Bethlehem/Easton, Pennsylvania; Harrisburg, Pennsylvania; Scranton/Wilkes Barre, Pennsylvania; Philadelphia, Pennsylvania; Baltimore, Maryland; and Newark, New Jersey (Figure 9.3-1). The ROI is large enough (encompassing portions of four states) to have sufficient environmental diversity. Bodies of water available as sources of cooling water for the proposed nuclear facility include Susquehanna River, Juniata River, Lehigh River, Patuxent River, Delaware River, Chesapeake Bay, Barnegat Bay, Lake Wallenpaupack, and the Atlantic Ocean. Major interstate highways include I-70, I-76, I-78, I-80, I-81, I-83, I-95, I-270, I-278, I-280, I-287, I-476, and I-695. Railroads in Maryland include Amtrak, Maryland and Delaware Railroad, and the Maryland Midland Railway. Railroads in New Jersey include Amtrak; Black River and Western Railroad; and the New York, Susquehanna and Western Railway. Railroads in Pennsylvania include Amtrak; Juniata Valley Railroad; New York, Susquehanna and Western Railway; North Shore Railroad; and Canadian Pacific Railroad. Topographic features in the ROI range from flat floodplains along the rivers and coastal plains along the bays to steep hills, deep ravines, and mountain ranges. Topography in Maryland includes coastal plains, the Piedmont Plateau, the Appalachian Mountains, Backbone Mountain, and land features such as Cunningham Falls and Calvert Cliffs. Topography in New Jersey includes coastal plains, the Piedmont Plateau, the Appalachian Mountains, and land features, such as High Point State Park. Topography in Pennsylvania includes coastal plains, the Piedmont Plateau, Pocono Plateau, and the Appalachian Mountains. Major land use designations can be found throughout the ROI and include Residential, Rural, Agricultural, Industrial, Commercial, Public Facilities, Parks, Open Space, Preserves, Reserves, Natural Areas, Transportation, Communications and Utilities, Government Special Designation, and Education. There are several military installations throughout the ROI, including the U.S. Naval Academy located in Annapolis, Maryland.

Various brownfield sites, remediation sites, other power facilities, and a greenfield site were considered as possible locations for a new nuclear power plant within the ROI. More than 8,000 sites within the ROI were initially identified for consideration (UniStar, 2009). This initial pool of sites within the ROI was established from the following sources: (1) the DOE, Energy Information Administration (EIA) State Energy Profiles for each of the four states in the ROI (EIA, 2008a; EIA, 2008b; EIA, 2008c; EIA, 2008d); (2) state brownfield site databases for the four states in the ROI—the State of Delaware Department of Natural Resources Environmental Control (DNERC) (DNERC, 2008); the State of Maryland Department of the Environment (MDE), Maryland Brownfield, Voluntary Cleanup Program and State Remediation Sites database (MDE, 2008); the State of New Jersey Brownfield SiteMart (NJSiteMart, 2008); and the Commonwealth of Pennsylvania Brownfield PA Site Search (PASiteSearch, 2008); and (3) PPL-owned sites provided by PPL (e.g., Martins Creek, New Jersey [NJ] greenfield site). These sources, in their entirety (i.e., without any additional filtering or screening) established the initial pool of over 8,000 sites, which were subsequently used in the BBNPP alternative site selection process.

To be retained for further consideration, the location must meet the following criteria, as outlined in NUREG-1555, Section 9.3 (III) (NRC, 2007):

- Consumptive use of water should not cause significant adverse effects on other users.
- There should not be any further endangerment of Federal, State, regional, local, and affected Native American tribal listed threatened, endangered, or candidate species.

- There should not be any potential significant impacts to spawning grounds or nursery areas of populations of important aquatic species on Federal, State, regional, local, and affected Native American tribal lists.
- Discharges of effluents into waterways should be in accordance with Federal, State, regional, local, and affected Native American tribal regulations and would not adversely impact efforts to meet water-quality objectives.
- There would be no preemption of or adverse impacts on land specially designated for environmental, recreational, or other special purposes.
- There would not be any potential significant impact on terrestrial and aquatic ecosystems, including wetlands, which are unique to the resource area.
- Population density and numbers conform to 10 Code of Federal Regulations (CFR) 100.
- There are no other significant issues that affect costs by more than 5% or that preclude the use of the site.

9.3.1.2 Candidate Areas and Candidate Sites

The next step in the site selection process was to identify suitable candidate areas by screening the ROI using exclusionary criteria. *Candidate Areas* refer to one or more areas within the ROI that remain after unsuitable areas have been removed. Screening of the ROI was performed at a high level with the purpose of quickly identifying areas within the ROI that would not be suitable for the siting of a nuclear power generating station.

The exclusionary criteria used in the screening of the ROI are listed below and are consistent with those identified in NUREG-1555, Environmental Standard Review Plan (ESRP) Section 9.3 (NRC, 2007) and the EPRI siting guide (EPRI, 2002):

- Population – Not located in densely populated areas (that is, not located in an area with greater than or equal to 300 persons per square mile [ppsm]) (300 persons per 2.6 km^2) (Figure 9.3-14). Note that this criterion is more restrictive than that specified in Regulatory Guide 4.7 and thus conservative.
- Transmission – Not located more than 30 miles (mi) (48.3 kilometers [km]) from a 345-kV or higher transmission line. The 345-kV or higher transmission lines are needed for the EPR standard grid connection design (Figure 9.3-15 [PJM, 2008b]).
- Dedicated Land – Not located on Dedicated Land (e.g., within national or state parks, tribal lands, etc.) (Figure 9.3-16 [Delaware Geographic Data Committee, 1998; Maryland Department of Natural Resources [MDNR], 1999; New Jersey Department of Environmental Protection (NJDEP), 1995; U.S. Census Bureau (USCB), 2000a])
- Water – Not located more than 15 mi (24.1 km) from a cooling water source capable of providing 50 million gallons per day (MGD) (189 million liters per day [mld]) or more (Figure 9.3-17).

Figure 9.3-2 shows the exclusion areas combined.

The exclusionary criterion pertaining to population density used in this siting evaluation is more specific and more conservative than what is presented in 10 CFR 100.21 (CFR, 2005). The information presented in 10 CFR 100.21 does not specify a permissible population density or

total population within this zone because the situation may vary from case to case. NRC Regulatory Guide 4.7, Rev. 2 (NRC, 1998) contains the same information as presented in 10 CFR 100.21, but adds the following specific criteria:

> *Preferably a reactor would be located so that, at the time of initial site approval and within about 5 years thereafter, the population density, including weighted transient population, averaged over any radial distance out to 20 miles (cumulative population at a distance divided by the circular area at that distance), does not exceed 500 persons per square mile [ppsm]. A reactor should not be located at a site whose population density is well in excess of the above value.*

In addition, the EPRI siting guide contains the most conservative criterion with regard to population density and proximity to major population centers (that is, not located in an area with greater than or equal to 300 ppsm [or 300 persons per 2.6 km^2]) (EPRI, 2002). This siting evaluation used the conservative population criterion (300 ppsm) as an exclusionary criterion in the identification of candidate areas to be in alignment with current industry objectives.

The *Candidate Areas* are those areas within the ROI that remain after applying the four exclusionary criteria and are shown in Figure 9.3-3. The locations of various sites, from the initial pool of sites, within the *Candidate Areas* are shown in Figure 9.3-18. It should be noted that the *Candidate Areas* reduced the initial pool of over 8,000 sites in the ROI to 356 sites.

The next step in the site selection process involved screening the remaining sites using refined criteria to identify *Potential Sites* for the placement of the proposed nuclear power station. A de-select criterion, as allowed by NUREG-1555 (NRC, 2007) and the EPRI siting guide (EPRI, 2002), was applied to the list of sites within the *Candidate Areas* to narrow the list. At least 420 ac (170 ha) are needed to construct the EPR. Therefore, all sites with less than 420 ac (170 ha) were screened out in this step. This narrowed the list to the following *Potential Sites*:

- Bainbridge (MD)
- Baltimore/Washington International (BWI) Airport (MD)
- Beiler (MD)
- Conowingo (MD)
- Delaware City Plant (DE)
- Humboldt Industrial Park (Humboldt) (PA)
- Keystone Industrial Port Complex (PA)
- Martins Creek (NJ)
- Montour (PA)
- Peach Bottom (PA)
- Seedco Industrial Park (Seedco) (PA)
- Sparrows Point (MD)
- Wallenpaupack (NJ)
- Indian River (DE)

Consistent with the evaluation process summarized in ER Section 9.3.1, the next step in the process was to confirm whether the *Potential Sites* were licensable and otherwise viable sites for constructing a new nuclear power station to establish the list of *Candidate Sites*. Of these 14 locations, the BWI Airport, Delaware City Plant, Keystone Industrial Port Complex, and Sparrows Point sites were determined not to be licensable due to population density within a

20-mi (32.2-km) radius of the site significantly exceeding NRC's Regulatory Guide 4.7 criterion of 500 ppsm. In addition, the BWI Airport site is adjacent to a major commercial airport.

The Beiler site was determined not to be a viable option after obtaining reconnaissance level information (needed to support scoring) and cursory evaluation identified that: (1) the nearest water source, Sassafras Creek, does not meet lowest 7-day average flow with a 10-year return frequency (7Q10) volume requirements, and (2) the next nearest water source, the confluence of Sassafras and Chesapeake Bay, which is over 12 mi away at its nearest point, is too shallow to support an inlet structure and would require significant dredging several more miles out, which would be beyond the 15 mi (24.1 km) exclusionary criterion. As a result, the following nine sites were identified as licensable and viable for continuing as *Candidate Sites* for the next step of the process:

- Bainbridge
- Conowingo
- Humboldt
- Martins Creek
- Montour
- Peach Bottom
- Seedco
- Wallenpaupack
- Indian River

The locations of the *Candidate Sites* are shown on Figure 9.3-5.

The next step in the evaluation process was to identify *Alternative Sites* by ranking the *Candidate Sites* based on a set of non-commercial criteria. This screening was accomplished using a table similar to Table 9.3-1 in NUREG-1555 (NRC, 2007). The ranking criteria used in this process are described in Table 9.3-8 and the rationale for the criteria is given in Table 9.3-9. The criteria used to evaluate the *Candidate Sites* were drawn from a larger, more comprehensive set of criteria identified in Section 9.3 of NUREG-1555 (NRC, 2007) and the EPRI siting guide (EPRI, 2002). A weighting value was also applied at this step to each of the criteria (Appendix D, UniStar, 2009). The summarized totals from the underlying assessment (UniStar, 2009) are provided in Table 9.3-10. The three sites with the highest scores are those selected for comparison as the *Alternative Sites*.

After ranking, the following three sites were identified as *Alternative Sites*:

- Montour
- Humboldt
- Seedco

These *Alternative Sites* were compared to the *Proposed Site* in the final step of the alternative site evaluation. The locations of the *Alternative Sites* and the *Proposed Site* are shown in Figure 9.3-19.

9.3.2 PROPOSED AND ALTERNATIVE SITE EVALUATION

Once the *Alternative Sites* were identified, the next step in the site evaluation process was to compare the *Alternative Sites* to the *Proposed Site* in a two-part sequential test to determine

whether an *Alternative Site* was (1) "Environmentally Preferred" and if so, (2) if it was "Obviously Superior" to the *Proposed Site*. The *Alternative Sites* that were compared with the *Proposed Site* are as follows:

- Montour
- Humboldt
- Seedco

The *Alternative Sites* were compared to the *Proposed Site* based on information about the existing sites and the surrounding area, as well as existing environmental studies and Final Environmental Impact Statements issued by the Atomic Energy Commission and/or the U.S. Nuclear Regulatory Commission and other reconnaissance level information. This comparison is performed to determine whether any *Alternative Sites* were "Environmentally Preferred" to the *Proposed Site*.

Based on the alternative site evaluation (UniStar, 2009), none of the *Alternative Sites* were determined to be "Environmentally Preferred" to the *Proposed Site*. If any of the *Alternative Sites* is determined to be "Environmentally Preferred" to the *Proposed Site* then the evaluation would have continued to the second step of the process. The second step of the process would have used commercially based evaluation criteria to rank the *Proposed Site* and the *Alternative Site(s)* that were determined to be "Environmentally Preferred" to determine if any *Alternative Site* was "Obviously Superior."

Throughout this section, environmental impacts of constructing and operating a nuclear power generating facility at the *Proposed Site* and *Alternative Sites* are assessed using the NRC three level standard of significance: SMALL, MODERATE, or LARGE. This standard of significance was developed using Council on Environmental Quality (CEQ) guidelines set forth in the footnotes to Table B-1 of 10 CFR 51, Subpart A, Appendix B (CFR, 2007) and is defined in ER Section 9.2.3.

To assess and analyze the environmental impacts of constructing and operating a nuclear power generating facility at each of the *Alternative Sites* and at the *Proposed Site*, it was assumed the construction and operation practices described in ER Chapters 4 and 5 will generally be applied to each site, thereby allowing for a consistent description of the impacts on each site.

A summary of the evaluation of environmental impacts on the *Proposed Site* and *Alternative Sites* is presented in the following sections.

9.3.2.1 Bell Bend Nuclear Power Plant (Proposed Site)

The BBNPP site is located directly adjacent to an existing nuclear facility: the Susquehanna Steam Electric Station (SSES). The *Proposed Site* is located in Salem Township, Luzerne County, Pennsylvania, approximately 4 mi (6.4 km) south of Shickshinny, Pennsylvania, and 5 mi (8 km) northeast of Berwick, Pennsylvania. U.S. Highway 11 is located south and east of the site. Figure 9.3-6 contains a location map showing a 6 mi (9.7 km) radius surrounding the BBNPP site. Figure 9.3-20 provides an aerial photograph of the BBNPP site and immediate vicinity. Also shown on Figure 9.3-20 are the Federal Emergency Management Agency (FEMA) 100- and 500-year floodplains (FEMA, 2008), mapped national wetland inventory (NWI)

wetlands (U.S. Fish and Wildlife Service [USFWS], 2009), and designated prime farmland (U.S. Department of Agriculture [USDA], 2009).

9.3.2.1.1 Land Use

Land use in the area surrounding the BBNPP site is predominantly rural. A majority of the area surrounding the site is wooded and undeveloped, or used for agricultural purposes. The BBNPP site is located in the rural Township of Salem, which has an estimated population of 4,269 people (USCB, 2000b). The largest community within 10 mi (16.1 km) of the site is the Borough of Berwick, Pennsylvania, approximately 5 mi (8 km) to the southwest. The site has an overall area of approximately 424 ac (172 ha). The majority of the site is wooded and undeveloped. As noted in ER Section 2.2.1, a majority of the BBNPP site is zoned as agricultural district, with a much smaller portion zoned as conservation district. Areas to the north and east containing the existing nuclear power plant are zoned heavy industrial.

The Pennsylvania Department of Environmental Protection (PADEP) eMapPA, Online Mapping System shows that the site contains or is located adjacent to a landfill. The database indicates the PP&L Class I Demo Site #3 is a Residual Waste Operation – Landfill. The PADEP indicated that the landfill is inactive and in compliance (PADEP, 2009a).

The topography of the BBNPP site is generally level with hills being present in the northern portions of the site. The site topography indicates a relief across the site of approximately 130 feet (ft) (39.6 meters [m]) (U.S. Geological Survey [USGS], 1989); therefore, the cut and fill requirements for construction would be minimal.

The BBNPP site can easily accommodate the 420 ac (170 ha) necessary for construction of the proposed new unit. Although nuclear power plant structures would occupy only a portion of the 420-ac (170-ha) area, the construction process could result in impacts on the entire area, such as vegetation removal, grading, and other earth-disturbing activities. These areas could also be used for laydown areas, stormwater retention ponds, and borrow areas during or post-construction.

Based upon available geographic information system (GIS) data, the nearest dedicated land (federal, state, or tribal) is the Ber Vaughn Park, which is approximately 5.8 mi (9.3 km) from the site (Pennsylvania Department of Conservation and Natural Resources (PA DCNR), 2009; National Atlas of the United States, 2005).

The BBNPP site is located west of the North Branch Susquehanna River. As discussed in ER Chapters 4 and 5, makeup water for the BBNPP would be drawn from the North Branch Susquehanna River. To obtain the water from the North Branch Susquehanna River, new water intake and discharge pipelines would need to be constructed. The water pipelines would extend from the eastern border of the BBNPP within the site boundary for about 1.2 mi (1.9 km) to the North Branch Susquehanna River. As described in ER Section 5.3.1, the Circulating Water System (CWS) Makeup Water Intake Structure is located approximately 300 ft (91.4 m) downstream of the existing SSES Units 1 and 2 River Intake Structure, and the discharge structure is located approximately 720 ft (220 m) south of the CWS Makeup Water Intake Structure.

Additional information regarding land use impacts associated with the construction and operation of the BBNPP is discussed in ER Sections 4.1.1 and 5.1.1, respectively. Overall land use impacts are anticipated to be SMALL for both construction and operation activities.

9.3.2.1.2 Air Quality

Luzerne County is designated as being in attainment for pollutants as regulated by the USEPA. Any air emissions that would occur as a result of the operation of the BBNPP should be low enough that they would not cause or contribute to a significant change in local or regional air quality levels. (USEPA, 2009a) However, the BBNPP site is located in a four-county maintenance area for ozone, and therefore an applicability analysis of emissions of ozone and its precursors is required to determine whether the federal Clean Air Conformity Rule would be triggered by BBNPP construction. There are no Prevention of Significant Deterioration (PSD) Class I areas in Pennsylvania, and there are no Class I areas within 100 mi (161 km) of the site (National Park Service [NPS], 2009).

Construction activities at the BBNPP site have the potential to temporarily impact ambient air quality in the immediate vicinity due to emissions from onsite construction equipment and the transportation of construction materials and workers to and from the site. These emissions are expected to be consistent with emissions resulting from other construction projects of this magnitude. It is anticipated that there would be no significant impacts on air quality at offsite locations during the construction period due to the large size of the site and the fact that the construction activities would be primarily located near the center of the site (where most construction and equipment laydown would also occur). Overall air quality impacts on the surrounding area attributable to the construction of the BBNPP would be SMALL due to adherence to regulatory requirements and the implementation of best management practices (BMPs) employed at large construction projects.

With the exception of some relatively small diesel-fueled emergency power generating equipment and fire pumps, operation of the BBNPP would not have significant sources of emissions attributable to the combustion of fossil or other fuels. The BBNPP would contain cooling towers that would emit water vapor and small amounts of particulate matter (PM) into the atmosphere. Because of the exceptionally low level of emissions, operation activities are not expected to cause or contribute to a violation of state or federal ambient air quality standards. It is anticipated that there would be a small increase in regional and local air emissions as a result of increased vehicular traffic associated with the workforce employed for facility operations and periodic refueling activities. It is anticipated that overall air quality impacts associated with operation of the BBNPP would be SMALL due to the inherently low emissions of operating nuclear power plants.

Additional air quality impact information associated with the construction and operation of the BBNPP is discussed in ER Sections 4.4.1 and 5.8.1, respectively. In summary, air quality impacts are anticipated to be SMALL for both construction and operation activities.

9.3.2.1.3 Water

The BBNPP site is located less than 1 mi (1.6 km) west of the North Branch Susquehanna River. The Water Use Protected designation for the North Branch Susquehanna River is warm

water fishery with no special quality designation (The Pennsylvania Code, 2007). As discussed in ER Chapters 4 and 5, makeup water for the BBNPP would be drawn from Susquehanna River. To obtain the water from the North Branch Susquehanna River, new water intake and discharge pipelines would need to be constructed. A conceptual route for the water pipelines would extend from the eastern border of the BBNPP within the site boundary for about 1.2 mi (1.9 km) to the North Branch Susquehanna River. Impacts associated with construction of the water pipelines are anticipated to be temporary in nature.

As described in ER Sections 5.3.1 and 5.3.2, the CWS Makeup Water Intake Structure is located approximately 300 ft (91.4 m) downstream of the existing SSES Units 1 and 2 River Intake Structure, and the discharge structure is located approximately 720 ft (220 m) south of the CWS Makeup Water Intake Structure. The lowest 7-day average flow in a 10-year period (7Q10) for the period of record (July 1999 to July 2009) for the river at the nearest USGS gage (01536500 on left bank at downstream side of North Street bridge in Wilkes-Barre, and 1.8 mi [2.9 km] upstream from Toby Creek) is approximately 505 MGD (1,912 mld) (USGS, 2009a). As discussed in ER Section 3.3.1, total water demand for the North Branch Susquehanna River during normal operation is expected to be approximately 37 MGD (140 mld). Therefore, the water availability in the Susquehanna River at low flow exceeds the total water usage at the site by approximately 14 times, and water use impacts associated with operation activities would be SMALL.

As further described in ER Section 2.3, groundwater at the site occurs within 5 ft (2 m) of the surface in some areas. Groundwater drains southward toward the Susquehanna River. Groundwater use in North Branch Susquehanna River Basin (Pennsylvania portion) has remained unchanged from 1970 to 1995. This includes the SSES, adjacent to BBNPP, which uses groundwater for operational purposes. As described in ER Section 4.2, the surficial glacial overburden aquifer is the main aquifer that could be temporarily impacted by construction activities at the BBNPP site. Groundwater withdrawals would not be used for construction purposes (except for water extracted via excavation dewatering) or to support operation of the BBNPP; therefore, there would be no long-term impact on groundwater resources.

BBNPP water use impacts from construction and operation activities and associated mitigation measures are discussed in greater detail in ER Sections 4.2.1, 4.2.2, 5.2.1, and 5.2.2, respectively. Construction-related water use impacts would be minimized by implementing BMPs, including erosion, grading, and sediment control measures; stormwater control measures; spill prevention plan; and observance of federal, state, regional, tribal, and local regulations pertaining to nonpoint source discharges. Based on the temporary nature of the construction-related impacts and implementation of BMPs during construction, the overall construction-related water impacts would be MODERATE.

Water discharges from the BBNPP to the North Branch Susquehanna River would include cooling tower blowdown, treated process wastewater, and small amounts of radioactive water. It is anticipated that there would be a site-specific water treatment system or the use of a municipal system, if available, for the sanitary wastewater from the BBNPP. Notwithstanding the use of potential engineered mitigation, the introduction of cooling tower blowdown to the receiving waters represents a limited thermal discharge. Ensuring permitted limits for water withdrawal and discharge are met through operational controls, and monitoring would minimize the potential for adverse impacts on water availability and water quality during operation of the

BBNPP. Based on the implementation of operational controls and monitoring to meet permit limits, overall water use impacts from operation activities would be SMALL.

In summary, water use impacts associated with construction activities would be MODERATE. Impacts associated with operation activities would be SMALL.

9.3.2.1.4 Terrestrial Ecology and Sensitive Species

ER Section 4.3.1 provides a detailed description of construction-related impacts on the terrestrial ecology at the BBNPP site and includes impacts on terrestrial habitat, including wetlands, and minor impacts within the North Branch Susquehanna River. Wherever possible, the construction footprint for the BBNPP has been designed to minimize impacts on the river channel and terrestrial ecosystems, specifically potential habitat for species of special concern; wetlands; and forest cover, especially large blocks of contiguous forest that provide habitat for forest interior dwelling species. Potential onsite and offsite wetland impacts are shown in Table 9.3-13.

As discussed in ER Section 4.3.1, the 1,200-ac (486-ha) Susquehanna Riverlands Environmental Preserve was also identified as an important habitat, as this area encompasses a wide variety of upland and wetlands habitats along both sides of the Susquehanna River, and includes a 400 ac (162 ha) of public recreation area. Site development within this area would consist of surface water intake and blowdown-related facilities.

As noted in ER Section 4.3.1.5, the PA DCNR was consulted concerning plants, natural communities, terrestrial invertebrates, and geologic features of special concern. PA DCNR's response indicated that no state or federal rare, threatened, or endangered plants are known to occur within the designated search area. (PA DCNR, 2008)

Sixteen species of terrestrial fauna were identified as potentially "important" at the BBNPP site according to rarity criteria defined in NUREG-1555. They include four mammals (Indiana bat, eastern small-footed myotis, northern myotis, and Allegheny woodrat); three birds, (bald eagle, peregrine falcon, and osprey); three reptiles redbelly turtle, timber rattlesnake, and eastern hognose snake), one amphibian (eastern spadefoot); and five insects (northern pearly-eye, long dash, mulberry wing, Baltimore checkerspot, and black dash. (NRC, 1999) Five of these species have ranges that include Luzerne County, Pennsylvania, but have not been observed at or in the immediate area of the BBNPP site during the 2007-2008 terrestrial faunal surveys or reported in previous studies.

Three rare bat species are known to occupy hibernacula within 5 mi (8 km) of the BBNPP site: the Indiana bat, which is federally and state-listed as endangered (PPL, 2006); the eastern smallfooted myotis, which is state-listed as threatened; and the northern myotis, which is state-listed as candidate rare. No bat hibernacula of any type have been identified at the BBNPP site, nor have any of these bat species been documented to occur at the BBNPP site. However, to further document the presence or absence of bat species, especially Indiana bat, at the BBNPP site, a mist-net capture survey and habitat evaluation by an expert bat biologist was completed in the summer of 2008. No Indiana bats were captured, seen or heard, no small-footed myotis were captured, but four adult male northern myotis were captured. However, the capture of only adult male northern myotis, and no females or young, provides

evidence for the existence of roost sites in the area surveyed, but not maternity colonies of females and young, at least for that species.

The clearing of forest habitat for construction could have a negative impact on the Indiana bat, the only federally and state-listed endangered species likely to occur at the BBNPP site. To avoid possible negative impacts on the Indiana bat, the USFWS advised that all tree cutting activities should occur only during the period November 16 through March 31, while the Indiana bat is hibernating (usually in caves or mines), so that removal of trees does not inadvertently injure or kill roosting individuals or families in maternity dens. If cutting is necessary from April 1 through November 15, no trees greater than 5 inches (13 centimeters) in diameter at breast height should be cut during non-hibernating periods. (USFWS, 2008a)

The bald eagle, peregrine falcon, and osprey (all state-threatened) have been observed with increasing frequency during migration along the Susquehanna River in recent years, but no nesting or intensive use have ever been documented on the BBNPP site, so it is unlikely that construction will have any significant impact on any of these bird species. A peregrine falcon nest site is located approximately 2 mi (3.2 km) east of proposed location of the intake and discharge structures. It is unlikely that construction would have any impact on the peregrine falcons since they often nest in urban locations where considerable human presence and construction activity are common events.

None of the potentially important rare reptiles or amphibians with ranges that include Luzerne County (eastern spadefoot, redbelly turtle, timber rattlesnake, and eastern hognose snake) listed in ER Section 2.4.1 has been documented to occur at the BBNPP Owner Controlled Area (OCA) and were deemed unlikely to occur due to lack of suitable habitat and range limitations. Accordingly, it is unlikely that construction activities would have any significant impact on any of these rare reptile or amphibian species.

A butterfly survey was conducted by an experienced entomologist as part of the terrestrial fauna studies during June and July of 2008. No northern pearly-eye, mulberry wing, or Baltimore checkerspot butterflies were located during the butterfly survey. One long dash butterfly and a pair of black dash butterflies were collected. In addition, at least 8 to 10 more black dash butterflies were observed at the BBNPP OCA during the butterfly survey.

The BBNPP site potentially provides suitable habitat for these butterflies based on habitat descriptions provided by PA DCNR and information collected concerning life histories and breeding/foraging preferences of these species. PA DCNR requested that attempts be made to minimize impacts on potential habitat for these butterflies within the BBNPP site. Accordingly, care would be taken to prevent loss of key plant species.

White-tailed deer, black bear, and wild turkey are identified as commercially or recreationally important species on the BBNPP site. White-tailed deer and wild turkey are currently abundant on the BBNPP site based on terrestrial vertebrate surveys of 2007-2008. Like the white-tailed deer, the resident wild turkey population will likely emigrate to adjacent suitable habitat after construction begins. Also, like the deer, wild turkey populations have increased dramatically in recent decades throughout Pennsylvania and the impacts of construction will likely be minimal at the landscape level. (Pennsylvania Game Commission [PAGC], 2008)

Black bear sign (tracks and scat) have been located on the OCA and several bears have been observed, but the 196 ac (79 ha) of forest habitat expected to be lost is very small when compared to the average home range of even a single bear. Due to the very large area requirements of bears and their preferential selection for larger blocks of forest habitat than is found in the BBNPP OCA, construction-related impacts on the local black bear population should be minimal.

Opportunities for mitigating unavoidable construction-related impacts on terrestrial ecosystems involve restoration of natural habitats temporarily disturbed by construction and creation of new habitat types in formerly disturbed areas, as well as enhancement of undisturbed natural habitats. Mitigation plans would be developed in consultation with the applicable state and local resource agencies and would be implemented at the BBNPP site to the extent practicable. The description of mitigation measures for upland areas (flora and fauna) and wetland areas is described in ER Section 4.3.1.6.

Terrestrial ecology impacts at the BBNPP site from operation activities, including impacts from salt drift, vapor plumes, icing, precipitation modifications, noise, and avian collisions with cooling towers, and associated mitigation measures are discussed in ER Sections 5.3.3.2 and 5.6.1.

In summary, terrestrial ecology impacts associated with construction and operation activities would be SMALL.

9.3.2.1.5 Aquatic Ecology and Sensitive Species

ER Section 4.3.2 provides an assessment of the potential impact construction activities will have on aquatic ecosystems in the onsite ponds, Walker Run, and North Branch Canal and offsite in the Susquehanna River and Unnamed Tributaries 1 and 3, including opportunities for mitigating unavoidable adverse impacts on aquatic ecosystems from construction.

In addition, ER Section 4.3.1 provides a detailed discussion of wetlands impacts. Although the wetland areas themselves are considered a sensitive and valuable resource, the particular wetlands that would be impacted onsite are not substantively distinguishable from other wetland acreage in the vicinity.

As discussed in ER Section 2.4.2, surveys of the onsite streams and impoundments documented that no rare or unique aquatic species occur in the construction area. The aquatic species that occur onsite are ubiquitous, common, and easily located in nearby waters. Typical and abundant fish species in the onsite ponds include green sunfish, bluegill, and brown bullhead. Common and abundant fish species onsite in Walker Run include creek chub, white sucker, and blacknose dace. The most important aquatic macroinvertebrate species in the impoundments and streams are the larval stages of aquatic insects. These species readily re-colonize available surface waters, and so would not be permanently lost to the area.

The construction footprint in the Susquehanna River will be limited to construction of the CWS Makeup Water Intake Structure and discharge structure. These construction activities are expected to have limited impact on the river.

As discussed in ER Section 2.4.2, extensive surveys of the Susquehanna River did not document any important fish species. Fish species observed in the river are year-round

residents and common in Pennsylvania. Recreationally important fishes that are abundant in the river include smallmouth bass, walleye, and channel catfish. Construction-related impacts on recreational fish species would be minimal based on the fact that the areas of impact are not unique to this segment of the river. That is, the areas do not serve a special ecological purpose for fish within this river segment. Two important species of mussels classified as species of special concern by the Pennsylvania Fish and Boat Commission (PFBC), green floater and yellow lampmussel, were collected within the vicinity of the proposed BBNPP intake/discharge structure location. Renewed coordination with the PFBC would be undertaken prior to initiation of construction of the intake and discharge structures. As discussed in ER Section 2.4.2, no unique habitats were identified in the Susquehanna River; thus, no loss of important habitat would occur as a result of construction of the intake/discharge structures.

Any new transmission lines and access corridors associated with the project would be limited to the BBNPP OCA. Transmission line construction would be limited to the onsite construction area. No incremental effect on aquatic resources beyond what currently occurs within the transmission corridor is expected for the construction of BBNPP.

Aquatic ecology impacts at the BBNPP site from operation activities are discussed in ER Sections 5.3.1.2 and 5.3.2.2. ER Section 9.3.2.1.3 describes the location of the intake and discharge structures, which are further described in ER Sections 5.3.1 and 5.3.2. Aquatic impacts attributable to the operation of the CWS Makeup Water Intake Structure are impingement and entrainment. ER Section 5.3.1.2 provides information regarding impingement and entrainment studies at the BBNPP site and the SSES.

The effects of the BBNPP discharge on aquatic ecology are anticipated to be similar to the SSES discharge. As noted in ER Section 5.3.2.2, no substantial detrimental ecological impacts resulting from operation of the SSES discharge have been documented in 24 years of monitoring.

In summary, aquatic ecology impacts associated with construction and operation activities would be SMALL.

9.3.2.1.6 Socioeconomics

The evaluation of socioeconomic impacts that may result from the construction and operation of the BBNPP was based on selection of a region of influence and the area encompassed by the 50-mi (80-km) radius. The region of influence for the BBNPP site included Columbia and Luzerne counties, since over 87 percent of the current workforce at SSES Units 1 and 2 resides in these two counties. For purposes of assessing the impact of in-migration of the construction and operations workforces, a range of in-migration between 20 and 35 percent was chosen based on previous studies (see ER Sections 2.5.1, 2.5.2, and 4.4.2).

The estimated population of the region of influence in 2000 was approximately 383,401 people and shrank to an estimated 378,034 people in 2006. During that same period, Columbia County's population grew from 64,151 people to an estimated 65,014 people. Within the 50-mi (80-km) radius of the BBNPP site, there were an estimated 1,781,893 people based on 2000 USCB data. Population densities for Columbia County have not changed considerably between 2000 and 2006; there has been an increase from 132 to 134 ppsm. Population densities for Luzerne County decreased by small margins from 2000 to 2006 (358 ppsm to 351 ppsm).

Nationally, the average population density was 85 ppsm in 2006. The median household income in Columbia County in 2004 was approximately $37,871 versus Luzerne County's median income of $36,968. (ER Section 2.5.1)

Socioeconomic impacts associated with the construction and operation of the BBNPP are discussed in greater detail in ER Sections 4.4 and 5.8, respectively. The total number of construction workers was estimated to peak at approximately 3,950 direct workers. About 363 workers would be needed during operations. Under the 20 percent in-migration scenario, it was estimated that approximately 688 direct construction workers would migrate into the region of influence. With 1,018 family members, the total increase in population size would be about 1,706 people, of which about 878 people would migrate into Columbia County and 829 into Luzerne County. Assuming 35 percent in-migration, a total of 1,204 direct construction workers would migrate into the region of influence, resulting in about 2,986 new residents, 1,536 in Columbia County, and 1,450 in Luzerne County.

The maximum potential in-migration, assuming all indirect workers migrate into the region of influence, would be 2,395 under the 20 percent scenario, or 4,191 people under the 35 percent scenario. This would represent a small percentage increase of 0.6 percent to 1.1 percent in the region of influence population of 378,034 people in 2006 (ER Section 4.4.2).

Based on 2000 USCB data, there were approximately 16,817 total housing units vacant within the region of influence. The number of in-migrating households under the 20 percent and 35 percent scenarios was estimated to represent a maximum of 5.7 percent to 10.0 percent of the available housing units. In addition, the number of new residents was not expected to exceed existing capacity on area doctors, hospitals, or political and social structures. However, the increased population levels could place some additional daily demands on constrained police services, fire suppression, EMS services, and schools.

A net benefit of the migration of workers and their families into the region of influence would be the additional income from direct and indirect employment and increases in local and county tax revenues. State and local income taxes would be generated by the in-migrating residents, although the amount cannot be estimated because of the variability of investment income, retirement contributions, tax deductions taken, applicable tax brackets, and other factors. It is estimated that Luzerne County and Columbia County would experience a $41.4-million increase and $43.8-million increase in annual wages from the direct workforce, respectively. (ER Section 4.4)

As stated in ER Section 5.8.2.6.2, the BBNPP would be built west of SSES Units 1 and 2, which have existing cooling towers and visible water vapor plumes. Thus, the plumes from the BBNPP would not introduce a new element to the visual landscape and the additional visual impacts from BBNPP would be SMALL. Socioeconomic beneficial and adverse impacts associated with the construction and operation of the BBNPP and associated mitigation measures are discussed in ER Sections 4.4 and 5.8, respectively. Based on the above information, socioeconomic adverse and beneficial impacts associated with construction activities would be SMALL to MODERATE due to the percent increase of population into the area and its resulting potential impact on housing, public services, and tax revenue. Adverse impacts associated with operation activities would be SMALL. Beneficial impacts associated with operation activities would be SMALL to LARGE due to the annual taxes and revenue generated by the new workers contributing to the local economy and the productivity of the region.

9.3.2.1.7 Transportation

The BBNPP site is located adjacent to U.S. Route 11, which is a two-lane federal highway. The anticipated area of construction is currently undeveloped and would require the construction of new roads to access the site. Although the BBNPP and the SSES would be independent operations, both existing roadways and rail access could, in part, be used to support the BBNPP.

Barge access is not possible at or within 5 mi (8 km) of the BBNPP site (World Port Source, 2009). There is an existing freight rail line at the BBNPP site, and a rail spur runs along the eastern border of the site; however, extensions and/or upgrades to the existing rail spur would be required to access the BBNPP site (ESRI, 2009a). Planning for roadway and railroad upgrades would be made in the context of future decisions regarding the optimum methods for transporting large and heavy components to the BBNPP site.

It would, however, be necessary to construct a new access road, approximately 0.8 mi (1.3 km) long, from U.S. Highway 11 to the construction site, thereby providing access to the construction areas without impeding traffic to the existing units. A site perimeter road system and access road around the cooling towers area and the power block would be built. An access driveway would be constructed to connect the proposed water intake structure to an existing road. A new rail road spur will connect to the existing line on the eastern boundary of SSES and provide access to the laydown area located near the northwestern boundary of the BBNPP site. The proposed roads would impact 16.9 ac (6.8 ha) and the rail spur 28.3 ac (11.4 ha).

There would be short-term traffic impacts on U.S. Route 11 and roads surrounding the site during construction and operations activities. These impacts would primarily be due to increased traffic volumes during shift changes. Transportation routes in the area are identified in ER Section 2.5.1. The development of a traffic management plan prior to construction and future operation activities would aid in identifying and mitigating potential traffic impacts. The following mitigation measures would be considered in developing a traffic management plan:

- Workforce shift changes and delivery options: Scheduling shift changes and the delivery of large items during off-peak hours could reduce potential traffic impacts on local roads.
- Carpooling: The use of carpooling and transit services (buses) during construction and operation of the BBNPP could reduce potential traffic congestion impacts on local roads.
- Coordination with local planning authorities: If necessary, the upgrading of local roads, intersections, and signals to handle increased traffic loads could reduce potential traffic impacts on local roads.

Implementing the appropriate mitigation measures identified above would result in SMALL to MODERATE impacts on transportation during construction activities, and a SMALL impact during operation of the BBNPP.

Additional discussion of the impacts on transportation from the construction and operation of the BBNPP and associated mitigation measures are discussed in ER Sections 4.4.1 and 5.8.1, respectively.

9.3.2.1.8 Historic, Cultural, and Archaeological Resources

The BBNPP site is located in Luzerne County and within 5 mi (8 km) of Columbia County. The site is located approximately 3 mi (4.8 km) from East Berwick, Luzerne County. Luzerne County was established in 1786 as a subdivision of Northumberland County. The site is located along the North Branch of the Susquehanna River in the Wyoming Valley. The growth of the county for over 150 years has been linked to the successful mining of anthracite, a hard form of coal. (Luzerne County, 2009a)

Columbia County was created in 1813 from a portion of Northumberland County. The primary industry of Columbia County is very similar to that of Northumberland County; being that agriculture has been the primary occupation since the arrival of early settlers. (Columbia County, 2009)

Based on a review of National Register of Historic Places (NRHP) data, three NRHP-listed properties are within 5 mi (8 km) of the site. The Berwick Armory and the Jackson Mansion & Carriage House are located in Columbia County, and the Benjamin Evans House is located in Luzerne County, south of Nescopeck. According to the NRHP database, there are no NRHP-listed properties or NRHP-listed historic districts within 1 mi (1.6 km) of the site. (NRHP, 2009a; NRHP, 2009b; Google Earth, 2009)

A complete cultural resources investigation of historic, cultural and archaeological resources would be necessary before construction activities began. This work would be conducted in coordination with the Pennsylvania Museum and Historic Commission (PMHC), and should any significant cultural resources be identified, appropriate mitigation measures would be developed prior to construction and operation activities.

Additional discussion of potential impacts to historic, cultural, and archaeological resources from the construction and operation of the BBNPP and associated mitigation measures are provided in ER Sections 4.1.3 and 5.1.3, respectively. Impacts on historic, cultural, and archaeological resources associated with construction and operation activities are anticipated to be SMALL because no NRHP-listed properties or NRHP-listed historic districts are located within 1 mi (1.6 km) of the site and only three NRHP-listed historic properties are located within 5 mi (8 km) of the site.

9.3.2.1.9 Environmental Justice

As discussed in ER Section 2.5.4, there were a total of 1,483 census block groups within the 50-mi (80-km) radius of the BBNPP site, of which 126 met at least one of the criteria defined as minority population. For the environmental justice evaluation, the region of influence consists of Luzerne County and Columbia County. Of the 314 census block groups in Luzerne County, 5 had an aggregate minority population and 4 had Black (African American) minority populations. Of the 55 census block groups in Columbia County, none met the criteria for aggregate minority population and there were no census block groups having an individual racial minority or Hispanic population. A total of 53 census block groups were classified as low income within a 50-mi (80-km) radius of the BBNPP site. Luzerne County had 13 census block groups classified as low income populations, while Columbia County had 3 census block groups classified as low income populations.

Further discussion of environmental justice impacts from the construction and operation of the BBNPP and associated mitigation measures is provided in ER Sections 4.4.3 and 5.8.3, respectively.

Environmental justice adverse impacts associated with construction would be SMALL because the number of minority and low income populations within close proximity to the site is low. Beneficial impacts associated with construction would be SMALL to MODERATE. Environmental justice adverse and beneficial impacts associated with operation activities would be SMALL.

9.3.2.1.10 Transmission Corridors

The BBNPP site is located adjacent to the existing SSES, thereby providing close access to significant transmission infrastructure. There are two existing Susquehanna 500-kV transmission lines available for possible interconnection approximately 0.8 mi (1.3 km) away from the site (Platts, 2009). There are 10 existing 230-kV transmission lines within 5 mi (8 km) of the BBNPP site. In addition, BBNPP would have access to the new 500-kV Susquehanna-Roseland project authorized by the PJM to improve regional reliability.

Two new 500-kV switchyards, and two new 500-kV, 4,260-megavolt ampere (MVA) circuits on individual towers, would be constructed onsite. An expansion of the existing Susquehanna 500-kV switchyard would also be required. The new transmission lines would connect the new BBNPP switchyard to an expansion of the existing Susquehanna 500-kV switchyard and to the new 500-kV Susquehanna Yard 2. The new onsite connector corridor would be located on the BBNPP OCA or on land already in use to generate electric power. Additionally, the 230-kV transmission lines currently passing through the BBNPP site would be relocated to run along the northern boundary of the BBNPP site. Line routing would be conducted to avoid or minimize impact on the existing wetlands and threatened and endangered species identified in the local area. A detailed discussion of the ecological impacts of the transmission corridor is provided in ER Sections 9.3.2.1.4 and 9.3.2.1.5. No new offsite corridors or widening of existing offsite corridors would be required.

Specific monitoring requirements for new transmission lines and corridors and associated switchyards would be designed to meet conditions of applicable federal, state, and local permits to minimize adverse environmental impacts and to ensure that organisms are protected against transmission line alterations. Routine maintenance in and along the onsite transmission corridor would require periodic cutting of herbaceous and low woody growth, saplings, larger shrubs, and small trees. Herbicide applications would only be used on an occasional basis, if at all. Access roads for construction and subsequent maintenance would be stabilized wherever necessary with a course of stones to prevent formation of ruts and gullies in the exposed soil. These road surfaces would be allowed to grass over and cut only as necessary to maintain occasional vehicular access.

Transmission system environmental impacts from the construction and operation of the BBNPP and associated mitigation measures are discussed in ER Sections 4.1.2 and 5.6, respectively. Because no new offsite transmission corridors will be required, transmission system impacts associated with construction and operation activities would be SMALL.

9.3.2.2 Montour Site (Alternative Site 1)

The Montour site is a greenfield site that is located north of the existing Montour coal-fired power plant in Derry Township, approximately 2 mi (3.2 km) northeast of the borough of Washingtonville, Montour County, Pennsylvania. State Route (SR) 54 and SR 254 are located to the west and south, respectively. Figure 9.3-7 provides a location map showing a 6 mi (9.7 km) radius surrounding the Montour site. Figure 9.3-21 provides an aerial photograph of the Montour site and immediate vicinity. Also shown on Figure 9.3-21 are the FEMA 100- and 500-year floodplains (FEMA, 2008), mapped NWI wetlands (USFWS, 2009), and designated prime farmland (USDA, 2009). There are no mapped NWI wetlands within the Montour site.

9.3.2.2.1 Land Use

Land use in the area surrounding the Montour site is predominantly rural. A majority of the area surrounding the site is wooded and undeveloped, or used for agricultural purposes. The Montour site is located in rural Anthony Township, which has an estimated population of approximately 1,388 people (USCB, 2000c). The largest community within 10 mi (16.1 km) of the site is the Borough of Washingtonville, Pennsylvania, approximately 3 mi (4.8 km) to the south. The site is sufficiently large to accommodate an EPR Nuclear Power Plant that would require an overall area of approximately 420 ac (170 ha). The majority of the site is wooded and undeveloped. According to the Montour County Zoning Map, the Montour site is located in a residential – agricultural zoning district (Montour County, 1972).

Land use in the area surrounding the Montour site is primarily agricultural/open land and forested areas. PPL owns approximately 2,500 ac (1,012 ha) of land that includes a coal-fired power plant site and adjoining lands. The proposed new unit at the Montour site would be located on PPL property just north of the coal-fired facility. Although nuclear power plant structures would occupy only a portion of the 420-ac (170-ha) site, the construction process could result in impacts on the entire area, such as vegetation removal, grading, and other earth disturbing activities. Portions of the 420 ac (170 ha) could also be used for laydown areas, stormwater retention ponds, and borrow areas during or after construction.

A review of the PADEP eMapPA, Online Mapping System did not identify any hazardous waste areas in the vicinity of the site (PADEP, 2009b). The topography of the site is generally level on the southern portion, but the elevation rises in the northern portions of the site. The site topography indicates a relief across the site of approximately 132 ft (40.2 m); therefore, the cut and fill requirements for construction would be minimal (USGS, 1983).

PPL owns additional property north of the coal-fired facility site, which includes the Montour Preserve (a recreational lake with boating and fishing, picnic areas, wildlife refuge, educational areas, hiking, hunting, etc.) and other areas that are largely undeveloped. Based upon available GIS data, the nearest dedicated land (federal, state, or tribal) is the Milton State Park, which is approximately 11.4 mi (18.3 km) from the site. Other land uses surrounding the Montour site are primarily agricultural and low density residential (PA DCNR, 2009; National Atlas of the United States, 2005).

A new gas pipeline was recently installed north of the Montour Preserve. Industrial facilities (greenhouses) are located northwest and south of the coal-fired facility. The gypsum/wallboard plant southeast of the coal plant that began operating in 2008 uses byproducts from the newly installed scrubber. A small residential area (Strawberry Ridge) is located east of the coal-fired

facility, and a larger area (Washingtonville) is located to the southwest. It is anticipated that the proposed new unit at the Montour site would take advantage of the existing rail infrastructure of the Montour Power Plant.

To obtain water from the West Branch Susquehanna River, new water intake and discharge pipelines would need to be constructed. At the reconnaissance-level of this evaluation, engineering design of the water pipelines to the river has not been performed. However, a conceptual route for the water pipelines would extend northwest from the western border of the Montour site for approximately 6 mi (10 km) and would then travel southwest for a total of approximately 12.3 mi (19.8 km) paralleling a railroad line for the majority of the distance to the West Branch Susquehanna River. It would be necessary to acquire a small amount of riverfront land sufficient for an intake, major pumping station and ancillary structures, as well as additional land for the construction of a pipeline large enough to provide approximately 50 MGD (189 mld) of river water to the plant site. It would be necessary for a pipeline to cross railroad tracks, a major highway, and several local roads between the river and the site.

Based on the distance to population centers and the low population density in the vicinity of the proposed new unit at the Montour site, overall land use impacts from construction and operation of the proposed new unit at the Montour site are anticipated to be SMALL.

9.3.2.2.2 Air Quality

Montour County is designated as an attainment area for pollutants regulated by the USEPA. Any air emissions that would occur as a result of the operation of the proposed new unit at the Montour site would be low enough that they should not cause a significant change in local or regional air quality levels. (USEPA, 2009a) There are no PSD Class I areas in Pennsylvania, and there are no Class I areas within 100 mi (161 km) of the site (NPS, 2009).

Construction activities at the Montour site have the potential to temporarily impact ambient air quality in the immediate vicinity due to emissions from onsite construction equipment and the transportation of construction materials and workers to and from the site. These emissions are expected to be consistent with emissions resulting from other construction projects of this magnitude. It is anticipated that there would be no significant impacts on air quality at offsite locations during the construction period since the construction equipment would be primarily located near the center of the site (where most construction and equipment laydown would also occur). Overall air quality impacts on the surrounding area attributable to the construction of the proposed new unit at the Montour site would be SMALL due to adherence to regulatory requirements and the implementation of BMPs employed for large construction projects.

With the exception of some relatively small diesel fueled emergency power generating equipment and fire pumps, operation of the proposed new unit at the Montour site would not have any significant sources of emissions attributable to the combustion of fossil or other fuels. The proposed facility would contain cooling towers that would emit water vapor and small amounts of PM into the atmosphere. Because of the exceptionally low level of emissions, operation activities are not expected to cause or contribute to a violation of state or federal ambient air quality standards. It is anticipated that there would be a small increase in regional and local air emissions as a result of increased vehicular traffic associated with the workforce employed for facility operations and periodic refueling activities. It is anticipated that overall air

quality impacts associated with operation of the proposed new facility would be SMALL due to the inherently low emissions of operating nuclear power plants.

In summary, air quality impacts are anticipated to be SMALL for both construction and operation activities.

9.3.2.2.3 Water

The Montour site lies approximately 10 mi (16 km) east of the West Branch Susquehanna River, the nearest sufficiently large source of water. This segment of the river is identified as part of Drainage List L (§ 93.9l) of the Susquehanna River Basin and is considered freshwater surface water. The Water Use Protected designation for this main stem of the West Branch Susquehanna River is warm water fishery with no special quality designation (The Pennsylvania Code, 2007).

Impacts on hydrology and consumptive water use would be primarily associated with water withdrawal from the Susquehanna River. Consumptive water use is associated with evaporative cooling attributable to the use of closed cycle cooling systems that require the use of cooling towers for heat rejection from both the main steam condensers and plant auxiliary heat exchangers. For planning purposes, the total water withdrawal of the proposed new unit at the Montour site is estimated to be 50 MGD (189 mld).

The main source of cooling water for the Montour site would be the West Branch Susquehanna River. The 7Q10 for the period of record (July 1999 to July 2009) for the river at the nearest USGS gage (01553500 at downstream side of Market Street Bridge on State Highway 45 at Lewisburg, 0.2 mi [0.3 km] downstream from Buffalo Creek, and 7.4 mi [11.9 km] upstream from mouth) is approximately 489 MGD (1851 mld) (USGS, 2009b). Therefore, the water availability in the West Branch Susquehanna River at low flow exceeds the total water withdrawal at the site by approximately 10 times.

Hydrologic impacts associated with construction activities could include alteration of the existing watershed surface; disturbance of the ground surface for stockpiles, material storage, and construction of temporary access roads; construction of water intake and discharge structures; construction of cofferdams and storm sewers; construction of structures that might alter shoreline processes; dredging operations; temporary dewatering activities; construction activities contributing to sediment runoff; changes in surface water drainage characteristics; decreases in surface water infiltration (increases of impervious surfaces); increased erosion and sedimentation; changes in groundwater levels related to temporary dewatering activities; and possible subsidence resulting from groundwater withdrawals. The extent of any of these possible impacts exceeds the requirements of reconnaissance and has not been determined.

Appropriate permits would be obtained for the use of groundwater for construction activities. The required quantity of water is anticipated to be similar to the quantity described in ER Section 4.2.2. Proper mitigation and management methods implemented during construction would limit the potential water quantity and quality impacts on surface water and groundwater.

To obtain the water from the West Branch Susquehanna River, new water intake and discharge pipelines would need to be constructed. At the reconnaissance-level of this evaluation, engineering design of the water pipelines to the river has not been performed. However, a

conceptual route for the water pipelines would extend northwest from the western border of the Montour site for approximately 6 mi (10 km) and would then travel southwest for a total of approximately 12.3 mi (19.8 km) paralleling a railroad line for the majority of the distance to the West Branch Susquehanna River along an assumed 120-foot (36.6-m) right-of-way (ROW). Impacts associated with construction of the water pipelines are anticipated to be temporary in nature. Table 9.3-12 lists the aggregate impact on water bodies and wetlands that would be affected by riverfront intake features and the construction of a water supply pipeline. Table 9.3-13 and Table 9.3-14 provide additional details on both onsite and offsite impacts to water bodies and wetlands.

Because the Montour site is comparatively remote from its closest suitable water supply, other hydrological impacts could be associated with the creation of a significant impoundment on the site to assure plant reliability and for safety as an Ultimate Heat Sink (UHS). A detailed analysis would be required to determine the design of such an impoundment based upon local site geology and hydrology. The reservoir would be designed and configured to avoid interface with the groundwater table. Final design would address soil type and depth to water table. Measures, such as clay liners, would be used as appropriate. Based upon studies performed for an EPR nuclear power plant, an impoundment with a surface area of approximately 6.4 ac (2.6 ha) and a depth of 25 ft (8 m) with sloped sides at a 3:1 horizontal to vertical ratio would be required; however, the actual dimensions would necessarily be influenced by local geology and hydrology. A pond of these dimensions could be built within the 420-ac (170-ha) proposed new unit footprint.

Construction-related water use impacts would be minimized by implementing BMPs, including erosion, grading, and sediment control measures; stormwater control measures; spill prevention plan; and observance of federal, state, regional, tribal, and local regulations pertaining to nonpoint source discharges. Based on the temporary nature of the construction-related impacts and implementation of BMPs during construction, the overall construction-related water impacts would be SMALL.

Water discharges from the Montour site to the West Branch Susquehanna River would include cooling tower blowdown, treated process wastewater, treated sanitary wastewater, and small amounts of radioactive water. Notwithstanding the use of potential engineered mitigation, the introduction of cooling tower blowdown to the receiving waters represents a limited thermal discharge. Ensuring permitted limits for water withdrawal and discharge are met through operational controls and monitoring will minimize the potential for adverse impacts to water availability and water quality during operation of the proposed new unit at the Montour site. It is anticipated that there would be a site-specific water treatment system or the use of a municipal system for sanitary wastewater, if available. Based on the implementation of operational controls and monitoring to meet permit limits, overall water use impacts from operation activities would be SMALL.

No more than 10 percent of the projected plant footprint would be include in the 100- or 500-year floodplain.

Based on the temporary nature of the construction-related impacts and the implementation of controls and monitoring during operation activities, it is anticipated that overall water quality impacts associated with the proposed new unit at the Montour site would be SMALL.

9.3.2.2.4 Terrestrial Ecology and Sensitive Species

Impacts on the terrestrial ecosystem associated with construction of the proposed facility would include noise, clearing and grading, and potential collisions by birds with new structures. Construction of the BBNPP would result in direct mortality for certain wildlife and would reduce the available habitat but would not adversely affect local or regional populations of wildlife species. Native habitats on the property have been significantly altered through agricultural and existing coal-fired facility operations, and listed species that are mobile are likely to preferentially use less disturbed habitats on adjacent conservation lands. The terrestrial ecology impacts from construction of the water pipeline and new/expanded transmission line corridors are anticipated to be MODERATE due to the commitment of land and construction impacts on ecological resources. To lessen impacts, wetland impacts would be avoided, minimized, and/or mitigated when possible; threatened and endangered species considered and protected; and BMPs used to minimize the potential for impacts to watercourses.

Table 9.3-1 (Pennsylvania Natural Heritage Program [PNHP], 2009a; PNHP, 2009b; PNHP, 2009c; PNHP, 2009d) provides a list of federally listed and state-listed threatened and endangered terrestrial species known to occur in Montour County, Pennsylvania. A search of the Environmental Data Resources (EDR) database indicated that the Indiana bat is a federally endangered species that may occur in the county but not onsite (EDR, 2008). If forested habitat on the site is determined to be suitable for Indiana bat summer roosting, any clearing would be conducted outside the Indiana bat's reproductive season.

There are eight plant species whose current or proposed status in the state would provide protection under Pennsylvania Code Title 17 Chapter 45, Conservation of Pennsylvania Native Wild Plants (The Pennsylvania Code, 2009) that may occur in Montour County. For purposes of this analysis, only those species listed as Pennsylvania Threatened, Pennsylvania Endangered, or species proposed for these two classifications are considered. Other levels of protection for plant species in Pennsylvania apply to commercial exploitation, and there would be no commercial exploitation of species on the Montour site. Four of the eight potential species are restricted to calcium-rich soils and/or wetlands and these habitat types do not occur on the Montour site (Rhoads and Block, 2007). The remaining four species (short-leaf pine, Hooker's orchid, blue curls, and horse-gentian) occur in habitats that may be present on the Montour site. Because of the limited number of protected species that have potentially suitable habitat on the Montour site, impacts on protected plant species would be SMALL.

There are no protected reptile or amphibian species known from Montour County and no additional protected mammalian species beyond the Indiana bat.

There are five bird species that are of state concern known to occur in Montour County. The marsh wren and the sora require emergent wetlands as habitat (Sibley, 2000). This habitat type does not occur on the Montour site, but does occur on the property. The bald eagle and the peregrine falcon may forage on the Montour site, but would be unlikely to nest there. The bald eagle prefers nesting near large bodies of water, the peregrine falcon along cliffs (Sibley, 2000), and neither of these habitats occur on the Montour site. The barn owl typically nests in tree cavities or barns and prefers a variety of habitats, including dense woodlands and areas bordering swamps and streams (Sibley, 2000). This species could occur onsite. A nest survey would be conducted prior to any development. If an active nest is discovered, any clearing or disturbance would be conducted after the young had fledged.

Because no federally protected species and only five state-protected species have the potential to occur on the Montour site, any impacts on terrestrial protected species from construction of the proposed new unit at the Montour site would be SMALL.

Construction of water pipelines and electric transmission corridors would have the potential to impact protected species. Any impacts would be limited to the period of construction, and there would be no impacts from operations and maintenance. As described in ER Sections 9.3.2.2.3 and 9.3.2.2.10, potential routes for these lines do not cross areas where calcareous soils occur, so the two state-protected plant species associated with calcareous soils would not occur along the proposed routes. The other six protected plant species could occur along these routes. The Indiana bat and the five protected avian species discussed above could occur along the potential pipeline and transmission line routes. Roosting/nesting surveys would be conducted in advance of construction, and any disturbance would avoid these critical life history periods. Appropriate BMPs would be implemented during construction to minimize potential indirect impacts to offsite habitats. Any impacts from installation of pipelines or powerlines to serve the proposed new unit at the Montour site would be SMALL.

Recreationally important terrestrial species potentially occurring within the vicinity of the Montour site include the white-tailed deer, black bear, wild turkey, ring-necked pheasant, and several small mammals. One of these species, the white-tailed deer also is considered commercially important because of the number of hunters participating and the number of deer harvested (PAGC, 2004a).

The white-tailed deer occurs in a variety of habitats ranging from forests and grasslands to urban and developed areas throughout the state. Regulated hunting is the primary management tool to prevent overpopulation of deer in the state. PAGC controls populations through a rationed harvest of female white-tailed deer; an estimated 335,850 deer were harvested in 2008 (PAGC, 2009a). Because of the ability of the white-tailed deer to use a variety of habitats and thrive in proximity to human development, the species would likely occur at and around the Montour site.

Bears primarily occur in wooded habitats and are rarely observed in urban and agricultural areas (PAGC, 2004a). The black bear population in Pennsylvania is estimated at 15,000, and PAGC manages a seasonal black bear harvest through recreational hunting to reduce bear-human interactions. In 2008, one bear was harvested in Montour County (PAGC, 2009b). It is unlikely that black bear occur at the Montour site.

Habitat and population restoration efforts for the wild turkey were enacted in Pennsylvania in the 1930s, and the current population is estimated at 250,000 wild turkey. Recreational turkey hunting is popular throughout the state, and an estimated 40,500 wild turkey were harvested during the 2008 spring harvest (PAGC, 2009c). The wild turkey prefers mixed forested, actively farmed, and reverting farmland habitats (PAGC, 2007). These habitats occur in the area and wild turkey could occur on the Montour site.

The ring-necked pheasant is an introduced species commonly found in the Midwest and Northeast. PAGC began stocking pheasants in 1915 and the population peaked in the 1970s. Loss of habitat has caused recent pheasant declines, and currently the pheasant population is largely sustained from stocking. Recreational pheasant hunting is popular in the state; over 110,000 birds were harvested in 2008 (PAGC, 2009d). The species typically occurs in

farmlands and other early successional habitats (PAGC, 2004b), which are common at and in the vicinity of the Montour site.

Small mammals, including squirrels, rabbits, and woodchucks, are hunted recreationally throughout Pennsylvania. These animals occupy a variety of habitats, including those found on the Montour site. In 2008, over 700,000 squirrels, 400,000 rabbits, and 900,000 woodchucks were harvested (PAGC, 2009d). Each of these small mammal species would be likely to be present at or adjacent to the Montour site.

The recreationally and commercially important terrestrial wildlife species that could occur at the Montour site are mobile and would be expected to relocate away from the disturbance associated with development. Limited incidental mortality is possible either directly from site preparation activities or from the action of relocating, but no population-level impacts would be expected. Impacts on recreationally and commercially important terrestrial wildlife species would be SMALL.

The Commonwealth of Pennsylvania has prepared and implemented a Wildlife Action Plan (WAP) to guide management of species of fish and wildlife considered ecologically important. The WAP identifies broadly defined wildlife habitat types occurring in Pennsylvania and the important species that typically occur in those habitats (PAGC, 2009e). The terrestrial habitat types present on and in the Montour site include temporal shrub lands/early successional forests, riparian forests/thickets, and human structures. Table 9.3-1 describes the ecologically important species that may occur in the habitat types present on the Montour site or along the potential utility corridors. These species are capable of relocating away from the disturbance associated with construction. Minor incidental mortality may occur, but no population-level impact would be expected. Where appropriate, roosting/nesting surveys would be conducted in advance of construction, and any disturbance would avoid these critical life history periods. Appropriate BMPs would be implemented during construction to minimize potential indirect impacts to offsite habitats. Any impacts on ecologically important species from facility construction or installation of pipelines or powerlines to serve the proposed new unit at the Montour site would be SMALL.

It is anticipated that terrestrial ecology impacts from operation of the proposed new unit at the Montour site would be similar to those described for the BBNPP site in ER Section 5.3.3. Therefore, impacts on terrestrial ecology from operation of the proposed new unit at the Montour site would be SMALL.

9.3.2.2.5 Aquatic Ecology and Sensitive Species

Construction-related impacts on the aquatic ecology would be similar to those described in ER Section 4.3 and include loss of wetlands and temporary loss of habitat and short-term degradation of water quality in isolated areas due to in water and shoreline construction of the CWS Makeup Water Intake Structure. According to the EDR database, there are wetlands located within 0.5 mi (0.8 km) of the Montour site. Tables 9.3-12, 9.3-13, and 9.3-14 provide a summary of wetlands and streams on the BBNPP site and *Alternative Sites*. Table 9.3-12 indicates that no wetlands occur on the Montour site, but that there are wetlands in the general vicinity. Table 9.3-12 also indicates that there would be impacts on 3,891 linear feet (lf) (1,186 m) of streams on the Montour site, primarily along the East Branch Chillisquaque Creek, which flows through the Montour site (ESRI, 2009b; USFWS, 2009). The Middle Branch

Chillisquaque Creek flows along the southwestern boundary of the Montour Site and would not be impacted.

It is anticipated that, while much of the supporting structure will be located onshore, the cooling water intake structure (CWIS) will extend a short distance into the waterway and will likely involve the dredging of sediment to allow for the construction of the concrete structure on the bottom of the river. The dredging of sediment and construction of the CWS Makeup Water Intake Structure would be performed within a temporary cofferdam. Nonetheless, some suspension and re-deposition of the sediment is likely to occur, and those benthic organisms living in or on the removed sediment would be removed as well. It is anticipated that any suspended sediment will quickly redeposit in the immediate area. For a short time, the suspended sediment will create increased turbidity in the immediate area of the construction. Fish and motile crustaceans present in the area during construction of the CWS Makeup Water Intake Structure will avoid the area during active construction or will actively feed on suspended organisms during dredging operations, and are unlikely to be adversely affected by the construction activities.

No construction effluents are anticipated from the CWS Makeup Water Intake Structure construction area. BMPs will be used to minimize runoff volumes and impacts. The use of a cofferdam to facilitate construction of the in water portions of the CWS Makeup Water Intake Structure will minimize releases of sediment. Prior to commencement of dredging, sediment in those areas proposed to be dredged will be sampled and analyzed to obtain detailed chemical characterizations according to the requirements of dredging permits; special sediment handling requirements suggested by the sediment sampling results and required by the dredging permit will be followed.

CWS Makeup Water Intake Structure construction related impacts on aquatic species are anticipated to be minor because the area of impacts is limited to the immediate vicinity of the construction activities. Because the potential impacts will be localized and given the short term nature of the construction activities and the relatively short term recovery periods for disturbed benthic species within and near the dredged area, no long term effects on important species and their habitats are anticipated to occur. Therefore, the adverse aquatic ecology impacts associated with construction of the CWS Makeup Water Intake Structure are anticipated to be SMALL.

As described in ER Section 9.3.2.2.3, an approximate 12.3-mi (19.8-km) long makeup and blowdown water pipeline would need to be constructed to connect the Montour site to the West Branch Susquehanna River. It is anticipated that the makeup and blowdown water system pipelines would extend along existing ROW, if feasible, to reduce potential impacts. It is anticipated that approximately 0.7 mi (1.1 km) of new transmission line would need to be constructed and 15.5 mi (24.9 km) of transmission corridor would need to be expanded to connect to the necessary 500-kV transmission system (ER Section 9.3.2.2.7). The water pipeline may cross 3.3 ac (1.3 ha) of wetlands and 1,724 lf (525.5 m) of stream, including the East Branch Chillisquaque Creek (Table 9.3-12). New/expanded transmission line corridor, described in ER Section 9.3.2.2.10, may impact an additional 6.3 ac (2.5 ha) of wetlands and 2,587 lf (788.5 m) of streams. New access roadways, described in ER Section 9.3.2.2.7, may impact 0.5 ac (0.2 ha) of wetlands and 246 lf (75.0 m) of streams (Table 9.3-12). A new rail line spur, described in ER Section 9.3.2.2.7, is not anticipated to impact any wetlands or streams (Table 9.3-12). Impacts on wetlands and streams would need to be coordinated through the

U.S. Army Corps of Engineers (USACE) and the state prior to construction activities. Tables 9.3-12, 9.3-13, and 9.3-13 provide information on potential impacts on onsite and offsite water bodies and wetlands that could be impacted by the project. It is anticipated that construction activities would have a MODERATE impact on aquatic ecology based on the commitment of land and on construction impacts associated with pipeline and transmission system corridors.

It is anticipated that aquatic ecology impacts from operation of the proposed new unit at the Montour site would be similar to those described for the BBNPP site in ER Section 5.3.3. Therefore, impacts on aquatic ecology from the operation of the proposed new unit at the Montour site would be SMALL.

Table 9.3-1 (PNHP, 2009a; PNHP, 2009b; PNHP, 2009c; PNHP, 2009d) provides a list of federally and state-listed threatened and endangered aquatic species located within Montour County, Pennsylvania. According to the EDR database, no federally or state-listed threatened or endangered species are located on site (EDR, 2008). No impacts on protected aquatic species would result from construction of the proposed new unit at the Montour site.

The yellow lampmussel typically occurs in larger streams and rivers with sand and gravel substrates and medium currents (NatureServe, 2009a). There would be a potential for construction-related impacts on these species along the potential pipeline and new/expanded transmission corridors. However, impacts along expanded powerlines would be small, as there already are lines in place across waters along the routes and the process of expanding these existing lines would be minimally intrusive to aquatic habitat. There would be a greater potential for impacts along the potential water line corridor, but impacts on any particular water would be limited to the immediate construction area. Conditions of applicable federal, state, and local permits would be met to minimize adverse environmental impacts and to ensure that organisms are protected against potential construction-related impacts. Any impacts on federally or state-protected aquatic species would be SMALL.

Pennsylvania has recreationally important fisheries, including bluegill, pumpkinseed, redbreast sunfish, rock bass, black and white crappie, yellow perch, smallmouth and largemouth bass, walleye, catfish (both channel and bullhead), carp, and a variety suckers. In addition, brook, rainbow, and brown trout are widely stocked to support fishing for these species (PFBC, 2009a).

Most of these species, with the exception of trout, could occur in the streams within the Montour site or along the potential water line corridor. Species that prefer larger rivers and lakes, such as the black and white crappies, bluegill, pumpkinseed, walleye, catfish, and suckers, could occur in the Susquehanna River (PFBC, 2009a). Brown and rainbow trout are not stocked in the drainage proposed for the water line corridor (PFBC, 2009b), and these species would not be expected to occur at the Montour site (PFBC, 2009a).

The Pennsylvania WAP guides management of fish and wildlife species considered ecologically important. The WAP identifies broadly defined wildlife habitat types occurring in Pennsylvania and the important species that typically occur in those habitats (PAGC, 2009e). The species that may occur in the habitat types found at and near the Montour site are listed in Table 9.3-11. Aquatic habitat types present on and in the area of the Montour site include streams, rivers, lakes, and ponds.

There would be impacts on 3,891 lf (1,186 m) of stream within the Montour site (Table 9.3-12), and recreationally important fish species or ecologically important aquatic species could be impacted. It is likely that fish would relocate away from the area of disturbance. Less mobile aquatic species, such as crustaceans, may experience some mortality. There would be a potential for construction-related impacts on these species along the potential pipeline and new/expanded transmission corridors. However, impacts along expanded powerlines would be small, as there already are lines in place across waters along the routes and the process of expanding these existing lines would be minimally intrusive to aquatic habitat. There would be a greater potential for impacts along the potential water line corridor, but impacts on any particular water would be limited to the immediate construction area. Conditions of applicable federal, state, and local permits would be met to minimize adverse environmental impacts and to ensure that organisms are protected against potential construction-related impacts. Because the amount of streams and wetlands that would be impacted is relatively small (approximately 8,448 lf [2,575 m] of stream and approximately 10.3 ac [4.2 ha] of wetlands combined [onsite and offsite; see Table 9.3-12], any impacts on recreationally important fish species or ecologically important aquatic species would be SMALL.

The Asiatic clam is known from this reach of the Susquehanna River (USGS, 2009c). The zebra mussel is only known from more southern portions of the drainage, but could be migrating upstream (USGS, 2009d). These exotic invasive mussel species could foul water intake structures placed in the Susquehanna River. Appropriate BMPs would be used to manage these species.

9.3.2.2.6 Socioeconomics

Based on USCB data, Montour County had a population of approximately 17,817 people in 2007 (USCB, 2009a). The population density within a 20-mi (32-km) radius of the Montour site in 2007 was 160 ppsm (ESRI, 2009b). The Montour County median household income in 1999 was $38,075 and $46,116 in 2007 (USCB, 2009b). (USCB, 2009c; USCB, 2009d) The median residence value was $91,500 in 2000 compared to $147,451 in 2007, while the median residence value for the entire Commonwealth of Pennsylvania during 2007 was $160,900 (City Data, 2009).

One hospital and three police stations or sheriff departments are located within Montour County (FEMA, 2007). The Montour County, Pennsylvania, Fire Services consists of six fire departments, one of which is a volunteer fire department (Montour County, 2008). Montour County has an emergency management agency (EMA) that coordinates and executes emergency operations and hazard mitigation plans (Montour County EMA, 2009). Pennsylvania also has an EMA with jurisdiction over Montour County (Pennsylvania Emergency Management Agency [PEMA], 2009).

There are approximately 427 public and private elementary, middle, and high schools located within a 50 mi (80 km) radius of the Montour site. (FEMA, 2007)

There are approximately 86 public and private airports located within a 50-mi (80-km) radius of the Montour site. Based on 2009 data, no airports are located in Montour County (USGS, 2009e).

There are approximately 149 parks located within a 50-mi (80-km) radius of the Montour site, which include 62 state game lands, 27 state parks and forests, 34 local parks and preserves, 2 playgrounds, 15 fields, courts and stadiums, and 9 other sites, including 1 camp and cultural sites. Two parks are located in Montour County, which include one local park and one playground. (USGS, 2009f)

For the purposes of evaluating the impact on availability of a construction workforce, housing, and public services, an approach was used similar to that used for the BBNPP. As discussed in ER Section 4.4.2.2.1, an estimated maximum of 3,950 construction workers is anticipated for the BBNPP site. A similar workforce is assumed to be needed for construction of the proposed new unit at the Montour site. A range of in-migration between 20 and 35 percent, consistent with ER Section 4.4.2.1, was also assumed. Based on these in-migration scenarios, between 1,706 and 2,986 additional people would migrate into the region of influence. These estimates include the direct workforce and family members. For comparison purposes, an assessment was made assuming the same level of in-migration for the host county. Given that Montour County had a population of 17,817 people in 2007, the population increase due to in-migration of construction workers and their families would represent an increase of between 9.6 and 16.8 percent.

Metropolitan and non-metropolitan area estimates from the U.S. Department of Labor (DOL), Bureau of Labor Statistics (BLS), were reviewed for construction occupation data within 50 mi (80 km) of the Montour site. If the 50-mi (80-km) radius encroached into a portion of a metropolitan and non-metropolitan area, the total construction occupation numbers for the metropolitan and non-metropolitan area were included in the analysis. According to May 2008 data, the construction workforce required for the project would be approximately 5 percent of the total construction workforce in the area (DOL, 2008).

Datasets from 2005 were reviewed to determine the number of housing units currently vacant within a 50-mi (80 km) radius of the Montour site. Based on this information, an assessment was made to determine if there would be adequate housing units available to address the influx of a workforce required to support the proposed new unit at the Montour site during its construction and operation. According to the data, a total of 130,160 housing units are vacant or not occupied within a 50-mi (80 km) radius of the Montour site. A total of 542 housing units are vacant in Montour County. (ESRI, 2009c) Applying the 20 to 35 percent in-migration analysis and data from Tables 4.4-7 and 4.4-8 of the ER for BBNPP, an estimated 688 to 1,204 direct workers (households) would in-migrate into the affected area. As a result the increase in housing demand in Montour County would be less than the existing availability of housing units within the 50-mi (80 km) radius.

The distance to population centers greater than 25,000 people in size was also assessed to determine the probable availability of shopping and other services for the construction and operation workforce. The nearest population center is Williamsport, Pennsylvania, which is approximately 20 mi (32 km) away (ESRI, 2009d).

According to the USEPA, Montour County has seven community public water systems (PWSs), which are defined by the PADEP as a "system that provides piped water for human consumption to at least 15 service connections or serves an average of at least 25 people for at least 60 days each year. PWSs can be community, non-transient non-community, or transient non-community systems" (PADEP, 2009c). These seven systems provide treated water to over 7,000 people throughout Montour County. Of these seven systems, four use groundwater as the

primary water source, while the remaining three use surface water. (USEPA, 2009b) In addition, Montour County has one major and three minor public (municipal) wastewater/sanitary sewer treatment plants. The total wastewater flow to these four municipal public sewer systems within the county is approximately 3.9 MGD (14.8 mld). (PADEP, 2009d) Within the Montour County Comprehensive Plan (Plan), the subject of sewer system capacity and how critical and urgent this issue is within the county is discussed in detail. Future strategic actions within the Plan acknowledge the vital link between adequate sewer system capacity and the growth, infrastructure enhancement, and development within Montour County, especially Valley Township. Valley Township includes an essential portion of a growth corridor, identified by the Plan, and with the present capacity restrictions at the Valley Township Wastewater Treatment Plant, development within this area is directly impacted. The Plan recommends that a multi-municipal approach to resolving the sewage treatment capacity issues that involves either an expansion of the local Valley Township Wastewater Treatment Plant or a conveyance to the Danville Borough Plant that currently has the reserve capacity to serve this area of Montour County. The Plan also recommends the extension of water and sanitary sewer service for a portion of Cooper Township within another designated growth corridor, by expanding treatment via the Danville Borough Plant. (Montour County Planning Commission [MCPC], 2009)

An increase in tax revenues in Montour County is expected from construction and operation of the proposed new unit at the Montour site. Actual tax revenues for Montour County in fiscal year 2006 totaled $3.6 million (Pennsylvania Governor's Center for Local Government Services [PA GCLGS], 2006). While the actual increase in tax revenues from a new unit is yet unknown, the increase would be comparable to that at the BBNPP site. Most people consider large tax payments a benefit to the taxing entity because they support the development of infrastructure that supports further economic development and growth.

The Montour site is adjacent to an existing coal-fired power plant with three stacks, two cooling towers, and associated plumes. The plumes from the proposed new unit at the Montour site would likely be visible at a considerable distance.

Based on the above information, socioeconomic adverse and beneficial impacts associated with construction activities would be SMALL to MODERATE due to the percent increase of population into the area and its resulting potential impact on housing, public services, and tax revenue. Adverse impacts associated with operation activities would be SMALL. Beneficial impacts associated with operation activities would be SMALL to LARGE due to the annual taxes and revenue generated by the new workers contributing to the local economy and the productivity of the region.

9.3.2.2.7 Transportation

The Montour site has access from SR 54 and SR 254, both of which are two lane state highways located near the site. The anticipated area of construction is currently undeveloped and would require the construction of new roads to access the site. There is existing infrastructure for the Montour Power Plant to support the current operations, and this could, in part, be used to support the proposed new unit at the Montour site. The existence of a large coal-fired power plant in the vicinity of the site suggests that both the existing roads and rail facilities are sufficient for the transportation of the large and heavy equipment required for the construction of an EPR nuclear power plant.

The Montour site is located more than 5 mi (8 km) from the nearest water source and has no practical barge access (World Port Source, 2009). There is an existing Norfolk Southern rail line and spur located approximately 1.4 mi (2.2 km) to the southwest of the site, which leads to the existing coal-fired facility (ESRI, 2009a; Pennsylvania Department of Transportation [PADOT], 2009). Extensions and/or upgrades to the existing rail spur would be required to access the site. Planning for roadway and railroad upgrades would be made in the context of future decisions regarding the optimum methods for transporting large and heavy components to the Montour site.

At the reconnaissance-level of this evaluation, engineering design of the access roads to the site has not been performed. However, a conceptual route for the access road would extend southeast from the southeast border of the Montour site to State Highway 254 for approximately 1.8 mi (2.9 km). A conceptual route for the rail spur would extend southeast from the southeast border of the Montour site, then west to the existing Conrail line for approximately 2.1 mi (3.4 km). Impacts associated with construction of the access road and rail spur are anticipated to be temporary in nature.

There would be short-term traffic impacts on SR 54 and SR 254, and roads surrounding the site (State Routes 1003, 1006, and 1009, McMichael Road, Strawberry Ridge Road, and White Hall Road) due to the transportation of construction materials and workers during construction and limited long-term traffic impacts during operation activities. These impacts would primarily be due to increased traffic volumes during shift changes. The development of a traffic management plan prior to construction and operation activities would aid in identifying and mitigating potential traffic impacts. The following mitigation measures would be considered in developing a traffic management plan:

- Workforce shift changes and delivery options: Scheduling shift changes and the delivery of large items during off peak hours could reduce potential traffic impacts on local roads.
- Carpooling: The use of carpooling and providing transit services (buses) during construction and operation of the facility could reduce potential traffic congestion impacts on local roads.
- Coordination with local planning authorities: If necessary, the upgrading of local roads, intersections, and signals to handle increased traffic loads could reduce potential traffic impacts on local roads.

Implementing the appropriate mitigation measures identified above would result in SMALL to MODERATE impacts on transportation during construction activities, and a SMALL impact during operation of the proposed new unit at the Montour site.

9.3.2.2.8 Historic, Cultural, and Archaeological Resources

Pennsylvania was inhabited by a number of Native American tribes before the arrival of the Europeans (Kindred Trails, 2004). Because archaeological sites are often found along watercourses, the area bordering Chillisquaque Creek and its tributaries is considered an archaeologically sensitive area (USGS, 2008). Montour County was established in 1850 from the subdivision of Columbia County. The Montour site is located on the North Branch of the Susquehanna River approximately 6 mi (10 km) southeast of Turbotville. Like Northumberland and Columbia counties, Montour County's history is focused on agriculture. The settlers of the

county used the river as a form of transportation to move cargo into and out of the county (Montour County, 2009). Montour County is the smallest county in Pennsylvania and has seven properties listed on the NRHP (NRHP, 2009c, Google Earth, 2009). Of the seven historic properties in Montour County, only one, the Keefer Covered Bridge No. 7, is located within 5 mi (8 km) of the Montour site (NRHP, 2009c). The bridge is located 1.7 mi (2.7 km) from the Montour site; therefore, direct impacts from construction and operation of the proposed facility are not anticipated. A review of the EDR database and the NRHP database on Google Earth indicated that no NRHP-listed historic properties or districts are located within 1 mi (1.6 km) of the site (EDR, 2008; Google Earth, 2009).

A complete cultural resources investigation of historic, cultural and archaeological resources would be necessary before construction activities began. This work would be conducted in coordination with the PMHC and should any significant cultural resources be identified, appropriate mitigation measures would be developed prior to construction and operation activities.

Impacts on historic, cultural, and archaeological resources associated with construction and operation activities are anticipated to be SMALL because no NRHP-listed properties or NRHP-listed historic districts are located within 1 mi (1.6 km) of the site and only one NRHP-listed historic property is located within 5 mi (8 km) of the site.

9.3.2.2.9 Environmental Justice

The demographic characteristics surrounding the Montour site were evaluated to determine the potential for disproportionate impacts on minority or low income populations. Demographic information used for this study was obtained from 2000 USCB data (USCB, 2000d). The analysis included Montour County and the areas encompassed by the 50-mi (80-km) radius. For purposes of comparison to the BBNPP site, a region of influence for the environmental justice evaluation was selected that included Montour, Northumberland, and Columbia counties.

Criteria established by the NRC in the Nuclear Reactor Regulation (NRR) Office Instruction license (LIC) 203 were used to classify census block groups as having minority or low income populations. A "minority" racial population is defined as: American Indian or Alaskan Native; Asian, Native Hawaiian, or other Pacific Islander; Black (African-American) races; and multi-racial, or "some other race." The racial population is expressed in terms of the number and/or percentage of people that are minorities in an area. Statistical analysis is conducted on the sum of all of the census block groups within the 50-mi (80-km) radius to determine if each census block group meets a certain significant threshold minority population, as further defined below. Therefore, the individual minority group tallies for Blacks or African American, Asian, Native Hawaiian or other Pacific Islander, some other race and multi-racial minorities will not sum to equal the aggregate (total) of racial minorities. The sum of these racial minority populations is referred to, within this section, as the aggregate racial minority population. Persons of Hispanic/Latino origin are the ethnic minority, may be of any race including the identified racial populations, and therefore, are identified as a separate subcategory. (NRC, 2004)

The NRC guidance indicates that a minority population exists if either of the following two criteria is met:

- The minority population percentage of the census block group or environmental impact area (in this case the 50-mi [80-km] comparative geographic area) exceeds 50 percent.
- The minority population percentage of the environmental impact area (in this case the smaller county area) is significantly greater (typically at least 20 percentage points) than the minority population percentage in the geographic area chosen for comparative analysis (in this case the 50-mi [80-km] comparative geographic area). (NRC, 2004)

Within the 50-mi (80-km) radius of the Montour site, there were 1,015 census block groups located in the Commonwealth of Pennsylvania (Table 9.3-2). Of these 1,015 census block groups, 19 were classified as having aggregate minority populations. Sixteen of the 19 aggregate minority census block groups were Black (African American) populations, mostly located within Lycoming County (Table 9.3-2). Of the 14 census block groups in Montour County, none were classified as having minority populations. Out of the 94 census block groups in the adjacent Northumberland County, one census block group had an aggregate minority population, which was a Black (African American) minority population. There were 55 census block groups in the adjacent Columbia County, none of which were classified as having minority populations. Figures 9.3-22 through 9.3-24 present census block groups with minority populations within a 50-mi (80-km) radius of the site that met the criteria stated above. A figure is not provided if a single minority population did not exceed the criteria; therefore, only figures for Black (African American), Native American, and total aggregate minority populations have been provided for the Montour site.

The USCB definition of a low income household is based on governmental statistical poverty thresholds (USCB, 2009e). For the purpose of conducting this analysis, a block group is considered to be low income if either of the following two criteria is met:

- The number of low income households in the census block group or the environmental impact area (in this case the 50-mi [80-km] comparative geographic area) exceeds 50 percent.
- The percentage of households below the poverty level in an environmental impact area (in this case the smaller county area) is significantly greater (typically at least 20 percentage points) than the low income population percentage in the geographic area chosen for comparative analysis (in this case, the 50-mi [80-km] comparative geographic area).

A total of three census block groups were classified as low income within the 50-mi (80-km) radius of the Montour site. Montour County had no census block groups classified as low income populations, while Northumberland County and Columbia County both had one census block group classified as low income population. Figure 9.3-25 presents census block groups with low income populations within the 50-mi (80-km) radius of the site that met the criteria stated above.

Based on the data presented in Table 9.3-2, the percent of minority and low income populations within close proximity to the Montour site is low. Any adverse human health and environmental consequences from construction and operation of the proposed new unit at the Montour site would not be borne disproportionately by minority or low income groups. Overall environmental justice impacts are anticipated to be SMALL.

9.3.2.2.10 Transmission Corridors

There are two existing 500-kV transmission lines available for possible interconnection to the Montour site; one is 14.3 mi (23 km) southeast of the site, and the other is 20.5 mi (33 km) southwest of the site. There are six existing 230-kV transmission lines within 5 mi (8 km) of the Montour site, and there is one 230-kV transmission line between 10 mi (16 km) and 20 mi (32 km) of the site (Platts, 2009).

To reach the proposed Catawissa Substation, a new transmission line ROW would need to be constructed. At the reconnaissance-level of this evaluation, engineering design of the transmission line has not been performed. However, a conceptual route for the transmission line would extend south from the southern boundary of the Montour site for approximately 0.7 mi (1.1 km), where 15.5 mi (24.9 km) of existing 230-kV transmission ROW would be expanded, then travel southeast to reach the substation. A review of publicly available online data indicates that most transmission corridors generally pass through land that is primarily agricultural and forest land. The areas surrounding the Montour site are mostly rural and remote with low population densities. The new transmission lines would also cross over numerous highways. The effect of these corridors on land usage would be minimal; farmlands that have corridors passing through them would generally continue to be used as farmland. It is anticipated that there would be ecological impacts from the development of new transmission corridors. A detailed discussion of the terrestrial and aquatic ecology impacts from the construction of new transmission corridors is provided in ER Sections 9.3.2.2.4 and 9.3.2.2.5, respectively. Utilization of existing transmission corridor ROWs could present opportunities to minimize adverse impacts. Specific monitoring requirements for upgrades to transmission lines and corridors would be designed to meet conditions of applicable federal, state, and local permits, to minimize adverse environmental impacts, and to ensure that organisms are protected against potential construction related impacts. Operational activities within the transmission corridors might include visual inspection and appropriate maintenance of transmission line ROWs. Maintenance activities could include re-clearing vegetation, tree trimming/removal, and encroachment licensing/removal. For maintenance purposes, wooded sections of the ROWs would be re-cleared to the full width through mechanical clearing, hand cutting, or herbicide application. Herbicide applications would only be used on an occasional basis, if at all.

Due to the construction and operation of new transmission corridors, construction and operation transmission impacts are anticipated to be SMALL to MODERATE.

9.3.2.3 Humboldt Industrial Park (Alternative Site 2)

The Humboldt Industrial Park (Humboldt site) is a brownfield site that is located west of the City of Hazleton in Luzerne County, Pennsylvania. SR 924 abuts a portion of the southern perimeter of the site. Figure 9.3-9 provides a location map showing a 6-mi (9.7-km) radius surrounding the Humboldt site. Figure 9.3-26 provides an aerial photograph of the Humboldt site and the immediate vicinity. Also shown on Figure 9.3-26 are the FEMA 100- and 500-year floodplains (FEMA, 2008), mapped NWI wetlands (USFWS, 2009), and designated prime farmland (USDA, 2009).

9.3.2.3.1 Land Use

Land uses in the area surrounding the Humboldt site include undeveloped land to the north, the Humboldt Reservoir to the northeast, industrial park development to the south and east, and residential and private recreational (Eagle Rock Resort and Country Club) development to the west. The Hazleton Municipal Airport is located north of the City of Hazleton and is approximately 5.5 mi (8.8 km) from the Humboldt site. The Humboldt site is located in Hazle Township, which has an estimated population of approximately 9,000 people (USCB, 2000e). The largest community within 10 mi (16.1 km) of the Humboldt site is the City of Hazleton, Pennsylvania, approximately 5 mi (8 km) to the east. The site is sufficiently large to accommodate an EPR Nuclear Power Plant that would require an overall area of approximately 420 ac (170 ha).

The Humboldt Industrial Park property has an overall area of approximately 3,796 ac (1,536 ha), which is sufficient to accommodate the construction of the proposed new unit. The majority of this acreage is located south of Pennsylvania SR 924 and contains an existing industrial park with active businesses. The approximately 420-ac (170-ha) area needed for construction of the proposed new unit at the Humboldt site would be located on the north side of SR 924 and is undeveloped. The majority of this area is forested. According to the Hazle Township Zoning Map, the Humboldt site is zoned as I-2 (industrial) (Hazle Township, 2005).

A review of the USGS topographic map indicates the southern portion of the Humboldt site contains lands formerly used for strip mines (USGS, 1989). The PADEP eMapPA, Online Mapping System, also identifies the Humboldt site as containing abandoned mine lands (PADEP, 2009e).

The topography of the Humboldt site is generally level across the eastern portion, but rises in elevation throughout the north and northwestern portions. The topography indicates a relief across the Humboldt site of approximately 230 ft (70.1 m); therefore, the cut and fill requirements for construction would be substantial (USGS, 1989).

Although nuclear power plant structures would occupy only a portion of the 420-ac (170-ha) site necessary to accommodate an EPR nuclear plant, the construction process could result in impacts on the entire 420-ac (170-ha) area, such as vegetation removal, grading, and other earth-disturbing activities. These areas could also be used for laydown areas, stormwater retention ponds, and borrow areas during and after construction.

Based upon available GIS data, the nearest dedicated land (federal, state, or tribal) is Tuscarora State Park, which is approximately 9.3 mi (15.0 km) from the Humboldt site (PA DCNR, 2009; National Atlas of the United States, 2005).

To obtain water from the Susquehanna River, new water intake and discharge pipelines would need to be constructed. At the reconnaissance-level of this evaluation, engineering design of the water pipelines to the river has not been performed. However, a conceptual 120-foot (36.6-m) ROW for the water pipelines would extend east from the eastern border of the Humboldt site until it reaches Interstate Highway 81 (I-81). The route would then parallel I-81 north until reaching Black Creek, where it would follow Black Creek to the Susquehanna River for a total of approximately 23.5 mi (37.8 km). It would be necessary to acquire a small amount of riverfront land sufficient for an intake, major pumping station and ancillary structures, as well as additional land for the construction of a pipeline large enough to provide approximately

50 MGD (189 mld) of river water to the proposed new unit at the Humboldt site. It would be necessary for a pipeline to cross railroad tracks, a major highway, and several local roads in order to traverse between the river and the Humboldt site.

Based on potential environmental remediation on abandoned mined lands, amount of relief in site topography, and proximity of adjacent residential and recreational land uses, overall land use impacts are expected to be MODERATE.

9.3.2.3.2 Air Quality

Luzerne County is designated as an attainment area for pollutants regulated by the USEPA. Any air emissions that would occur as a result of the operation of the proposed new unit at the Humboldt site would be low enough that they should not cause or contribute to a significant change in local or regional air quality levels. (USEPA, 2009a) However, the Humboldt site is located in a four-county maintenance area for ozone, and therefore an applicability analysis of emissions of ozone and its precursors is required to determine whether the federal Clean Air Conformity Rule would be triggered by the plant's construction. There are no PSD Class I areas in Pennsylvania, and there are no Class I areas within 100 mi (161 km) of the Humboldt site (NPS, 2009).

Construction activities at the Humboldt site have the potential to temporarily impact ambient air quality in the immediate vicinity due to emissions from onsite construction equipment and the transportation of construction materials and workers to and from the site. These emissions are expected to be consistent with emissions resulting from other construction projects of this magnitude. It is anticipated that there would be no significant impacts on air quality at offsite locations during the construction period since construction activities would be located primarily near the center of the site (where most construction and equipment laydown would also occur). Overall air quality impacts on the surrounding area attributable to the construction of the proposed new unit at the Humboldt site would be SMALL due to adherence to regulatory requirements and the implementation of BMPs employed for large construction projects.

With the exception of some relatively small diesel-fueled emergency power generating equipment and fire pumps, operation of the proposed new unit at the Humboldt site would not have any significant sources of emissions attributable to the combustion of fossil or other fuels. The proposed new unit at the Humboldt site would contain cooling towers that would emit water vapor and small amounts of PM into the atmosphere. Because of the exceptionally low level of emissions, operation activities are not expected to cause a violation of state or federal ambient air quality standards. It is anticipated that there would be a small increase in regional and local air emissions as a result of increased vehicular traffic associated with the workforce employed for facility operations and periodic refueling activities. It is anticipated that overall air quality impacts associated with operation of the proposed new unit at the Humboldt site would be SMALL due to the inherently low emissions of operating nuclear power plants.

In summary, air quality impacts are anticipated to be SMALL for both construction and operation activities.

9.3.2.3.3 Water

The Humboldt site lies approximately 10 mi (16 km) southeast from the main branch of the Susquehanna River, the nearest sufficiently large source of water. This segment of the river is identified as part of Drainage List K (§ 93.9k – Main Stem, Lackawanna River to West Branch Susquehanna River) of the Susquehanna River Basin and is considered freshwater surface water. The Water Use Protected designation for this segment of the river is warm water fishery with no special quality designation (The Pennsylvania Code, 2007).

Impacts on hydrology and consumptive water use would be primarily associated with water withdrawal from the main source of water. Consumptive water use is associated with evaporative cooling attributable to the use of closed cycle cooling systems that require the use of cooling towers for heat rejection from both the main steam condensers and plant auxiliary heat exchangers. For planning purposes, the total water withdrawal of the proposed new unit at the Humboldt site is estimated to be 50 MGD (189 mld).

The main source of water for the Humboldt site would be the Susquehanna River. The 7Q10 for the period of record (July 1999 to July 2009) for the river at the nearest USGS gage (01536500 on left bank at downstream side of North Street bridge in Wilkes-Barre, and 1.8 mi [2.9 km] upstream from Toby Creek) is approximately 505 MGD (1,912 mld) (USGS, 2009a). Therefore, the water availability in the Susquehanna River at low flow would exceed the total water withdrawal at the Humboldt site by approximately 10 times.

Hydrologic impacts associated with construction activities could include alteration of the existing watershed surface; disturbance of the ground surface for stockpiles, material storage, and construction of temporary access roads; construction of water intake and discharge structures; construction of cofferdams and storm sewers; construction of structures that might alter shoreline processes; dredging operations; temporary dewatering activities; construction activities contributing to sediment runoff; changes in surface water drainage characteristics; decreases in surface water infiltration (increases of impervious surfaces); increased erosion and sedimentation; changes in groundwater levels related to temporary dewatering activities; and possible subsidence resulting from groundwater withdrawals. Permitted withdrawal of groundwater would be used for construction activities. The required quantity of water is anticipated to be similar to the quantity described in ER Section 4.2.2. Proper mitigation and management methods implemented during construction would limit the potential water quantity and quality impacts on surface water and groundwater.

To obtain the water from the Susquehanna River, new water intake and discharge pipelines would need to be constructed. At the reconnaissance-level of this evaluation, engineering design of the water pipelines to the river has not been performed. However, a conceptual route for the water pipelines would extend east from the eastern border of the Humboldt site until it reaches Interstate Highway 81 (I-81). The route would then parallel I-81 north until reaching Black Creek, where it would follow Black Creek to the Susquehanna River for a total of approximately 23.5 mi (37.8 km). Impacts associated with construction of the water pipelines in a 120-foot (36.6-m) ROW are anticipated to be temporary in nature. Table 9.3-12 lists the aggregate impact on water bodies and wetlands that would be affected by riverfront intake features and the construction of a water supply pipeline. Table 9.3-13 and Table 9.3-14 provide additional details on both onsite and offsite impacts on water bodies and wetlands.

Because the Humboldt site is comparatively remote from its closest suitable water supply, other hydrological impacts could be associated with the creation of a significant impoundment on the site to assure plant reliability and for safety as a UHS. A detailed analysis would be required to determine the design of such an impoundment based upon local site geology and hydrology. The reservoir would be designed and configured to avoid interface with the groundwater table. Final design would address soil type and depth to water table. Measures, such as clay liners, would be used as appropriate. Based upon studies performed for an EPR nuclear power plant, an impoundment with a surface area of approximately 6.4 ac (2.6 ha) and a depth of 25 ft (8 m) with sloped sides at a 3:1 horizontal to vertical ratio would be required; however, the actual dimensions would necessarily be influenced by local geology and hydrology. A pond of these dimensions could be built within the 420-ac (170-ha) proposed new unit footprint.

Construction-related water use impacts would be minimized by implementing BMPs, including erosion, grading, and sediment control measures; stormwater control measures; spill prevention plan; and observance of federal, state, regional, tribal, and local regulations pertaining to nonpoint source discharges. Based on the temporary nature of the construction-related impacts and implementation of BMPs during construction, the overall construction-related water impacts would be SMALL.

Water discharges from the Humboldt site to the Susquehanna River would include cooling tower blowdown, treated process wastewater, treated sanitary wastewater and small amounts of radioactive water. Notwithstanding the use of potential engineered mitigation, the introduction of cooling tower blowdown to the receiving waters represents a limited thermal discharge. Ensuring permitted limits for water withdrawal and discharge are met through operational controls and monitoring would minimize the potential for adverse impacts on water availability and water quality during operation of the proposed new unit at the Humboldt site. It is anticipated that there would be a site-specific water treatment system or the use of a municipal system for sanitary wastewater, if available. Based on the implementation of operational controls and monitoring to meet permit limits, overall water use impacts from operation activities would be SMALL.

No more than 10 percent of the projected plant footprint would be include in the 100- or 500-year floodplain.

Based on the temporary nature of the construction-related impacts and the implementation of controls and monitoring during operation activities, it is anticipated that overall water quality impacts associated with the proposed new unit at the Humboldt site would be SMALL.

9.3.2.3.4 Terrestrial Ecology and Sensitive Species

Impacts on the terrestrial ecosystem associated with construction of the proposed new unit at the Humboldt site could include noise, clearing and grading, and potential collisions by birds with new structures. Construction of the proposed new unit at the Humboldt site would result in direct mortality for certain wildlife and would reduce available habitat, but would not adversely affect local or regional populations of wildlife species. Native habitats on the property have been significantly altered through historical strip mining operations, and listed species that are mobile are likely to preferentially use less disturbed habitats on adjacent conservation lands. The terrestrial ecology impacts from construction of the water pipeline and new/expanded transmission line corridors to accommodate 500-kV lines are anticipated to be MODERATE due

to the commitment of land and construction-related impacts on ecological resources. To lessen impacts, wetland impacts would be avoided, minimized, and/or mitigated when possible; threatened and endangered species considered and protected; and BMPs used to minimize the potential for impacts on watercourses.

Table 9.3-3 (PNHP, 2009d; PNHP, 2009e; PNHP, 2009f; PNHP, 2009g) provides a list of federally and state-listed threatened and endangered terrestrial species that may occur in Luzerne County, Pennsylvania. The Indiana bat is the only federally endangered species that could occur on the Humboldt site. This species prefers wooded or semi-wooded areas, typically along streams, and roosts beneath loose or dead bark of trees during the summer. Impacts on this species could occur, but can be limited by clearing trees outside of their reproductive season.

There are 59 plant species whose current or proposed status in the state would provide protection under Pennsylvania Code Title 17 Chapter 45, Conservation of Pennsylvania Native Wild Plants (The Pennsylvania Code, 2009) that may occur in Luzerne County. For purposes of this analysis, only those species listed as Pennsylvania Threatened, Pennsylvania Endangered, or species proposed for these two classifications are considered. Other levels of protection for plant species in Pennsylvania apply to commercial exploitation, and there would be no commercial exploitation of species on the Humboldt site. Two of the 59 species are restricted to calcareous habitats that do not occur on the Humboldt site (Rhoads and Block, 2007), but the other 57 species could occur on the Humboldt site. In spite of the past mining disturbance to much of the Humboldt site, it is adjacent to the Humboldt Barrens and the Valmont Industrial Park, two known natural communities with considerable botanical diversity. Because of the proximity to these two natural areas and the potential for similar habitats, particularly acidic seeps and Sphagnum-rich areas, within the Humboldt site, there is a greater probability that state-protected plant species occur compared to the other considered *Alternative Sites*. The potential impacts on protected plant species from construction of the proposed new unit at the Humboldt site would be MODERATE due to the large number of species that may occur on the Humboldt site.

There are nine state-listed mammal species of concern in Luzerne County, including the Indiana bat, which is also federally listed and previously discussed. The Allegheny woodrat prefers deciduous and mixed forests and riparian forests, which occur on the Humboldt site (Whitaker and Hamilton, 1998). To the extent possible, tree clearing would be restricted to the colder months when the bats would not be present on the Humboldt site. The eastern small-footed bat and the northern myotis prefer deciduous and mixed forests. The rock vole, northern flying squirrel, and water shrew prefer riparian forests and thickets. The eastern fox squirrel prefers oak and hickory forests. These species could be affected by removal of habitat by clearing the Humboldt site and riparian zones within the Humboldt site. However, these species would be capable of relocating to other nearby suitable habitat. Some incidental mortality may occur, but no population-level impacts would be expected. The northern river otter prefers large rivers and water bodies (Whitaker and Hamilton, 1998). It is unlikely that this species would occur on the Humboldt site, as the only perennial stream on the site flows though the previously strip mined area. Impacts on protected mammalian species would be SMALL.

There are 12 bird species that are of state concern known to occur in Luzerne County. The marsh wren, black-crowned night heron, and the sora require emergent wetlands as habitat (Sibley, 2000). This habitat type occurs on the Humboldt site and would be impacted by

construction. A nest survey would be conducted prior to any development. If active nests are discovered, any clearing and disturbance would be done after young had fledged. The bald eagle and the peregrine falcon may forage on the Humboldt site, but would unlikely nest in the area. The bald eagle prefers nesting near large bodies of water, the peregrine falcon along cliffs (Sibley, 2000). The northern goshawk is a year-round resident of the area and prefers habitat consisting of coniferous or deciduous forests and forest edges (Sibley, 2000). This species could occur on the Humboldt site and could be impacted by clearing trees. A nest survey would be conducted prior to any development. If active nests are discovered, any clearing or disturbance would be conducted after young had fledged. The yellow-bellied flycatcher is a Neotropical migrant that summers in the region. This species may nest in the area. A nest survey would be conducted prior to any development. If active nests are discovered, any clearing and disturbance would be conducted after young had fledged. Impacts on protected bird species would be SMALL.

The timber rattlesnake is the only state-listed reptile that may occur on the Humboldt site (Table 9.3-3). There is potentially suitable habitat for this species on the Humboldt site (PFBC, 2004). Should the timber rattlesnake occur on the Humboldt site, grading and site preparation could impact the species and there could be incidental mortality from this activity. However, most snakes would be expected to relocate away from the area of disturbance. Site preparation would begin after the typical denning period for the timber rattlesnake to minimize the potential for collapsing a den filled with adult and juvenile snakes. Impacts on protected reptile species would be SMALL.

There are no protected amphibian species known to occur in Luzerne County.

Because of limited potentially suitable habitat on the Humboldt site, small numbers of protected species that may occur on the Humboldt site, BMPs and design features that would be implemented to minimize the potential for impacts, and the ability of animals to relocate to other nearby suitable habitat, potential construction impacts on protected animal species at the Humboldt site would be SMALL.

Construction of water pipelines and electric transmission corridors would have the potential to impact protected species. Construction of these lines, described in ER Sections 9.3.2.3.3 and 9.3.2.3.10, potentially would result in clearing through habitat types that could support all but the two state-protected plant species associated with calcareous soils. The other 57 protected plant species and the 9 protected mammal species known to occur in the county (Table 9.3-3) could occur along these potential routes. Roosting/nesting surveys would be conducted in advance of construction, and any disturbance would avoid these critical life history periods. Appropriate BMPs would be implemented during construction to minimize potential indirect impacts to offsite habitats. Any impacts on protected species from installation of pipelines or powerlines to serve the proposed unit at the Humboldt site would be SMALL.

Recreationally important terrestrial species potentially occurring within the vicinity of the Humboldt site include the white-tailed deer, black bear, wild turkey, ring-necked pheasant, and several small mammals. One of these species, the white-tailed deer also is considered commercially important because of the number of hunters participating and the number of deer harvested (PAGC, 2004c).

The white-tailed deer occurs in a variety of habitats ranging from forests and grasslands to urban and developed areas throughout the state. Regulated hunting is the primary management tool to prevent overpopulation of deer in the state. PAGC controls population through a rationed harvest of female white-tailed deer; an estimated 335,850 deer were harvested in 2008 (PAGC, 2009a). Because of the ability of the white-tailed deer to use a variety of habitats and thrive in proximity to human development, the species would likely occur at and around the Humboldt site.

Bears primarily occur in wooded habitats and are rarely observed in urban and agricultural areas (PAGC, 2004a). The black bear population in Pennsylvania is estimated at 15,000 bears, and PAGC manages a seasonal black bear harvest through recreational hunting to reduce bear-human interactions. In 2008, 59 black bears were harvested in Luzerne County (PAGC, 2009b), and the species is likely to occur adjacent to the Humboldt Industrial Park and may occasional occur on the Humboldt site.

Habitat and population restoration efforts for the wild turkey were enacted in Pennsylvania the 1930s, and the current population is estimated at 250,000 wild turkey. Recreational turkey hunting is popular throughout the state, and an estimated 40,500 wild turkey were harvested during the 2008 spring harvest (PAGC, 2009c). The wild turkey prefers mixed forested, actively farmed, and reverting farmland habitats (PAGC, 2007). These habitats occur in the area, and the wild turkey could occur at the Humboldt site.

The ring-necked pheasant is an introduced species commonly found in the Midwest and Northeast. PAGC began stocking pheasants in 1915, and the population peaked in the 1970s. Loss of habitat has caused recent pheasant declines, and currently the pheasant population is largely sustained from stocking. Recreational pheasant hunting is popular in the state, and over 110,000 birds were harvested in 2008 (PAGC, 2009d). The species typically occurs in farmlands and other early successional habitats (PAGC, 2004b), which are not common at or in the vicinity of the Humboldt site.

Small mammals, including squirrels, rabbits, and woodchucks, are hunted recreationally throughout Pennsylvania. These animals occupy a variety of habitats, including those found on the Humboldt site. In 2008, over 700,000 squirrels, 400,000 rabbits, and 900,000 woodchucks were harvested (PAGC, 2009d). Each of these small mammal species would be likely to be present on or adjacent to the Humboldt site.

The recreationally and commercially important terrestrial wildlife species that could occur at the Humboldt site are mobile and would be expected to relocate away from the disturbance associated with development. Limited incidental mortality is possible either directly from Humboldt site preparation activities or from the action of relocating, but no population-level impacts would be expected. Impacts on recreationally and commercially important terrestrial wildlife species would be SMALL.

The Pennsylvania WAP guides management of species of fish and wildlife considered ecologically important. The WAP identifies broadly defined wildlife habitat types occurring in Pennsylvania and the important species that typically occur in those habitats (PAGC, 2009e). The terrestrial habitat types present on and in the area of the Humboldt site include mixed-deciduous forest, forested wetlands and bogs, shrub-scrub swamps, emergent wetlands, shrub lands/early successional forests, riparian forests/thickets, and human structures.

Table 9.3-11 describes the ecologically important species that may occur in the habitat types present on the Humboldt site or along the potential utility corridors. All of these species are capable of relocating away from the disturbance associated with construction. Minor incidental mortality may occur, but no population-level impacts would be expected. Where appropriate, roosting/nesting surveys would be conducted in advance of construction, and any disturbance would avoid these critical life history periods. Appropriate BMPs would be implemented during construction to minimize potential indirect impacts on offsite habitats. Any impacts on ecologically important species from facility construction or installation of pipelines or powerlines to serve the proposed new unit at the Humboldt site would be SMALL.

It is anticipated that terrestrial ecology impacts from operation of the proposed new unit at the Humboldt site would be similar to those described for the BBNPP site in ER Section 5.3.3. Therefore, impacts on terrestrial ecology from the operation of the proposed new unit at the Humboldt site would be SMALL.

9.3.2.3.5 Aquatic Ecology and Sensitive Species

Construction-related impacts on the aquatic ecology would be similar to those described for the BBNPP site in ER Section 4.3 and include loss of wetlands and temporary loss of habitat and short-term degradation of water quality in isolated areas due to in water and shoreline construction of the CWS Makeup Water Intake Structure. Tables 9.3-12, 9.3-13, and 9.3-14 provide a summary of wetlands and streams on the BBNPP site and *Alternative Sites*. Table 9.3-12 indicates that 3.8 ac (1.5 ha) of wetlands occur on the Humboldt site and additional wetlands occur in the general vicinity (ESRI, 2005; USFWS, 2008b). Table 9.3-12 also indicates that there would be impacts to 5,057 lf (1541.4 m) of streams on the Humboldt site, primarily along tributaries to Black Creek (ESRI, 2005; USFWS, 2008b).

It is anticipated that, while much of the supporting structure would be located onshore and the CWIS would extend a short distance into the waterway, construction of the CWIS would likely involve the dredging of sediment to allow for the construction of the concrete structure on the bottom of the river. Sediment dredging during construction of the CWS Makeup Water Intake Structure would result in temporary suspension and re-deposition of the sediment, as well as the removal of benthic organisms living in or on the removed sediment. It is anticipated that the suspended sediment would quickly redeposit in the immediate area. For a short time, the suspended sediment would create increased turbidity in the immediate area of the construction. Fish and motile crustaceans present in the area during construction of the CWS Makeup Water Intake Structure would likely avoid the area during active construction, may actively feed on suspended organisms during dredging operations, and are unlikely to be adversely affected by the construction activities.

No construction effluents are anticipated from the CWS Makeup Water Intake Structure construction area. BMPs would be used to minimize runoff volumes and impacts. The use of a cofferdam to facilitate construction of the in-water portions of the CWS Makeup Water Intake Structure would minimize releases of sediment. Prior to commencement of dredging, sediment in areas proposed to be dredged would be sampled and analyzed to obtain detailed chemical characterizations according to the requirements of dredging permits, special sediment handling requirements suggested by the sediment sampling results, and required by the dredging permit.

CWS Makeup Water Intake Structure construction-related impacts on aquatic species are anticipated to be minor because the area of impacts is limited to the immediate vicinity of the construction activities. Because the potential impacts would be localized, and given the short-term nature of the construction activities and the relatively short-term recovery periods for disturbed benthic species within and near the dredged area, no long-term effects on important species and their habitats are anticipated to occur. Therefore, the adverse aquatic ecology impacts associated with construction of the CWS Makeup Water Intake Structure are anticipated to be SMALL.

As described in ER Section 9.3.2.3.3, an approximate 23.5-mi (37.8-km) long makeup and blowdown water pipeline would need to be constructed to connect the Humboldt site to the Susquehanna River. It is anticipated that the makeup and blowdown water system pipelines would extend along existing ROWs, if feasible, to reduce potential impacts. It is anticipated that approximately 0.7 mi (1.1 km) of new transmission corridor would need to be constructed to connect with existing infrastructure and approximately an additional 13.6 mi (21.9 km) of transmission corridor would need to be expanded to connect to the necessary 500-kV transmission system (ER Section 9.3.2.3.7). The water pipeline may cross 23.4 ac (9.5 ha) of wetlands and 8,924 lf (2,720 m) of stream, including Black Creek (Table 9.3-12). New transmission line ROW, described in ER Section 9.3.2.3.7, may cross an additional 0.2 ac (0.08 ha) of wetlands and 2,773 lf (845.2 m) of streams (Table 9.3-12). Because there is existing road and rail access to the site, no wetlands or streams beyond those onsite are anticipated to be impacted by construction of new roadways or a rail spur. Impacts on wetlands and streams would need to be coordinated through the USACE and the state prior to construction activities. Therefore, it is anticipated that construction activities would have a MODERATE impact on aquatic ecology based on the commitment of land and on construction impacts associated with pipeline and transmission system corridors.

It is anticipated that aquatic ecology impacts from operation of the proposed new unit at the Humboldt site would be similar to those described for the BBNPP site in ER Section 5.3.3. Therefore, impacts on aquatic ecology from the operation of the proposed new unit at the Humboldt site would be SMALL.

There are no federally protected aquatic species known to occur in Luzerne County, Pennsylvania (Table 9.3-3). Table 9.3-3 identifies three state-protected aquatic species known to occur in Luzerne County. The eastern mudminnow is found in quiet, mudbottomed, often heavily vegetated streams, sloughs, swamps, and ponds, particularly along margins, over sand, mud, and debris (PNHP, 2009h). The yellow lampmussel typically inhabits larger streams and rivers with sand and gravel substrates and medium currents (NatureServe, 2009a). The alewife floater inhabits streams, rivers, and pools, in a variety of substrates, including silt, sand, and gravel. Its distribution appears to be controlled by the distribution of its host fish, the alewife (NatureServe, 2009b). These three species are unlikely to occur on the Humboldt site due to the past disturbance of the primary stream as a result of strip mining for coal. Any impacts on protected aquatic species would be SMALL as a result of construction of the proposed new unit at the Humboldt site.

There would be a potential for construction-related impacts on these species along the potential pipeline and new/expanded transmission corridors. However, impacts along expanded powerlines would be small, as there already are lines in place across waters along the routes and the process of expanding these existing lines would be minimally intrusive to aquatic

habitat. There would be a greater potential for impacts along the potential water line corridor, but impacts on any particular water would be limited to the immediate construction area. Conditions of applicable federal, state, and local permits would be met to minimize adverse environmental impacts, and to ensure that organisms are protected against potential construction related impacts. Any impacts on federally or state-protected aquatic species would be SMALL.

Pennsylvania has recreationally important fisheries, including bluegill, pumpkinseed, redbreast sunfish, rock bass, black and white crappie, yellow perch, smallmouth and largemouth bass, walleye, catfish (both channel and bullhead), carp and a variety suckers. In addition, brook, rainbow, and brown trout are widely stocked to support fishing for these species (PFBC, 2009a). Most of these species, with the exception of trout, could occur in the streams within the Humboldt site or along the potential water line corridor. Species that prefer larger rivers and lakes, such as the black and white crappies, bluegill, pumpkinseed, walleye, catfish, and suckers, could occur in the Susquehanna River (PFBC, 2009a). Brown and rainbow trout are not stocked in the drainage proposed for the water line corridor (PFBC, 2009b), and these species would not be expected to occur at the Humboldt site.

The Pennsylvania WAP guides management of species of fish and wildlife considered ecologically important. The WAP identifies broadly defined wildlife habitat types occurring in Pennsylvania and the important species that typically occur in those habitats (PAGC, 2009e). The species that may occur in the habitat types found at and near the Humboldt site are listed in Table 9.3-11. Aquatic habitat types present on and in the area of the Humboldt site include streams, rivers, lakes, and ponds.

There would be impacts on 5,057 lf (1541.4 m) of stream within the Humboldt site (Table 9.3-12), and recreationally important fish species or ecologically important aquatic species could be impacted. It is likely that fish would relocate away from the area of disturbance. Less mobile aquatic species, such as crustaceans, may experience some mortality. There would be a potential for short-term construction-related impacts along the pipeline and new/expanded transmission corridors. However, impacts along expanded powerlines would be minimal as there already are lines in place and the process of upgrading expanding these existing lines would be minimally intrusive and primarily cross over aquatic habitat. There would be a greater potential for impacts along the potential water line corridor, but impacts on any particular water would be limited to the immediate construction area and the area would be restored such that there would be no net loss of resources. Conditions of applicable federal, state, and local permits would be met to minimize adverse environmental impacts and to ensure that organisms are protected against potential construction related impacts. Because the amount of streams and wetlands that would be impacted is substantial (approximately 16,754 lf [5106.6 m] of stream and approximately 27.6 ac [11.16 ha] of wetlands combined between the Humboldt site and the potential utility corridors), any impacts on recreationally important fish species or ecologically important aquatic species would be MODERATE.

The Asiatic clam is known from this reach of the Susquehanna River (USGS, 2009c). The zebra mussel is only known from more southern portions of the drainage, but could be migrating upstream (USGS, 2009d). These exotic invasive mussel species could foul water intake structures placed in the Susquehanna River. Appropriate BMPs would be used to manage these species.

9.3.2.3.6 Socioeconomics

Based on USCB data, Luzerne County had a population of approximately 312,265 people in 2007 (USCB, 2009a). The population density within a 20-mi (32-km) radius of the Humboldt site was 222 ppsm (ESRI, 2009b). Luzerne County median household income was $33,771 in 1999 and $43,229 in 2007 (USCB, 2009f; USCB, 2009g). The median residence value was $83,500 in 2000 compared to $116,200 in 2007, while the median residence value for the entire Commonwealth of Pennsylvania during 2007 was $160,900 (USCB, 2009d; USCB, 2009h; USCB, 2009i).

A total of 11 hospitals, 31 police stations or sheriff departments, and 39 fire stations or departments (including volunteer stations) are located within Luzerne County (FEMA, 2007). Luzerne County has an EMA that helps prepare for, manage, and recover from any type of natural disaster and emergency or threat to security that may occur in the county (Luzerne County EMA, 2009). Pennsylvania also has an EMA with jurisdiction over Luzerne County (PEMA, 2009).

There are approximately 869 public and private elementary, middle, and high schools located within a 50-mi (80-km) radius of the Humboldt site (FEMA, 2007).

There are approximately 133 public and private airports located within a 50-mi (80-km) radius of the Humboldt site. Based on 2009 data, 13 airports are located in Luzerne County (USGS, 2009e).

There are approximately 405 parks located within 50-mi (80-km) radius of the Humboldt site, which include 57 state game lands, 18 state parks and forests, 216 local parks and preserves, 12 recreational areas, 36 playgrounds, 47 fields, courts and stadiums, and 19 other sites including community centers and facilities, camps, museums, gardens and historic and cultural sites. A total of 21 parks are located in Luzerne County, which include 9 state game lands, 3 state parks, 6 local parks, 1 field site, and 2 cultural sites. (USGS, 2009f)

For the purposes of evaluating the impact on availability of a construction workforce, housing, and public services, an approach was used similar to that used for the BBNPP. As discussed in ER Section 4.4.2.2.1, an estimated maximum of 3,950 construction workers is anticipated for the BBNPP site. A similar workforce is assumed to be needed for construction of the proposed new unit at the Humboldt site. A range of in-migration between 20 and 35 percent, consistent with ER Section 4.4.2.1, was assumed. Based on these in-migration scenarios, between 1,706 and 2,986 additional people would migrate into the region of influence. These estimates include the direct workforce and family members. For comparison purposes, an assessment was made assuming the same level of in-migration for the host county. Given that Luzerne County had a population of 312,265 people in 2007, the population increase due to in-migration of construction workers and their families would represent an increase of between 0.5 and 1.0 percent.

Metropolitan and non-metropolitan area estimates from the DOL, BLS, were reviewed for construction occupation data within 50 mi (80 km) of the Humboldt site. If the 50-mi (80-km) radius encroached into a portion of a metropolitan and non-metropolitan area, the total construction occupation numbers for the metropolitan and non-metropolitan area were included in the analysis. According to May 2008 data, the construction workforce required for the project would represent almost 3 percent of the total construction workforce in the area (DOL, 2008).

Datasets from 2005 were reviewed to determine the number of housing units currently vacant within a 50-mi (80-km) radius of the Humboldt site. Based on this information, an assessment was made to determine if there appears to be adequate housing units available to address the influx of a workforce required to support the proposed new unit at the Humboldt site during its construction and operation. According to the data, a total of 156,777 housing units are vacant or not occupied within a 50-mi (80-km) radius of the Humboldt site. A total of 13,999 housing units are vacant in Luzerne County. (ESRI, 2009c) Applying the 20 to 35 percent in-migration analysis and data for the BBNPP from Tables 4.4-7 and 4.4-8, an estimated 688 to 1,204 direct workers (households) would migrate into the county. As a result, the increase in housing demand in Luzerne County would be less than the existing availability of housing units within the 50-mi (80-km) radius.

The distance to population centers greater than 25,000 people in size was also assessed to determine the probable availability of shopping and other services for the construction and operation workforce. The nearest population center is Wilkes-Barre, Pennsylvania, which is approximately 23 mi (37 km) away (ESRI, 2009d).

According to the USEPA, Luzerne County has 91 community PWSs, which are defined by the PADEP as a "system that provides piped water for human consumption to at least 15 service connections or serves an average of at least 25 people for at least 60 days each year. PWSs can be community, non-transient non-community, or transient non-community systems" (PADEP, 2009c). These 91 systems provide treated water to over 274,000 people throughout the County. Of the 91 systems, 7 of them use surface water as the primary water source, while the remaining 84 use groundwater. (USEPA, 2009c) In addition, Luzerne County has four major and nine minor public (municipal) wastewater/sanitary sewer treatment plants. The total wastewater flow to these 13 municipal public sewer systems within Luzerne County is approximately 73.6 MGD (278.6 mld). (PADEP, 2009d) According to Luzerne County, Dupont Borough recently completed a modern $5-million sewer collection system (Luzerne County, 2009b), and the Township of Salem is currently in the process of initiating a new sewer system in the residential areas of East Berwick and Beach Haven (Luzerne County, 2009c). Given the availability of existing vacant housing in the county and within the 50-mi (80-km) radius of the site, it is unlikely that the in-migration associated with the construction would have any significant impact on water supply or sewage.

An increase in tax revenues in Luzerne County is to be expected from the construction and operation of the proposed new unit at the Humboldt site. Actual tax revenues for Luzerne County in fiscal year 2006 totaled $65.8 million (PA GCLGS, 2006). While the actual increase in tax revenues from a new unit is yet unknown, the increase would be comparable to that at the BBNPP site. Most people consider large tax payments a benefit to the taxing entity because they support the development of infrastructure that supports further economic development and growth.

The introduction of large plumes from the cooling towers into the skies where there are currently no plumes of this magnitude has the potential to adversely affect the character and quality of views in the area surrounding the Humboldt site. These plumes from the proposed new unit at the Humboldt site would likely be visible at a considerable distance

Based on the above information, socioeconomic adverse and beneficial impacts associated with construction activities would be SMALL to MODERATE due to the percent increase of

population into the area and its resulting potential impact on housing and public services, and tax revenue. Adverse impacts associated with operation activities would be MODERATE due to the impacts on the character and quality of views in the area. Beneficial impacts associated with operation activities would be SMALL to LARGE due to the annual taxes and revenue generated by the new workers contributing to the local economy and the productivity of the region.

9.3.2.3.7 Transportation

The Humboldt site is located adjacent to Pennsylvania SR 924 and I-81. The anticipated area of construction is currently undeveloped and would require the construction of new roads to access the site.

Barge access is not possible at or within 5 mi (8 km) of the Humboldt site (World Port Source, 2009). There is an existing Norfolk Southern Railway Class I rail line at the Humboldt site, which runs along the eastern edge of the site (Greater Hazleton Can Do, 2009). Extensions and/or upgrades to the existing rail spur would be required to access the site. Planning for roadway and railroad upgrades would be made in the context of future decisions regarding the optimum methods for transporting large and heavy components to the Humboldt site.

At the reconnaissance-level of this evaluation, engineering design of the access roads and rail spur to the site has not been performed. However, because SR 924 abuts the southeastern border of the Humboldt site and a rail spur extends into the eastern border, no offsite impacts associated with construction of the access road and rail spur are anticipated.

There would be short-term traffic impacts on SR 924 and I-81 due to the transportation of construction materials and workers during construction and limited long-term traffic impacts from operation activities. These impacts would primarily be due to increased traffic volumes during shift changes. The development of a traffic management plan prior to construction would aid in identifying and mitigating potential traffic impacts. The following mitigation measures would be considered in developing a traffic management plan:

- Workforce shift changes and delivery options: Scheduling shift changes and the delivery of large items during off peak hours could reduce potential traffic impacts on local roads.
- Carpooling: The use of carpooling and providing transit services (buses) during construction and operation of the facility could reduce potential traffic congestion impacts on local roads.
- Coordination with local planning authorities: If necessary, the upgrading of local roads, intersections, and signals to handle increased traffic loads reduce potential traffic impacts on local roads.

Implementing the appropriate mitigation measures identified above would result in SMALL to MODERATE impacts on transportation during construction activities, and a SMALL impact during operation of the proposed new unit at the Humboldt site.

9.3.2.3.8 Historic, Cultural, and Archaeological Resources

The Humboldt site is located in Luzerne County, which was established in 1786 from the county of Northumberland. The site is located along the North Branch of the Susquehanna River in the

Wyoming Valley. The growth of the county for over 150 years has been linked to the successful mining of anthracite, a hard form of coal (Luzerne County, 2009a).

Based on a review of NRHP data, two NRHP-listed properties are within 5 mi (8 km) of the site. The Markle Bank and Trust Company and the St. Gabriel's Catholic Parish Complex are located in Hazleton City. According to the NRHP database, there are no NRHP-listed properties or NRHP-listed historic districts within 1 mi (1.6 km) of the site (NRHP, 2009a; Google Earth, 2009).

A complete cultural resources investigation of historic, cultural and archaeological resources would be necessary before construction activities began. This work would be conducted in coordination with the PMHC and should any significant cultural resources be identified, appropriate mitigation measures would be developed prior to construction and operation activities.

Impacts on historic, cultural, and archaeological resources associated with construction and operation activities are anticipated to be SMALL because no NRHP-listed properties or NRHP-listed historic districts are located within 1 mi (1.6 km) of the site and only two NRHP-listed historic properties are located within 5 mi (8 km) of the site.

9.3.2.3.9 Environmental Justice

The demographic characteristics surrounding the Humboldt site were evaluated to determine the potential for disproportionate impacts on minority or low income populations. Demographic information used for this study was obtained from 2000 USCB data (USCB, 2000d). Within the 50-mi (80-km) radius of the Humboldt site, there were 1,920 census block groups located in New Jersey and the Commonwealth of Pennsylvania (Table 9.3-4). Of these 1,920 census block groups, 130 were classified as having aggregate minority populations. A total of 55 census block groups were classified as some other race, 19 as Black (African American), and 1 as Asian minority populations. A majority of census block groups classified as some other race and Black (African American) race were located within Berks County. The region of influence for the environmental justice evaluation includes Luzerne, Carbon, and Schuylkill counties.

Of the 314 census block groups in Luzerne County, 4 were classified as having an aggregate minority population, 3 of which were Black (African-American) minority population. Of the 48 census block groups in Carbon County, none were classified as having a minority population. Of the 145 census block groups in Schuylkill County, 2 were classified as having an aggregate minority population, and they were both Black (African American) minority populations. Luzerne, Carbon, and Schuylkill counties had no Hispanic populations. Figures 9.3-27 through 9.3-31 present census block groups with minority populations within a 50-mi (80-km) radius of the Humboldt site that met the criteria stated in ER Section 9.3.2.2.9. A figure is not provided if a single minority population did not exceed the criteria; therefore, only figures for Black (African American), Asian, other race, total aggregate, and Hispanic minority populations have been provided for the Humboldt site.

There were 16 census block groups classified as low income within the 50-mi (80 km) radius of the Humboldt site, with the majority (6) located in Berks County. Schuylkill County had one census block group classified as low income, while Luzerne and Carbon counties had no

census block groups classified as low income. Figure 9.3-32 presents census block groups with low income populations within the 50-mi (80-km) radius of the Humboldt site that met the criteria stated in ER Section 9.3.2.2.9.

Based on the data presented in Table 9.3-4, the percent of minority and low income populations within close proximity to the Humboldt site is low. Any adverse human health and environmental consequences from construction and operation of the proposed new unit at the Humboldt site would not be borne disproportionately by minority or low income groups. Overall environmental justice impacts are anticipated to be SMALL.

9.3.2.3.10 Transmission Corridors

There are two existing 500-kV transmission lines available for possible interconnection to the Humboldt site; one is 10.2 mi (16.4 km) north of the site, and the other is 11.6 mi (18.7 km) north of the site. There are two existing 230-kV transmission lines within 5 mi (8 km) of the Humboldt site, and there are nine 230-kV transmission lines between 10 mi (16 km) and 20 mi (32 km) of the Humboldt site (Platts, 2009).

To reach the nearest existing substation, new transmission line ROW would need to be constructed. At the reconnaissance-level of this evaluation, engineering design of the transmission line has not been performed. However, a conceptual route for the transmission line would extend east from the eastern boundary of the Humboldt site for approximately 0.7 mi (1.1 km), where 13.6 mi (21.9 km) of existing 230-kV transmission ROW would be expanded, then travel north to reach the existing substation. A review of publicly available online data indicates that most transmission corridors generally pass through land that is primarily agricultural and forest land. The areas surrounding the Humboldt site are mostly rural and remote with low population densities. The new transmission lines would cross over numerous highways. The effect of these corridors on land usage would be minimal; farmlands that have corridors passing through them would generally continue to be used as farmland. As new and expanded ROW would need to be constructed to accommodate the new transmission lines, it is anticipated that there would be ecological impacts from the development of new transmission corridors. A detailed discussion of the terrestrial and aquatic ecology impacts from the construction of new transmission corridors is provided in ER Sections 9.3.2.3.4 and 9.3.2.3.5, respectively. Utilization of existing transmission corridor ROWs could present opportunities to minimize adverse impacts. Specific monitoring requirements for upgrades to transmission lines and corridors would be designed to meet conditions of applicable federal, state, and local permits to minimize adverse environmental impacts and to ensure that organisms are protected against potential construction related impacts.

Operation activities within the transmission corridors might include visual inspection and appropriate maintenance of transmission line ROWs. Maintenance activities could include re-clearing vegetation, tree trimming/removal, and encroachment licensing/removal. For maintenance purposes, wooded sections of the ROWs would be re-cleared to the full width through mechanical clearing, hand cutting, or herbicide application. Herbicide applications would only be used on an occasional basis, if at all.

Due to the construction and operation of new transmission corridors, construction and operation transmission impacts are anticipated to be SMALL to MODERATE.

9.3.2.4 Seedco Industrial Park (Alternative Site 3)

The Seedco Industrial Park (Seedco site) is a brownfield site that is located east/southeast of the community of Ranshaw and the City of Shamokin in Northumberland County, Pennsylvania. State Highway 61 is located less than 1 mi to the north of the site. Figure 9.3-11 provides a location map showing a 6-mi (9.7-km) radius surrounding the Seedco site. Figure 9.3-33 provides an aerial photograph of the Seedco site and the immediate vicinity. Also shown on Figure 9.3-33 are the FEMA 100- and 500-year floodplains (FEMA, 2008) and mapped NWI wetlands (USFWS, 2009). There is no designated prime farmland (USDA, 2009) at the Seedco site or immediately surrounding the site (within the boundary of Figure 9.3-33).

9.3.2.4.1 Land Use

Land use in the area surrounding the Seedco site includes commercial development to the north, residential development to the northwest, and undeveloped lands to the east, south, and west. The Seedco site is located in Coal Township, which has an estimated population of approximately 10,628 people (USCB, 2000f). The largest community within 10 mi (16.1 km) of the Seedco site is the City of Shamokin, Pennsylvania, approximately 2.5 mi (4.0 km) to the west. The site is sufficiently large to accommodate an EPR Nuclear Power Plant that would require an overall area of approximately 420 ac (170 ha).

The Seedco Industrial Park encompasses approximately 1,061 ac (429 ha). The approximately 420-ac (170-ha) area needed for construction of the proposed new unit at the Seedco site would be located within the southwest portion of the property. According to Coal Township, the Seedco site is zoned as M-1 (manufacturing) (Coal Township, 2009).

The majority of the land at Seedco site is forested, while portions of the southern and eastern sections of the area contain abandoned mine lands. A review of the USGS topographic map indicates the southern portion of the Seedco site contains lands formerly used for strip mines (USGS, 1975). The PADEP eMapPA, Online Mapping System, also identifies the site as containing abandoned mine lands (PADEP, 2009f). It is unknown whether any of the mined lands require remediation.

The Seedco site is located on a hill overlooking Pennsylvania SR 901, with Shamokin Creek to the south. The Seedco site topography indicates a relief across the site of approximately 300 ft (91.4 m); therefore, the cut and fill requirements for construction would be substantial (USGS, 1975).

The Seedco site can easily accommodate construction of the proposed new unit. Although nuclear power plant structures would occupy only a portion of the 1,061-ac (429-ha) property, the construction process could result in impacts on the entire 420-ac (170-ha) area, such as vegetation removal, grading, and other earth-disturbing activities. These areas could also be used for laydown areas, stormwater retention ponds, and borrow areas during or after construction.

Based upon available GIS data, the nearest dedicated land (federal, state, or tribal) is a State Game Land area, which is approximately 15 mi (24.1 km) from the Seedco site (PA DCNR, 2009; National Atlas of the United States, 2005).

To obtain the water from the Susquehanna River, new water intake and discharge pipelines would need to be constructed. At the reconnaissance-level of this evaluation, engineering design of the water pipelines to the river has not been performed. However, a conceptual route for the water pipelines would follow the Shamokin Creek from the eastern border of the Seedco site for approximately 21 mi (34 km), where it would reach the Susquehanna River. It would be necessary to acquire riverfront land sufficient for an intake, major pumping station and ancillary structures, as well as additional land for the construction of a pipeline with the capacity to provide approximately 50 MGD (189 mld) of river water to the plant. It would be necessary for the pipeline to cross a railroad and numerous local roads; however, no major roads are located between the river and the Seedco site.

Based on potential environmental remediation on abandoned mined lands, the relief in site topography, and proximity of adjacent residential land uses, overall land use impacts are expected to be MODERATE.

9.3.2.4.2 Air Quality

Northumberland County is designated as an attainment area for pollutants regulated by the USEPA. Any air emissions that would occur as a result of the operation of the proposed new unit at the Seedco site would be low enough that they should not cause or contribute to a significant change in local or regional air quality levels. (USEPA, 2009a) There are no PSD Class I areas in Pennsylvania, and there are no Class I areas within 100 mi (161 km) of the Seedco site (NPS, 2009).

Construction activities at the Seedco site have the potential to temporarily impact ambient air quality in the immediate vicinity due to emissions from onsite construction equipment and the transportation of construction materials and workers to and from the site. These emissions are expected to be consistent with emissions resulting from other construction projects of this magnitude. It is anticipated that there would be no significant impacts on air quality at offsite locations during the construction period since construction activities would be located primarily near the center of the site (where most construction and equipment laydown would also occur). Overall air quality impacts on the surrounding area attributable to the construction of the proposed new unit at the Seedco site would be SMALL due to adherence to regulatory requirements and the implementation of BMPs employed for large construction projects.

With the exception of some relatively small diesel-fueled emergency power generating equipment and fire pumps, operation of the proposed new unit at the Seedco site would not have any significant sources of emissions attributable to the combustion of fossil or other fuels. The proposed new unit at the Seedco site would contain cooling towers that would emit water vapor and small amounts of PM into the atmosphere. Because of the exceptionally low level of emissions, operation activities are not expected to cause or contribute to a violation of state or federal ambient air quality standards.

It is anticipated that there would be a small increase in regional and local air emissions as a result of increased vehicular traffic associated with workforce employed for facility operations and periodic refueling activities. It is also anticipated that overall air quality impacts associated with operation of the proposed new unit at the Seedco site would be SMALL due to the typically low emissions for an operating nuclear power plant. In summary, air quality impacts are anticipated to be SMALL for both construction and operation activities.

9.3.2.4.3 Water

The Seedco site lies approximately 15 mi (24 km) southeast from the main branch of the Susquehanna River, the nearest sufficiently large source of water, This segment of the river is identified as part of Drainage List M (§ 93.9m – Main Stem, West Branch to Juniata River) of the Susquehanna River Basin and is considered freshwater surface water. The Water Use Protected designation for this segment of the river is warm water fishery with no special quality designation (The Pennsylvania Code, 2007).

Impacts on hydrology and consumptive water use would be primarily associated with water withdrawal from the main source of water. Consumptive water use is associated with evaporative cooling attributable to the use of closed cycle cooling systems that require the use of cooling towers for heat rejection from both the main steam condensers and plant auxiliary heat exchangers. For planning purposes, the total water withdrawal of the proposed new unit at the Seedco site is estimated to be 50 MGD (189 mld).

The main source of water for the Seedco site would be the Susquehanna River. The lowest 7Q10 for the period of record (July 1999 to July 2009) for the river at the nearest USGS gage (01554000 on right bank at borough of Shamokin Dam, on grounds of former Pennsylvania Power and Light Co. generating plant, 1.0 mi [1.6 km] downstream from Sunbury Fabridam, and 1.8 mi [2.9 km] south of Sunbury) is approximately 1,389 MGD (5,257 mld) (USGS, 2009g). Therefore, the water availability in the Susquehanna River at low flow would exceed the total water withdrawal at the Seedco site by approximately 28 times.

Hydrologic impacts associated with construction activities could include alteration of the existing watershed surface; disturbance of the ground surface for stockpiles, material storage, and construction of temporary access roads; construction of water intake and discharge structures; construction of cofferdams and storm sewers; construction of structures that might alter shoreline processes; dredging operations; temporary dewatering activities; construction activities contributing to sediment runoff; changes in surface water drainage characteristics; decreases in surface water infiltration (increases of impervious surfaces); increased erosion and sedimentation; changes in groundwater levels related to temporary dewatering activities; and possible subsidence resulting from groundwater withdrawals. Permitted withdrawal of groundwater would be used for construction activities. The required quantity of water is anticipated to be similar to the quantity described in ER Section 4.2.2. Proper mitigation and management methods implemented during construction would limit the potential water quantity and quality impacts on surface water and groundwater.

To obtain the water from the Susquehanna River, new water intake and discharge pipelines would need to be constructed. At the reconnaissance-level of this evaluation, engineering design of the water pipelines to the river has not been performed. However, a conceptual 120-foot (36.6-m) ROW for the water pipelines would follow the Shamokin Creek from the eastern border of the Seedco site for approximately 21 mi (34 km), where it would reach the Susquehanna River. Impacts associated with construction of the water pipelines are anticipated to be temporary in nature. Table 9.3-12 lists the aggregate impact on water bodies and wetlands that would be affected by riverfront intake features and the construction of a water supply pipeline. Table 9.3-13 and Table 9.3-14 provide additional details on both onsite and offsite impacts on water bodies and wetlands.

Because the Seedco site is comparatively remote from its closest suitable water supply, other hydrological impacts could be associated with the creation of a significant impoundment on the site to assure plant reliability and for safety as a UHS. A detailed analysis would be required to determine the design of such an impoundment based upon local site geology and hydrology. The reservoir would be designed and configured to avoid interface with the groundwater table. Final design would address soil type and depth to water table. Measures, such as clay liners, would be used as appropriate. Based upon studies performed for an EPR nuclear power plant, an impoundment with a surface area of approximately 6.4 ac (2.6 ha) and a depth of 25 ft (8 m) with sloped sides at a 3:1 horizontal to vertical ratio would be required; however, the actual dimensions would necessarily be influenced by local geology and hydrology. A pond of these dimensions could be built within the 420-ac (170-ha) proposed new unit footprint.

Construction-related water use impacts would be minimized by implementing BMPs, including erosion, grading, and sediment control measures; stormwater control measures; spill prevention plan; and observance of federal, state, regional, tribal, and local regulations pertaining to nonpoint source discharges. Based on the temporary nature of the construction-related impacts and implementation of BMPs during construction, the overall construction-related water impacts would be SMALL.

Water discharges from the proposed new unit at the Seedco site to the Susquehanna River would include cooling tower blowdown, treated process wastewater, treated sanitary wastewater and small amounts of radioactive water. Notwithstanding the use of potential engineered mitigation, the introduction of cooling tower blowdown to the receiving waters represents a limited thermal discharge. Ensuring permitted limits for water withdrawal and discharge are met through operational controls and monitoring would minimize the potential for adverse impacts on water availability and water quality during operation of the proposed new unit at the Seedco site. It is anticipated that there would be a site-specific water treatment system or the use of a municipal system for sanitary wastewater, if available. Based on the implementation of operational controls and monitoring to meet permit limits, overall water use impacts from operation activities would be SMALL.

No more than 10 percent of the projected plant footprint would be include in the 100- or 500-year floodplain.

Based on the temporary nature of the construction-related impacts and the implementation of controls and monitoring during operation activities, it is anticipated that overall water quality impacts associated with the proposed new unit at the Seedco site would be SMALL.

9.3.2.4.4 Terrestrial Ecology and Sensitive Species

Impacts on the terrestrial ecosystem associated with construction of the proposed new unit at the Seedco site could include noise, clearing and grading, and potential collisions by birds with new structures. Construction of the proposed new unit at the Seedco site would result in direct mortality for certain wildlife and would reduce available habitat, but would not adversely affect local or regional populations of wildlife species. Native habitats on the property have been significantly altered through historical strip mining operations, and listed species that are mobile are likely to preferentially use less disturbed habitats on adjacent conservation lands. The terrestrial ecology impacts from construction of the water pipeline and new/expanded transmission line corridors to accommodate a 500-kV line are anticipated to be MODERATE

due to the commitment of land and construction impacts on ecological resources. To lessen impacts, wetland impacts would be avoided, minimized, and/or mitigated when possible; threatened and endangered species considered and protected; and BMPs used to prevent impacts on watercourses.

Table 9.3-5 (PNHP, 2009d; PNHNP, 2009i; PNHP, 2009j; PNHP, 2009k) provides a list of state-protected terrestrial species that may occur in Northumberland County, Pennsylvania. There are no federally protected species that are known to occur in the county. No impacts on federally protected species would be expected.

There are 14 plant species whose current or proposed status in the state would provide protection under Pennsylvania Code Title 17 Chapter 45, Conservation of Pennsylvania Native Wild Plants (The Pennsylvania Code, 2009) that may occur in Northumberland County. For purposes of this analysis, only those species listed as Pennsylvania Threatened, Pennsylvania Endangered, or species proposed for these two classifications are considered. Other levels of protection for plant species in Pennsylvania apply to commercial exploitation, and there would be no commercial exploitation of species on the Seedco site. Three of the 14 species are restricted to calcareous habitats that do not occur on the Seedco site (Rhoads and Block, 2007), and an additional 5 species are restricted to wetland types that do not occur on the Seedco site (Rhoads and Block, 2007). The other nine state-protected species could occur on the Seedco site. Because of the limited number of protected species that have potentially suitable habitat on the Seedco site, impacts on protected plant species would be SMALL.

Construction of water pipelines and electric transmission corridors would have the potential to impact protected species. Impacts would be limited to the period of construction, and there should be no impacts from operations and maintenance. Construction of these lines, described in ER Sections 9.3.2.4.3 and 9.3.2.4.10, potentially would result in clearing through habitat types that could support all but the two plant state-protected plant species associated with calcareous soils. The other 57 protected plant species and the 9 protected mammal species known to occur in the county (Table 9.3-5) could occur along these routes. Roosting/nesting surveys would be conducted in advance of construction, and any disturbance would avoid these critical life history periods. Appropriate BMPs would be implemented during construction to minimize potential indirect impacts on offsite habitats. Impacts on protected species from installation of pipelines or powerlines to serve the proposed new unit at the Seedco site would be SMALL.

There are four state-protected animal species that may occur on the Seedco site. The eastern small-footed bat and the northern myotis prefer deciduous and mixed forests. These species would be capable of relocating to other nearby suitable habitat. Some incidental mortality may occur, but no population-level impacts would be expected. Impacts on protected mammalian species would be SMALL.

The eastern spadefoot typically breeds in ephemeral ponds (NatureServe, 2009c). It is unlikely that the eastern spadefoot occurs on the Seedco site. The only pond on the Seedco site is a permanent water body and the past mining disturbance makes acidic conditions likely. No impacts to this species would be expected.

There is potentially suitable habitat for the timber rattlesnake on the Seedco site (PFBC, 2004). Should the timber rattlesnake occur on the Seedco site, grading and site preparation could impact the species and there could be incidental mortality from this activity. However, most

snakes would be expected to relocate away from the area of disturbance. Seedco site preparation would begin after the typical denning period for the timber rattlesnake to minimize the potential for collapsing a den filled with adult and juvenile snakes. Impacts on protected reptile species would be SMALL.

There are no protected avian species known to occur in Northumberland County.

Because of limited potentially suitable habitat on the Seedco site, small numbers of protected species that may occur on the Seedco site, BMPs and design features that would be implemented to minimize the potential for impacts, and the ability of animals to relocate to other nearby suitable habitat, potential construction-related impacts on protected animal species at the Seedco site would be SMALL.

Recreationally important terrestrial species potentially occurring within the vicinity of the Seedco site include the white-tailed deer, black bear, wild turkey, ring-necked pheasant, and several small mammals. One of these species, the white-tailed deer, also is considered commercially important because of the number of hunters participating and the number of deer harvested (PAGC, 2004c).

The white-tailed deer occurs in a variety of habitats ranging from forests and grasslands to urban and developed areas throughout the state. Regulated hunting is the primary management tool to prevent overpopulation of deer in the state. PAGC controls populations through a rationed harvest of female white-tailed deer; an estimated 335,850 deer were harvested in 2008 (PAGC, 2009a). Because of the ability of the white-tailed deer to use a variety of habitats and thrive in proximity to human development, the species would likely occur at and around the Seedco site.

Bears primarily occur in wooded habitats and are rarely observed in urban and agricultural areas (PAGC, 2004a). The black bear population in Pennsylvania is estimated at 15,000 bears, and PAGC manages a seasonal black bear harvest through recreational hunting to reduce bear-human interactions. In 2008, six bears were harvested in Northumberland County (PAGC, 2009b). It is unlikely that black bear would occur on or adjacent to the Seedco Site.

Habitat and population restoration efforts for the wild turkey were enacted in Pennsylvania the 1930s, and the current population is estimated at 250,000 wild turkey. Recreational turkey hunting is popular throughout the state, and an estimated 40,500 wild turkey were harvested during the 2008 spring harvest (PAGC, 2009c). The wild turkey prefers mixed forested, actively farmed, and reverting farmland habitats (PAGC, 2007). All of these habitats occur in the area, and the wild turkey could occur on the Seedco site.

The ring-necked pheasant is an introduced species commonly found in the Midwest and Northeast. PAGC began stocking pheasants in 1915, and the population peaked in the 1970s. Loss of habitat has caused recent pheasant declines, and currently the pheasant population is largely sustained from stocking. Recreational pheasant hunting is popular in the state, and over 110,000 birds were harvested in 2008 (PAGC, 2009d). The species typically occurs in farmlands and other early successional habitats (PAGC, 2004b), which are not common at or in the vicinity of the Seedco site.

Small mammals, including squirrels, rabbits, and woodchucks, are hunted recreationally throughout Pennsylvania. These animals occupy a variety of habitats, including those found on the Seedco site. In 2008, over 700,000 squirrels, 400,000 rabbits, and 900,000 woodchucks were harvested (PAGC, 2009d). Each of these small mammal species would be likely to be present on or adjacent to the Seedco site.

The Pennsylvania WAP guides management of species of fish and wildlife considered ecologically important. The WAP identifies broadly defined wildlife habitat types occurring in Pennsylvania and the important species that typically occur in those habitats (PAGC, 2009e). The terrestrial habitat types present on and in the area of the Seedco site include mixed-deciduous forest, forested wetlands and bogs, shrub-scrub swamps, emergent wetlands, shrub lands/early successional forests, riparian forests/thickets, and human structures. Table 9.3-11 describes the ecologically important species that may occur in the habitat types present on the Seedco site or along the potential utility corridors. All of these species are capable of relocating away from the disturbance associated with construction. Minor incidental mortality may occur, but no population-level impacts would be expected. Where appropriate, roosting/nesting surveys would be conducted in advance of construction and any disturbance would avoid these critical life history periods. Appropriate BMPs would be implemented during construction to minimize potential indirect impacts on offsite habitats. Any impacts on ecologically important species from facility construction or installation of pipelines or powerlines to serve the proposed new unit at the Seedco site would be SMALL.

It is anticipated that terrestrial ecology impacts from operation of the proposed new unit at the Seedco site would be similar to those described for the BBNPP site in ER Section 5.3.3. Therefore, impacts on terrestrial ecology from the operation of the proposed new unit at the Seedco site would be SMALL.

9.3.2.4.5 Aquatic Ecology and Sensitive Species

Construction-related impacts on the aquatic ecology would be similar to those for the BBNPP site described in ER Section 4.3 and include loss of wetlands and temporary loss of habitat and short-term degradation of water quality in isolated areas due to in water and shoreline construction of the CWS Makeup Water Intake Structure. Tables 9.3-12, 9.3-13, and 9.3-14 provide a summary of wetlands and streams on the BBNPP site and *Alternative Sites*. Table 9.3-12 indicates that 0.7 ac (0.3 ha) of wetlands occur on the Seedco site and additional wetlands occur in the general vicinity (ESRI, 2005; USFWS, 2008b). Table 9.3-12 also indicates that there would be impacts on 3,284 lf (1001.0 m) of streams on the Seedco site, primarily along Shamokin Creek, which flows through the southeastern portion of the Seedco site (ESRI, 2005; USFWS, 2008b).

It is anticipated that, while much of the supporting structure would be located onshore and the CWIS would extend a short distance into the waterway, construction of the CWIS would likely involve the dredging of sediment to allow for the construction of the concrete structure on the bottom of the river. Sediment dredging during construction of the CWS Makeup Water Intake Structure would result in temporary suspension and re-deposition of the sediment, as well as the removal of benthic organisms living in or on the removed sediment. It is anticipated that the suspended sediment would quickly redeposit in the immediate area. For a short time, the suspended sediment would create increased turbidity in the immediate area of the construction. Fish and motile crustaceans present in the area during construction of the CWS Makeup Water

Intake Structure would likely avoid the area during active construction and may actively feed on suspended organisms during dredging operations, and are unlikely to be adversely affected by the construction activities.

No construction effluents are anticipated from the CWS Makeup Water Intake Structure construction area. BMPs would be used to minimize runoff volumes and impacts. The use of a cofferdam to facilitate construction of the in water portions of the CWS Makeup Water Intake Structure would minimize releases of sediment. Prior to commencement of dredging, sediment in areas proposed to be dredged would be sampled and analyzed to obtain detailed chemical characterizations according to the requirements of dredging permits, special sediment handling requirements suggested by the sediment sampling results, and required by the dredging permit.

CWS Makeup Water Intake Structure construction-related impacts on aquatic species are anticipated to be minor because the area of impacts is limited to the immediate vicinity of the construction activities. Because the potential impacts would be localized, and given the short-term nature of the construction activities and the relatively short-term recovery periods for disturbed benthic species within and near the dredged area, no long-term effects on important species and their habitats are anticipated to occur. Therefore, the adverse aquatic ecology impacts associated with construction of the CWS Makeup Water Intake Structure are anticipated to be SMALL.

As described in ER Section 9.3.2.4.3, an approximate 21-mi (34-km) long makeup and blowdown water pipeline would need to be constructed to connect the Seedco site to the Susquehanna River. It is anticipated that the makeup and blowdown water system pipelines would extend along existing ROWs, if feasible, to reduce potential impacts. It is anticipated that approximately 9.0 mi (14.5 km) of new transmission corridor would need to be constructed and an additional 14.6 mi (23.5 km) of transmission corridor would need to be expanded to connect to the necessary 500-kV transmission system (ER Section 9.3.2.4.10). The water pipeline may cross 35.7 ac (14.4 ha) of wetlands and 7,182 lf (2,189.1 m) of stream, including the Shamokin Creek (Table 9.3-12). New transmission line ROW may cross 6.1 ac (2.5 ha) of wetlands and 3,062 lf (933.3 m) of streams. New access roadways and a railroad spur with associated rail improvements, described in ER Section 9.3.2.4.7, would impact no wetlands and 328 lf (100 m) of streams (Table 9.3-12). Impacts on wetlands and streams would need to be coordinated through the USACE and the state prior to construction activities. Therefore, it is anticipated that construction activities would have a MODERATE impact on aquatic ecology based on the commitment of land and on construction impacts associated with pipeline and transmission system corridors.

It is anticipated that aquatic ecology impacts from operation of the proposed new unit at the Seedco site would be similar to those described for the BBNPP site in ER Section 5.3.3. Therefore, impacts on aquatic ecology from the operation of the proposed new unit at the Seedco site would be SMALL.

There are no federally protected aquatic species known to occur in Northumberland County, Pennsylvania. Table 9.3-5 identifies two state-protected aquatic species known to occur in Northumberland County. The yellow lampmussel typically inhabits larger streams and rivers with sand and gravel substrates and medium currents (NatureServe, 2009a). The greenfloater typically occurs in small creeks and large rivers (sometimes canals) in pools and other calm water areas. The green floater is intolerant of strong currents and its preferred substrate is

gravel and sand in water depths of 1 to 4 ft. Good water quality is also important for the green floater (PNHP, 2009l). Shamokin Creek, the main water body draining the Seedco site, has been impacted by previous coal mining in the region (USEPA, 2001), particularly acid mine drainage, and is unlikely to support these protected aquatic species at the Seedco site, and other streams on the Seedco site would be too small to support the mussels. No impacts on state-protected aquatic species would be likely to occur as a result of development of the Seedco site.

There would be a potential for short-term construction-related impacts along the pipeline and new/expanded transmission corridors. However, impacts along expanded powerlines would be minimal as there already are lines in place and the process of upgrading expanding these existing lines would be minimally intrusive and primarily cross over aquatic habitat. There would be a greater potential for impacts along the potential water line corridor, but impacts on any particular water would be limited to the immediate construction area and the area would be restored such that there would be no net loss of resources. Conditions of applicable federal, state, and local permits would be met to minimize adverse environmental impacts, and to ensure that organisms are protected against potential construction related impacts. Any impacts on state-protected aquatic species would be SMALL.

Pennsylvania has recreationally important fisheries, including bluegill, pumpkinseed, redbreast sunfish, rock bass, black and white crappie, yellow perch, smallmouth and largemouth bass, walleye, catfish (both channel and bullhead), carp and a variety suckers. In addition, brook, rainbow, and brown trout are widely stocked to support fishing for these species (PFBC, 2009a). Most of these species could occur in the streams along the potential water line corridor. Species that prefer larger rivers and lakes, such as the black and white crappies, bluegill, pumpkinseed, walleye, catfish, and suckers, could occur in the Susquehanna River. Brown and rainbow trout are stocked in Shamokin Creek drainage along the potential water line corridor (PFBC, 2009b).

The Pennsylvania WAP guides management of species of fish and wildlife considered ecologically important. The WAP identifies broadly defined wildlife habitat types occurring in Pennsylvania and the important species that typically occur in those habitats (PAGC, 2009e). Aquatic habitat types present on and in the area of the Seedco site include forested wetlands and bogs, shrub-scrub swamps, emergent wetlands, streams, and rivers. The species that may occur in the habitat types found at and near the Seedco site are listed in Table 9.3-11. Aquatic habitat types present on and in the area of the Seedco site include streams, rivers, lakes, and ponds.

There would be impacts on 3,284 lf (1001.0 m) of stream within the Seedco site, and recreationally important fish species or ecologically important aquatic species could be impacted. It is likely that fish would relocate away from the area of disturbance. Less mobile aquatic species, such as crustaceans, may experience some mortality. There would be a potential for short-term construction-related impacts along the pipeline and new/expanded transmission corridors. However, impacts along expanded powerlines would be minimal as there already are lines in place and the process of upgrading expanding these existing lines would be minimally intrusive and primarily cross over aquatic habitat. There would be a greater potential for impacts along the potential water line corridor, but impacts on any particular water would be limited to the immediate construction area and the area would be restored such that there would be no net loss of resources. Conditions of applicable federal, state, and local permits would be met to minimize adverse environmental impacts and to ensure that organisms

are protected against potential construction related impacts. Because the amount of streams and wetlands that would be impacted is substantial (approximately 13,856 lf [4223.4 m] of stream and approximately 42.7 ac [17.3 ha] of wetlands combined [onsite and offsite]), any impacts on recreationally important fish species or ecologically important aquatic species would be MODERATE.

The Asiatic clam is known from this reach of the Susquehanna River (USGS, 2009c). The zebra mussel is only known from more southern portions of the drainage, but could be migrating upstream (USGS, 2009d). These exotic invasive mussel species could foul water intake structures placed in the Susquehanna River. Appropriate BMPs would be used to manage these species.

9.3.2.4.6 Socioeconomics

Based on USCB data, Northumberland County had a population of approximately 91,003 people in 2007 (USCB, 2009a). The population density within a 20-mi (32-km) radius of the Seedco site was 195 ppsm (ESRI, 2009b). The Northumberland County median household income was $31,314 in 1999 and $37,282 in 2007 (USCB, 2009j; USCB, 2009k). The median residence value was $70,000 in 2000 compared to $93,100 in 2007, while the median house value for the entire Commonwealth of Pennsylvania during 2007 was $160,900 (USCB, 2009c; USCB, 2009d; USCB, 2009l).

A total of 2 hospitals, 15 police stations or sheriff departments, and 24 fire stations or departments (including volunteer stations) are located within Northumberland County (FEMA, 2007). Northumberland County has a department of public safety that maintains programs and procedures that protect lives and property within the county from the effects of natural or man-made disasters (Northumberland County Department of Public Safety, 2009). Pennsylvania also has an EMA with jurisdiction over Northumberland County (PEMA, 2009).

There are approximately 869 public and private elementary, middle, and high schools located within a 50-mi (80-km) radius of the Seedco site (FEMA, 2007).

There are approximately 140 public and private airports located within a 50-mi (80-km) radius of the Seedco site. Based on 2009 data, eight airports are located in Northumberland County (USGS, 2009e).

There are approximately 369 parks located within a 50-mi (80-km) radius of the Seedco site, which includes 68 state game lands, 25 state parks and forests, 181 local parks and preserves, 8 recreational areas, 36 playgrounds, 31 fields, courts and stadiums, and 20 other sites, including community centers and facilities, camps, museums, gardens, and historic and cultural sites. A total of 12 parks are located in Northumberland County, which includes 5 state game lands, 2 state parks, 4 local parks, and 1 stadium. (USGS, 2009f)

For the purposes of evaluating the impact on availability of a construction workforce, housing, and public services, an approach was used similar to that used for the BBNPP. As discussed in ER Section 4.4.2.2.1, an estimated maximum of 3,950 construction workers is anticipated for the BBNPP site. A similar workforce is assumed to be needed for construction of the proposed new unit at the Seedco site. A range of in-migration between 20 and 35 percent, consistent with ER Section 4.4.2.1, was assumed. Based on these in-migration scenarios, between 1,706 and

2,986 additional people would migrate into the region of influence. These estimates include the direct workforce and family members. For comparison purposes, an assessment was made assuming the same level of in-migration for the host county. Given that Northumberland County had a population of 91,003 people in 2007, the population increase due to in-migration of construction workers and their families would represent an increase of between 1.9 and 3.3 percent.

Metropolitan and non-metropolitan area estimates from the DOL, BLS, were reviewed for construction occupation data within 50 mi (80 km) of the Seedco site. If the 50-mi (80-km) radius encroached into a portion of a metropolitan and non-metropolitan area, the total construction occupation numbers for the metropolitan and non-metropolitan area were included in the analysis. According to May 2008 data, the construction workforce required for the project would represent approximately 4 percent of the total construction workforce in the area (DOL, 2008).

Datasets from 2005 were reviewed to determine the number of housing units currently vacant within a 50-mi (80 km) radius of the Seedco site. Based on this information, an assessment was made to determine if there appears to be adequate housing units available to address the influx of a workforce required to support the proposed new unit at the Seedco site during its construction and operation. According to the data, a total of 125,072 housing units are vacant or not occupied within a 50-mi (80-km) radius of the Seedco site. A total of 4,329 housing units are vacant in Northumberland County. (ESRI, 2009c) Applying the 20 to 35 percent in-migration analysis and data for the BBNPP from Tables 4.4-7 and 4.4-8, an estimated 688 to 1,204 direct workers (households) would migrate into the county. As a result, the increase in housing demand in Northumberland County would be less than the existing availability of housing units within the 50-mi (80-km) radius.

The distance to population centers greater than 25,000 people in size was also assessed to determine the probable availability of shopping and other services for the construction and operation workforce. The nearest population center is Harrisburg, Pennsylvania, which is approximately 38 mi (61 km) away (ESRI, 2009d).

According to the USEPA, Northumberland County has 13 community PWSs, which are defined by the PADEP as a "system that provides piped water for human consumption to at least 15 service connections or serves an average of at least 25 people for at least 60 days each year. PWSs can be community, non-transient non-community, or transient non-community systems" (PADEP, 2009c). These 13 systems provide treated water to over 86,000 people throughout Northumberland County. Three of these systems use surface water as the primary water source, while eight use groundwater and two use groundwater that is under the influence of surface water. (USEPA, 2009d) In addition, Northumberland County has 5 major and 14 minor public (municipal) wastewater/sanitary sewer treatment plants. The total wastewater flow to these 19 municipal public sewer systems within Northumberland County is approximately 19.6 MGD (74.2 mld). (PADEP, 2009d) Given the availability of existing vacant housing in the county and the within the 50-mi (80-km) radius of the site, it is unlikely that the in-migration associated with the construction would have any significant impact on water supply or sewage.

An increase in tax revenues in Northumberland County is to be expected from the construction and operation of the proposed new unit at the Seedco site. Actual tax revenues for Northumberland County in fiscal year 2006 totaled $14.8 million (PA GCLGS, 2006). While the actual increase in tax revenues from a new unit is yet unknown, the increase would be

comparable to that at the BBNPP site. Most people consider large tax payments a benefit to the taxing entity because they support the development of infrastructure that supports further economic development and growth.

The introduction of large plumes from the cooling towers into the skies where there are currently no plumes of this magnitude has the potential to adversely affect the character and quality of views in the area surrounding the Seedco site. These plumes from the proposed new unit at the Seedco site would likely be visible at a considerable distance.

Based on the above information, socioeconomic adverse and beneficial impacts associated with construction activities would be SMALL to MODERATE due to the percent increase of population into the area and its resulting potential impact on housing and public services, and tax revenue. Adverse impacts associated with operation activities would be MODERATE due to the impacts on the character and quality of views in the area. Beneficial impacts associated with operation activities would be SMALL to LARGE due to the annual taxes and revenue generated by the new workers contributing to the local economy and the productivity of the region.

9.3.2.4.7 Transportation

The Seedco site is located northeast of Pennsylvania State Highway 901 and south of State Highway 61. The anticipated area of construction is currently undeveloped and would require the construction of new roads to access the site.

Barge access is not possible at or within 5 mi (8 km) of the Seedco site (World Port Source, 2009). There is an existing Conrail freight rail line at the Seedco site, which runs along the western edge of the site (ESRI, 2009a). Extensions and/or upgrades to the existing rail spur would be required to access the site. Planning for roadway and railroad upgrades would be made in the context of future decisions regarding the optimum methods for transporting large and heavy components to the Seedco site.

At the reconnaissance-level of this evaluation, engineering design of the access roads to the site has not been performed. However, a conceptual route for the access road would extend north from the northeast border of the Seedco site to State Highway 61 for approximately 0.5 mi (0.8 km). A conceptual route for the rail spur would extend west from the western border of the Seedco site to the existing Conrail line for approximately 0.3 mi (0.5 km). Impacts associated with construction of the access road and rail spur are anticipated to be temporary in nature.

There would be short-term traffic impacts on State Highways 901 and 61 due to the transportation of construction materials and workers during construction and limited long-term traffic impacts during operation activities. These impacts would primarily be due to increased traffic volumes during shift changes. The development of a traffic management plan prior to construction would aid in identifying and mitigating potential traffic impacts. The following mitigation measures would be considered in developing a traffic management plan:

- Workforce shift changes and delivery options: Scheduling shift changes and the delivery of large items during off peak hours could reduce potential traffic impacts on local roads.

- Carpooling: The use of carpooling and providing transit services (buses) during construction and operation of the facility could reduce potential traffic congestion impacts on local roads.
- Coordination with local planning authorities: If necessary, the upgrading of local roads, intersections, and signals to handle increased traffic loads could reduce potential traffic impacts on local roads.

Implementing the appropriate mitigation measures identified above would result in SMALL to MODERATE impacts on transportation during construction activities, and a SMALL impact during operation of the proposed new unit at the Seedco site.

9.3.2.4.8 Historic, Cultural, and Archaeological Resources

Northumberland County was established in 1772. Early settlers included soldiers and families who moved to the area after the French and Indian War. The Seedco site lies near the North Branch of the Susquehanna River, an important means of transportation for early county residents. As the time passed, railroads replaced the river as the primary mode of transportation. Coal mining was very important to Northumberland County, and the railroads were constructed to provide a more efficient method to move coal to state and national markets. Coal remained the most important industry in Northumberland County until the middle of the twentieth century (Northumberland County, 2009).

Agriculture was important to success of settlers in the early years of Northumberland County, who raised crops for subsistence and trading. As the area became more established, Northumberland farmers began to mechanize their farms, reflecting the availability of iron in the region. As transportation methods improved, farmers were able to ship bulk crops to other regions more efficiently. Agriculture continues to be an important industry in Northumberland County (Northumberland County, 2009).

The Seedco site is located in Northumberland County and is within 5 mi (8 km) of Columbia County. Based on NRHP data, there are two NRHP-listed properties in Northumberland County that are within 5 mi (8 km) of the site, neither of which are less than 1 mi (1.6 km) from the site. These two resources are known as the Richards Covered Bridge and the Kreigbaum Covered Bridge. There are no NRHP-listed historic districts in Northumberland County within 5 mi (8 km) of the site. There are no NRHP-listed properties or NRHP-listed historic districts in Columbia County that are within 5 mi (8 km) of the site. (NRHP, 2009b; NRHP, 2009d; Google Earth, 2009).

A complete cultural resources investigation of historic, cultural and archaeological resources would be necessary before construction activities began. This work would be conducted in coordination with the PMHC and should any significant cultural resources be identified, appropriate mitigation measures would be developed prior to construction and operation activities.

Impacts on cultural resources, including historic and archaeological resources, associated with construction and operation activities are anticipated to be SMALL because no NRHP-listed properties or NRHP-listed historic districts are located within 1 mi (1.6 km) of the site and only two NRHP-listed historic properties are located within 5 mi (8 km) of the site.

9.3.2.4.9 Environmental Justice

The demographic characteristics surrounding the Seedco site were evaluated to determine the potential for disproportionate impacts on minority or low income populations. Demographic information used for this study was obtained from 2000 USCB data (USCB, 2000d). Within the 50-mi (80-km) radius of the Seedco site, there were 1,681 census block groups located in the Commonwealth of Pennsylvania (Table 9.3-6). Of these 1,681 census block groups, 133 were classified as having aggregate minority populations. Within the census block groups classified as having aggregate minority populations, a total of 76 were Black (African American) minority populations, with a majority (57) located in Dauphin County. The region of influence includes Northumberland, Columbia, and Schuylkill counties.

Of the 94 census block groups in Northumberland County, 1 was classified as having an aggregate minority population, which was a Black (African-American) minority population. Of the 55 census block groups in Columbia County, none were classified as having a minority population. Of the 145 census block groups in Schuylkill County, 2 were classified as having an aggregate minority population, which were Black (African American) minority populations. Northumberland, Columbia, and Schuylkill counties had no Hispanic populations. Figures 9.3-34 through 9.3-37 present census block groups with minority populations within the 50-mi (80-km) radius of the Seedco site that met the criteria stated in ER Section 9.3.2.2.9. A figure is not provided if a single minority population did not exceed the criteria; therefore, only figures for Black (African American), other race, total aggregate, and Hispanic minority populations have been provided for the Seedco site.

A total of 12 census block groups classified as low income were located within the 50-mi (80-km) radius and the majority (6) was located in Berks County. Northumberland, Columbia, and Schuylkill counties each had one census block group classified as low income. Figure 9.3-38 presents census block groups with low income populations within the 50-mi (80-km) radius of the Seedco site that met the criteria stated in ER Section 9.3.2.2.9.

Based on the data presented in Table 9.3-6, the percent of minority and low income populations within close proximity to the Seedco site is low. Any adverse human health and environmental consequences from construction and operation of the proposed new unit at the Seedco site would not be borne disproportionately by minority or low income groups. Overall environmental justice impacts are anticipated to be SMALL.

9.3.2.4.10 Transmission Corridors

There are four existing 500-kV transmission lines available for possible interconnection to the Seedco site; one is 9.2 mi (14.8 km) north of the site, one is 16.3 mi (26.2 km) west of the site, and the other two are 25.8 mi (41.5 km) south of the site. There is one existing 230-kV transmission line within 5 mi (8 km) of the Seedco site, and there are five 230-kV transmission lines between 5 mi (8 km) and 20 mi (32 km) of the Seedco site (Platts, 2009).

As there is no existing substation near the Seedco site, new transmission line ROW would need to be constructed to reach the nearest potential substation location. At the reconnaissance-level of this evaluation, engineering design of the transmission line has not been performed. However, a conceptual route for the transmission line would extend east-northeast from the eastern boundary of the Seedco site for approximately 9.0 mi (14.5 km), where 14.6 mi

(23.5 km) of existing 230-kV transmission ROW would be expanded, then travel north-northwest to reach the closest potential substation location. A review of publicly available online data indicates that most transmission corridors generally pass through land that is primarily agricultural and forest land. The areas surrounding the Seedco site are mostly rural and remote with low population densities. The new transmission lines would cross numerous highways. The effect of these corridors on land usage would be minimal; farmlands that have corridors passing through them would generally continue to be used as farmland. As new and expanded ROW would need to be constructed to accommodate the new transmission lines, it is anticipated that there would be ecological impacts from the development of new transmission corridors. A detailed discussion of the terrestrial and aquatic ecology impacts from the construction of new transmission corridors is provided in ER Sections 9.3.2.4.4 and 9.3.2.4.5, respectively. Utilization of existing transmission corridor ROWs could present opportunities to minimize adverse impacts. Specific monitoring requirements for upgrades to transmission lines and corridors would be designed to meet conditions of applicable federal, state, and local permits to minimize adverse environmental impacts and to ensure that organisms are protected against potential construction-related impacts.

Operation activities within the transmission corridors might include visual inspection and appropriate maintenance of transmission line ROWs. Maintenance activities could include re-clearing vegetation, tree trimming/removal, and encroachment licensing/removal. For maintenance purposes, wooded sections of the ROWs would be re-cleared to the full width through mechanical clearing, hand cutting, or herbicide application. Herbicide applications would only be used on an occasional basis, if at all.

Due to the construction and operation of new transmission corridors, construction and operation transmission impacts are anticipated to be SMALL to MODERATE.

9.3.3 SUMMARY AND CONCLUSIONS

PPL has implemented the site selection process discussed in the above sections to select a *Proposed Site* for the location of a nuclear power generating facility within the identified ROI. The results of that selection process identified the BBNPP, located in Luzerne County, Pennsylvania, as the *Proposed Site*.

The detailed site evaluations are contained in the BBNPP Alternative Site Evaluation (UniStar, 2009). Table 9.3-10 compares the weighted numerical scores of the Candidate Sites derived from the above referenced Alternative Site Evaluation. Table 9.3-7 is a summary comparison of the *Proposed Site* and *Alternative Sites* using the NRC three-level standard of significance. As summarized in Table 9.3-7, the evaluation and comparison of the *Alternative Sites* to the *Proposed Site* verified that none of the *Alternative Sites* is "Environmentally Preferred," and thus "Obviously Superior," to the selected *Proposed Site*. Therefore, the BBNPP site is the candidate site submitted to the NRC by the applicant as the proposed location for a new nuclear power generating station.

The advantages of the BBNPP site over the *Alternative Sites* are summarized as follows:

- The postulated consumptive use of water by a new unit at the BBNPP site would be no greater than water use at the *Alternative Sites*.

- The impacts of development of a new unit at the *Proposed Site* on endangered species are no greater than impacts postulated for the *Alternative Sites.*
- No federal, state, or Native American tribal lands are affected by the *Proposed Site.*
- The BBNPP site does not contain any identified spawning and/or nesting grounds for any threatened or endangered species. Thus the impacts on spawning or nesting areas are no greater than impacts at the *Alternative Sites.*
- Locating the BBNPP immediately adjacent to an existing nuclear facility would have lesser land use impacts than locating the site at an alternative greenfield site. Therefore, land use impacts would be no greater than the impacts at the *Alternative Sites.*
- The potential impacts of a new nuclear facility on terrestrial and aquatic ecology at the BBNPP would be no greater than at the *Alternative Sites.*
- The BBNPP site is located less than 1 mi from an existing 500 kV line and can be connected to the 500 kV switchyard. Therefore, transmission impacts would be no greater than at the *Alternative Sites.*
- The BBNPP site is in a generally rural area that has a population density less than 300 ppsm.

Overall, the *Alternative Sites* do not offer environmental advantages over the BBNPP site. In addition, operational experience at the adjacent SSES has shown that the environmental impacts are SMALL and operation of the new unit is expected to have essentially the same or less environmental impacts.

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Table 9.3-1 State and Federal Threatened and Endangered Species in Montour County, Pennsylvania

Scientific Name	Common Name	State Status	Proposed Status	Federal Status
		Plants		
Carex retrorsa	Backward Sedge	PE	PE	-
Carex typhina	Cattail Sedge	PE	PT	-
Dodecatheon radicatum	Jeweled Shooting-star	PT	PT	-
Lysimachia hybrida	Lance-leaf Loosestrife	N	PT	-
Pinus echinata	Short-leaf Pine	N	PT	-
Platanthera hookeri	Hooker's Orchid	TU	PE	-
Trichostema setaceum	Blue-curls	PE	PE	-
Triosteum angustifolium	Horse-gentian	TU	PE	-
		Birds		
Cistothorus palustris	Marsh Wren	-	CR	-
Falco peregrinus	Peregrine Falcon	PE	PE	-
Haliaeetus leucocephalus	Bald Eagle	PT	PT	-
Porzana carolina	Sora	-	CR	-
Tyto alba	Barn Owl	-	CR	-
		Mollusks		
Lampsilis cariosa	Yellow Lampmussel	-	CU	-

Notes:

State

PE Pennsylvania Endangered
PT Pennsylvania Threatened
PR Pennsylvania Rare
PX Pennsylvania Extirpated
PV Pennsylvania Vulnerable
PC Animals that could become endangered or threatened in the future.
CP Candidate Proposed
CA Candidate at Risk
CR Candidate Rare
CU Condition Undetermined
TU Tentatively Undetermined
N No current legal status exists, but is under review for future listing.

Federal

LE Listed Endangered
LT Listed Threatened

Sources: PNHP, 2009a; PNHP, 2009b; PNHP, 2009c; PNHP, 2009d

Table 9.3-2 Census Block Groups within 50 mi (80 km) of the Montour Site with Minority and Low Income Populations

	Number of Minority Census Block Groups									
State/County	Total Census Block Groups	Black	American Indian or Alaskan Native	Asian	Native Hawaiian or Other Pacific Islander	Some Other Race	Multi-Racial	Aggregate (Total)[1]	Hispanic[2]	Number of Low Income Census Block Groups
Pennsylvania										
Berks	12	0	0	0	0	0	0	0	0	0
Bradford	33	0	0	0	0	0	0	0	0	0
Carbon	25	0	0	0	0	0	0	0	0	0
Centre	10	0	0	0	0	0	0	0	0	0
Clinton	35	0	0	0	0	0	0	0	0	0
Columbia[3]	55	0	0	0	0	0	0	0	0	1
Dauphin	27	0	0	0	0	0	0	0	0	0
Juniata	11	0	0	0	0	0	0	0	0	0
Lackawanna	2	0	0	0	0	0	0	0	0	0
Lebanon	14	0	0	0	0	0	0	0	0	0
Lehigh	1	0	0	0	0	0	0	0	0	0
Luzerne	310	3	1	0	0	0	0	5	0	0
Lycoming	115	8	0	0	0	0	0	9	0	0
Mifflin	5	0	0	0	0	0	0	0	0	0
Montour[3]	14	0	0	0	0	0	0	0	0	0
Northumberland[3]	94	1	0	0	0	0	0	1	0	1
Perry	15	0	0	0	0	0	0	0	0	0
Schuylkill	145	2	0	0	0	0	0	2	0	1
Snyder	29	0	0	0	0	0	0	0	0	0
Sullivan	6	0	0	0	0	0	0	0	0	0
Susquehanna	2	0	0	0	0	0	0	0	0	0
Tioga	10	0	0	0	0	0	0	0	0	0
Union	26	2	0	0	0	0	0	2	0	0

Table 9.3-2 Census Block Groups within 50 mi (80 km) of the Montour Site with Minority and Low Income Populations

	Number of Minority Census Block Groups									
State/County	Total Census Block Groups	Black	American Indian or Alaskan Native	Asian	Native Hawaiian or Other Pacific Islander	Some Other Race	Multi-Racial	Aggregate (Total)[1]	Hispanic[2]	Number of Low Income Census Block Groups
Wyoming	19	0	0	0	0	0	0	0	0	0
TOTAL	**1015**	**16**	**1**	**0**	**0**	**0**	**0**	**19**	**0**	**3**

Notes:

(1) The aggregate or total minority census block group is the total of all minorities (Black, American Indian or Alaskan Native, Asian, Native Hawaiian, or Pacific Islander, Some Other Race, or Multi-Racial) that exceeds the NRC threshold for minority.

(2) A person of Hispanic/Latino origin may be of any race, and therefore may also be included in the aggregate racial minority percentage.

(3) Montour, Columbia, and Northumberland counties are the Region of Influence for socioeconomic impact analysis.

Source: USCB, 2000d

Table 9.3-3 State and Federal Threatened and Endangered Species in Luzerne County, Pennsylvania

Scientific Name	Common Name	State Status	Proposed Status	Federal Status
	Plants			
Aletris farinosa	Colic-root	TU	PE	-
Alopecurus aequalis	Short-awn Foxtail	N	PT	-
Amelanchier humilis	Serviceberry	TU	PE	-
Amelanchier obovalis	Coastal Juneberry	TU	PE	-
Amelanchier sanguinea	Roundleaf Serviceberry	TU	PE	-
Aristida purpurascens	Arrow-feathered Three Awned	PT	PT	-
Asclepias variegata	White Milkweed	TU	PE	-
Baptisia australis	Blue False-indigo	N	PT	-
Bouteloua curtipendula	Tall Gramma	PT	PT	-
Bromus kalmii	Brome Grass	N	PT	-
Carex bicknellii	Bicknell's Sedge	PE	PE	-
Carex limosa	Mud Sedge	TU	PT	-
Carex oligosperma	Few-seeded Sedge	PT	PT	-
Carex polymorpha	Variable Sedge	PE	PT	-
Carex siccata	A Sedge	N	PE	-
Chenopodium foggii	Fogg's Goosefoot	PE	PE	-
Cladium mariscoides	Twig Rush	PE	PE	-
Coeloglossum viride	Long-bracted Green Orchid	TU	PE	-
Cuscuta coryli	Hazel Dodder	TU	PT	-
Cyperus diandrus	Umbrella Flatsedge	PE	PE	-
Cypripedium calceolus var. parviflorum	Small Yellow Lady's-slipper	PE	PE	-
Dryopteris clintoniana	Clinton's Wood Fern	N	PT	-
Elatine aamericana	Long-stemmed Water-wort	PX	PE	-
Eriophorum tenellum	Rough Cotton-grass	PE	PE	-
Eurybia radula	Rough-leaved Aster	N	PT	-
Helianthemum bicknellii	Bicknell's Hoary Rockrose	PE	PE	-

Table 9.3-3 State and Federal Threatened and Endangered Species in Luzerne County, Pennsylvania

Scientific Name	Common Name	State Status	Proposed Status	Federal Status
Hieracium umbellatum	Umbellate Hawkweed	N	PE	-
Juncus militaris	Bayonet Rush	PE	PE	-
Liatris scariosa	Round-head Gayfeather	N	PT	-
Linum sulcatum	Grooved Yellow Flax	PE	PE	-
Lonicera hirsuta	Hairy Honeysuckle	TU	PE	-
Malaxis bayardii	Bayard's Malaxis	PR	PE	-
Megalodonta beckii	Beck's Water-marigold	PE	PE	-
Minuartia glabra	Appalachian Sandwort	PT	PT	-
Muhlenbergia uniflora	Fall Dropseed Muhly	PE	PT	-
Myriophyllum heterophyllum	Broad-leaved Water-milfoil	PE	SP	-
Oryzopsis pungens	Slender Mountain-ricegrass	PE	PE	-
Panicum xanthophysum	Slender Panic-grass	PE	PE	-
Platanthera blephariglottis	White Fringed-orchid	N	PE	-
Platanthera ciliaris	Yellow-fringed Orchid	TU	PT	-
Poa languida	Drooping Bluegrass	TU	PT	-
Poa paludigena	Bog Bluegrass	PT	PR	-
Polemonium vanbruntiae	Jacob's-ladder	PE	PE	-
Polystichum braunii	Braun's Holly Fern	PE	PE	-
Potamogeton confervoides	Tuckerman's Pondweed	PT	PT	-
Potamogeton gramineus	Grassy Pondweed	PE	PE	-
Potamogeton oakesianus	Oakes' Pondweed	TU	PE	-
Potamogeton vaseyi	Vasey's Pondweed	PE	PE	-
Potentilla tridentata	Three-toothed Cinquefoil	PE	PE	-
Prunus pumila var. susquehanae		-	PT	-
Ranunculus fascicularis	Tufted Buttercup	PE	PE	-
Ribes lacustre	Swamp Currant	TU	PE	-
Scheuchzeria palustris	Pod-grass	PE	PE	-
Schoenoplectus torreyi	Torrey's Bulrush	PE	PE	-

Table 9.3-3 State and Federal Threatened and Endangered Species in Luzerne County, Pennsylvania

Scientific Name	Common Name	State Status	Proposed Status	Federal Status
Solidago rigida	Hard-leaved Goldenrod	TU	PE	-
Sparganium angustifolium	Bur-reed	N	PT	-
Streptopus amplexifolius	White Twisted-stalk	PT	PE	-
Utricularia cornuta	Horned Bladderwort	N	PT	-
Utricularia intermedia	Flat-leaved Bladderwort	PT	PT	-
	Birds			
Accipiter gentilis	Northern Goshawk	-	CR	-
Botaurus lentiginosus	American Bittern	PE	PE	-
Catharus ustulatus	Swainson's Thrush	-	CR	-
Circus cyaneus	Northern Harrier	-	CA	-
Cistothorus palustris	Marsh Wren	-	CR	-
Empidonax flaviventris	Yellow-bellied Flycatcher	PE	PE	-
Falco peregrinus	Peregrine Falcon	PE	PE	-
Gallinago delicata	Wilson's Snipe	-	CR	-
Haliaeetus leucocephalus	Bald Eagle	PT	PT	-
Nycticorax nycticorax	Black-crowned Night-heron	PE	PE	-
Pandion haliaetus	Osprey	PT	PT	-
Porzana carolina	Sora	-	CR	-
	Mammals			
Glaucomys sabrinus	Northern Flying Squirrel	PE	-	-
Lontra canadensis	Northern River Otter	-	CA	-
Microtus chrotorrhinus	Rock Vole	-	CA	-
Myotis leibii	Eastern Small-footed Myotis	PT	PT	-
Myotis septentrionalis	Northern Myotis	-	CR	-
Myotis sodalis	Indiana or Social Myotis	PE	PE	LE
Neotoma magister	Allegheny Woodrat	PT	PT	-
Sciurus niger vulpinus	Eastern Fox Squirrel	-	CR	-
Sorex palustris albibarbis	Water Shrew	-	CR	-

Table 9.3-3 State and Federal Threatened and Endangered Species in Luzerne County, Pennsylvania

Scientific Name	Common Name	State Status	Proposed Status	Federal Status
	Reptiles			
Crotalus horridus	Timber Rattlesnake	PC	CA	-
	Fish			
Umbra pygmaea	Eastern Mudminnow	PC	CP	-
	Mollusks			
Anodonta implicata	Alewife Floater	-	CU	-
Lampsilis cariosa	Yellow Lampmussel	-	CU	-

Notes:

State

PE Pennsylvania Endangered
PT Pennsylvania Threatened
PR Pennsylvania Rare
PX Pennsylvania Extirpated
PV Pennsylvania Vulnerable
PC Animals that could become endangered or threatened in the future.
CP Candidate Proposed
CA Candidate at Risk
CR Candidate Rare
CU Condition Undetermined
TU Tentatively Undetermined
N No current legal status exists, but is under review for future listing.

Federal

LE Listed Endangered
LT Listed Threatened

Sources: PNHP, 2009a; PNHP, 2009b; PNHP, 2009c; PNHP, 2009d

Table 9.3-4 Census Block Groups within 50 mi (80 km) of the Humboldt Industrial Park with Minority and Low Income Populations

	Number of Minority Census Block Groups									
State/County	Total Census Block Groups	Black	American Indian or Alaskan Native	Asian	Native Hawaiian or Other Pacific Islander	Some Other Race	Multi-Racial	Aggregate (Total) [1]	Hispanic[2]	Number of Low Income Census Block Groups
New Jersey										
Warren	26	0	0	0	0	0	0	0	0	0
Pennsylvania										
Berks	262	6	0	0	0	31	0	53	51	6
Bradford	6	0	0	0	0	0	0	0	0	0
Bucks	14	0	0	0	0	0	0	0	0	0
Carbon [3]	48	0	0	0	0	0	0	0	0	0
Columbia	55	0	0	0	0	0	0	0	0	1
Dauphin	18	0	0	0	0	0	0	0	0	0
Juniata	1	0	0	0	0	0	0	0	0	0
Lackawanna	183	0	0	0	0	0	0	4	0	2
Lancaster	19	0	0	0	0	0	0	0	0	0
Lebanon	75	0	0	0	0	0	0	3	5	0
Lehigh	236	2	0	1	0	17	0	42	33	3
Luzerne [3]	314	3	0	0	0	0	0	4	0	0
Lycoming	35	1	0	0	0	0	0	1	0	0
Monroe	69	0	0	0	0	0	0	3	0	0
Montgomery	28	0	0	0	0	0	0	0	0	0
Montour	14	0	0	0	0	0	0	0	0	0
Northampton	192	2	0	0	0	7	0	15	14	2
Northumberland	94	1	0	0	0	0	0	1	0	1
Pike	4	0	0	0	0	0	0	0	0	0
Schuylkill [3]	145	2	0	0	0	0	0	2	0	1
Snyder	20	0	0	0	0	0	0	0	0	0
Sullivan	6	0	0	0	0	0	0	0	0	0
Susquehanna	3	0	0	0	0	0	0	0	0	0
Union	19	2	0	0	0	0	0	2	0	0
Wayne	11	0	0	0	0	0	0	0	0	0

Table 9.3-4 Census Block Groups within 50 mi (80 km) of the Humboldt Industrial Park with Minority and Low Income Populations

	Number of Minority Census Block Groups									
State/County	Total Census Block Groups	Black	American Indian or Alaskan Native	Asian	Native Hawaiian or Other Pacific Islander	Some Other Race	Multi-Racial	Aggregate (Total) [1]	Hispanic[2]	Number of Low Income Census Block Groups
Wyoming	23	0	0	0	0	0	0	0	0	0
TOTAL	**1920**	**19**	**0**	**1**	**0**	**55**	**0**	**130**	**103**	**16**

Notes:

[1] The aggregate or total minority census block group is the total of all minorities (Black, American Indian or Alaskan Native, Asian, Native Hawaiian, or Pacific Islander, Some Other Race, or Multi-Racial) that exceeds the NRC threshold for minority.

[2] A person of Hispanic/Latino origin may be of any race, and therefore may also be included in the aggregate racial minority percentage.

[3] Carbon, Luzerne, and Schuylkill counties are the Region of Influence for socioeconomic impact analysis.

Source: USCB, 2000d

Table 9.3-5 State and Federal Threatened and Endangered Species in Northumberland County, Pennsylvania

Scientific Name	Common Name	State Status	Proposed Status	Federal Status
		Plants		
Alisma triviale	Northern Water-plantain	PE	PE	-
Carex bullata	Bull Sedge	PE	PE	-
Carex longii	Long's Sedge	TU	PT	-
Carex lupuliformis	False Hop Sedge	TU	PE	-
Cuscuta polygonorum	Smartweed Dodder	TU	PT	-
Dodecatheon radicatum	Jeweled Shooting-star	PT	PT	-
Juncus biflorus	Grass-leaved Rush	TU	PT	-
Juncus scirpoides	Scirpus-like Rush	PE	PE	-
Lipocarpha micrantha	Common Hemicarpa	PE	PE	-
Ludwigia polycarpa	False Loosestrife Seedbox	PE	PE	-
Lysimachia hybrida	Lance-leaf Loosestrife	N	PT	-
Monarda punctata	Spotted Bee-balm	PE	PE	-
Platanthera ciliaris	Yellow-fringed Orchid	TU	PT	-
Solidago rigida	Hard-leaved Goldenrod	TU	PE	-
		Birds		
Asio otus	Long-eared Owl	-	CU	-
Bartramia longicauda	Upland Sandpiper	PT	PT	-
Botaurus lentiginosus	American Bittern	PE	PE	-
Cistothorus palustris	Marsh Wren	-	CR	-
Cistothorus platensis	Sedge Wren	PE	PE	-
Falco peregrinus	Peregrine Falcon	PE	PE	-
Gallinula chloropus	Common Moorhen	-	CA	-
Haliaeetus leucocephalus	Bald Eagle	PT	PT	-
Ixobrychus exilis	Least Bittern	PE	PE	-
Porzana carolina	Sora	-	CR	-
Tyto alba	Barn Owl	-	CR	-
		Mammals		
Myotis leibii	Eastern Small-footed Myotis	PT	PT	-

Table 9.3-5 State and Federal Threatened and Endangered Species in Northumberland County, Pennsylvania

Scientific Name	Common Name	State Status	Proposed Status	Federal Status
Myotis septentrionalis	Northern Myotis	-	CR	-
Reptiles				
Crotalus horridus	Timber Rattlesnake	PC	CA	-
Amphibians				
Scaphiopus holbrookii	Eastern Spadefoot	PE	PE	-
Mollusks				
Lampsilis cariosa	Yellow Lampmussel	-	CU	-
Lasmigona subviridis	Green Floater	-	CU	-

Notes:

State

PE Pennsylvania Endangered
PT Pennsylvania Threatened
PR Pennsylvania Rare
PX Pennsylvania Extirpated
PV Pennsylvania Vulnerable
PC Animals that could become endangered or threatened in the future.
CP Candidate Proposed
CA Candidate at Risk
CR Candidate Rare
CU Condition Undetermined
TU Tentatively Undetermined
N No current legal status exists, but is under review for future listing.

Federal

LE Listed Endangered
LT Listed Threatened

Sources: PNHP, 2009d; PNHP, 2009i; PNHP, 2009j; PNHP, 2009k

Table 9.3-6 Census Block Groups within 50 mi (80 km) of the Seedco Industrial Park with Minority and Low Income Populations

	Number of Minority Census Block Groups									
State/County	Total Census Block Groups	Black	American Indian or Alaskan Native	Asian	Native Hawaiian or Other Pacific Islander	Some Other Race	Multi-Racial	Aggregate (Total)[1]	Hispanic[2]	Number of Low Income Census Block Groups
Pennsylvania										
Berks	237	3	0	0	0	31	0	52	51	6
Carbon	48	0	0	0	0	0	0	0	0	0
Centre	3	0	0	0	0	0	0	0	0	0
Clinton	8	0	0	0	0	0	0	0	0	0
Columbia [3]	55	0	0	0	0	0	0	0	0	1
Cumberland	85	1	0	0	0	0	0	1	0	0
Dauphin	191	57	0	0	0	2	0	62	6	3
Juniata	15	0	0	0	0	0	0	0	0	0
Lancaster	147	0	0	0	0	0	0	0	0	0
Lebanon	85	0	0	0	0	0	0	2	5	0
Lehigh	35	0	0	0	0	0	0	0	0	0
Luzerne	265	3	0	0	0	0	0	4	0	0
Lycoming	112	7	0	0	0	0	0	7	0	0
Mifflin	4	0	0	0	0	0	0	0	0	0
Montour	14	0	0	0	0	0	0	0	0	0
Northampton	7	0	0	0	0	0	0	0	0	0
Northumberland [3]	94	1	0	0	0	0	0	1	0	1
Perry	32	0	0	0	0	0	0	0	0	0
Schuylkill [3]	145	2	0	0	0	0	0	2	0	1
Snyder	29	0	0	0	0	0	0	0	0	0
Sullivan	5	0	0	0	0	0	0	0	0	0
Union	26	2	0	0	0	0	0	2	0	0
Wyoming	3	0	0	0	0	0	0	0	0	0

Table 9.3-6 Census Block Groups within 50 mi (80 km) of the Seedco Industrial Park with Minority and Low Income Populations

	Number of Minority Census Block Groups									
State/County	Total Census Block Groups	Black	American Indian or Alaskan Native	Asian	Native Hawaiian or Other Pacific Islander	Some Other Race	Multi-Racial	Aggregate (Total)[1]	Hispanic[2]	Number of Low Income Census Block Groups
York	36	0	0	0	0	0	0	0	0	0
TOTAL	**1681**	**76**	**0**	**0**	**0**	**33**	**0**	**133**	**62**	**12**

Notes:

(1) The aggregate or total minority census block group is the total of all minorities (Black, American Indian or Alaskan Native, Asian, Native Hawaiian, or Pacific Islander, Some Other Race, or Multi-Racial) that exceeds the NRC threshold for minority.

(2) A person of Hispanic/Latino origin may be of any race, and therefore may also be included in the aggregate racial minority percentage.

(3) Northumberland, Columbia, and Schuylkill counties are the Region of Influence for socioeconomic impact analysis.

Source: USCB, 2000d

Table 9.3-7 Summary Comparison of Alternative Sites

Location	BBNPP Site	Montour Site	Humboldt Site	Seedco Site
Land Use	SMALL	SMALL	MODERATE	MODERATE
Air Quality	SMALL	SMALL	SMALL	SMALL
Water	SMALL to MODERATE	SMALL	SMALL	SMALL
Terrestrial Ecology	SMALL	SMALL	SMALL to MODERATE	SMALL
Aquatic Ecology	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Socioeconomics	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Historic, Cultural, and Archaeological Resources	SMALL	SMALL	SMALL	SMALL
Environmental Justice	SMALL	SMALL	SMALL	SMALL
Transmission Corridors	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Transportation	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Is this Site a Candidate Site?	Yes	Yes	Yes	Yes
Is this Candidate Site a Good Alternative Site to the Proposed Site?	Yes	Yes	Yes	Yes
Is the Site Environmentally Preferred?	Preferred alternative	No	No	No
Is the Site Obviously Superior?	Preferred alternative	No	No	No

Table 9.3-8 Site Ranking Criteria

Ranking Criteria[1]	Metric[2]	Scoring Basis[2]
1. Land use, including availability, and areas requiring special consideration		
1a. Ability to support the combined EPR footprint including the protected area, cooling towers, ponds, switchyard, construction support areas SCORED BY EXPERT PANEL[4]	Size and configuration of site	5 = No changes needed in layout and no restrictions for construction work area 3 = Limited changes needed in layout and/or some restrictions for construction work area 1 = Substantive changes needed in layout and/or substantive restrictions for construction work area
1b. Hazardous waste or spoils areas SCORED BY EXPERT PANEL[4]	Based on anticipated need for environmental remediation at the site or interconnects due to known current or previous uses (i.e. listed RCRA, CERCLIS, LUST or other designation)	5 = No/limited anticipated environmental remediation necessary 3 = Unknown if site needs environmental remediation 1 = Expected environmental remediation necessary
1c. Zoning SCORED BY EXPERT PANEL[4]	Compatibility with existing land use planning and proposed development	5 = Area zoned for industrial facilities/operations; no zoning restrictions; known ownership 3 = Area unzoned or unclear if zoning would be an issue; no known zoning restrictions for nuclear/industrial facilities; known ownership 1 = Area zoned for use other than industrial facilities/operations; likely zoning restrictions for nuclear/industrial facilities if zoning change is attempted; ownership unclear, or unknown
1d. Dedicated land SCORED BY EXPERT PANEL[4]	Distance to dedicated land (e.g., Federal, State, Tribal) from site	5 = No dedicated land within 10 mi of the site 3 = Dedicated land located greater than or equal to 5 but less than 10 mi of site 1 = Dedicated lands located within 5 mi of the site

Table 9.3-8 Site Ranking Criteria

Ranking Criteria[1]	Metric[2]	Scoring Basis[2]
1e. Topography SCORED BY EXPERT PANEL[4]	Site topography and resulting cut-and-fill requirements for construction	5 = Site topography is flat or has less than 50 feet of relief; no/limited cut-and-fill required. 3 = Site topography is hilly with greater than or equal to 50 feet but less than 100 feet of relief in the area to be developed; significant amounts of cut-and-fill required 1 = Site has steep topography with greater than 100 feet of relief in the area of the site to be developed
2. Hydrology, water quality, and water availability		
2a. Water Quality (chemistry) SCORED BY EXPERT PANEL[4]	Applicable State water quality standards (salt, brackish, fresh, polluted) as related to condenser CT cycles prior to blowdown	5 = Fresh water 4 = Fresh/Tidal water 3 = Oligohaline water 2 = Mesohaline water 1 = Salt or gray water

Table 9.3-8 Site Ranking Criteria

Ranking Criteria[1]	Metric[2]	Scoring Basis[2]
2b. Receiving Body Water Quality SCORED BY EXPERT PANEL[4]	Applicable State water quality classification Tier I, Tier II (as described and defined in COMAR 28.02.08.04-1) and Tier III (Outstanding National Resource Waters [ONRW] as described and defined in COMAR 28.02.08.04-2 for Maryland sites; State of Delaware Water Quality Standards as amended July 11, 2004 for Delaware sites; New Jersey Administrative Code 7:9B Surface Water Quality Standards for New Jersey sites; and Pennsylvania Code, Title 25, Chapter 93, Water Quality Standards for Pennsylvania sites)	**Maryland sites:** 5 = Tier 1 waters (i.e., no special state classification) 3 = Tier II waters (i.e., require antidegradation review of new or amended water/sewer plans and discharges) 1 = Tier III waters (i.e., ONRW) **Delaware sites:** 5 = Contact and recreation waters (primary and secondary), fish, aquatic life & wildlife waters, industrial water supply 3 = Public water supply source, agricultural water supply, cold water fish (put and take), harvestable shellfish waters 1 = Waters of exceptional recreational or ecological significance (ERES) **New Jersey sites:** 5 = Saline waters (i.e., saline estuarine categories 1, 2, & 3, saline coastal) 3 = Freshwaters (i.e., Category 2 freshwaters: trout status, trout production, trout maintenance, non-trout) 1 = Outstanding National Resource Waters (i.e., Category 1 freshwater, Pinelands waters [fresh and saline]) **Pennsylvania sites:** 5 = Recreation and fish consumption (i.e., boating, fishing, water contact sports, esthetics), industrial water supply, wildlife water supply 3 = Aquatic life and/or water supply (i.e., cold water fishery, warm water fishery, migratory fishes, trout stocking; potable water supply, livestock water supply, irrigation) 1 = Special Protection (i.e., high quality waters, exceptional value waters)

Table 9.3-8 Site Ranking Criteria

Ranking Criteria[1]	Metric[2]	Scoring Basis[2]
2c. Water Availability SCORED BY EXPERT PANEL[4]	Metric based on lowest 7-day average flow in a 10-year period (i.e., 7Q10) and need for 50 MGD water supply	5 = Source water body exceeds 7Q10 by 6-to 10% or equal to 10 times the needed volume for the annual requirement [182,500 MGD] 3 = Source water body exceeds 7Q10 by 2 to 5% or source water body is less than or equal to 5 times the needed volume for the annual requirement [91,250 MGD] 1 = Source water body 7Q10 does not meet 50 MGD or source water body is below needed volume for the annual requirement [18,250 MGD]
3. Terrestrial resources (including endangered species)		
3a. T&E habitats SCORED USING SCREENING DATA	Existence of mapped Federal and State T&E species habitat on or adjacent to site	5 = No T&E estimated habitat types onsite 3 = T&E estimated habitat types mapped within 1 mi of the site but not onsite 1 = T&E estimated habitat types onsite
3b. Floodplains SCORED USING SCREENING DATA	Existence of mapped Federal Emergency Management Area (FEMA) 100 or 500 year floodplain or State floodplain affecting site footprint	5 = No 100 or 500 year FEMA floodplain or State floodplain affecting approximate footprint of site 4 = 100 or 500 year FEMA floodplain or State floodplain affecting less than 10% of site footprint 3 = 100 or 500 year FEMA floodplain or State floodplain affecting 11% to 20% of site footprint 2 = 100 or 500 year FEMA floodplain or State floodplain affecting 21% to 30% of site footprint 1 = 100 or 500 year FEMA floodplain or State floodplain affecting greater than 30% of site footprint
4. Aquatic biological resources (including endangered species)		

Table 9.3-8 Site Ranking Criteria

Ranking Criteria[1]	Metric[2]	Scoring Basis[2]
4a. T&E habitats SCORED USING SCREENING DATA	Existence of mapped Federal and State T&E species habitat on or adjacent to site	5 = No T&E estimated habitat types onsite 3 = T&E estimated habitat types mapped within 1 mi of the site but not onsite 1 = T&E estimated habitat types onsite
4b. Thermal Discharge Sensitivity SCORED USING SCREENING DATA	Designated finfish/shellfish and/or other resource areas within intake or discharge waters	5 = No designated aquatic resources or habitats located within intake or discharge waters 3 = Designated warm water aquatic resources located within intake or discharge waters 1 = Designated cold water or marine aquatic resources located within intake or discharge waters
5. Socioeconomics (including aesthetics, demography, and infrastructure)		
5a. Emergency services SCORED BY EXPERT PANEL[4]	Availability of existing emergency services infrastructure (police, fire, emergency medical service (EMS), and hospital services) to support increased construction and operation workforce	5 = At least two or more of each full time police, fire, EMS, and hospital services within the county of the proposed site 3 = At least one of each police, fire, EMS, and hospital services within the county of the proposed site 1 = At least one of any of the services part-time or volunteer police, fire, EMS, and hospital services within the county of the proposed site. Some services (e.g., hospital may require flights to other communities).
5b. Construction traffic SCORED BY EXPERT PANEL[4]	Ability of existing transportation infrastructure to support construction traffic	5 = State route or interstate highway within 1 mi 3 = State route or interstate highway greater than 1 but less than 5 mi 1 = State route or interstate highway greater than 5 mi

Table 9.3-8 Site Ranking Criteria

Ranking Criteria[1]	Metric[2]	Scoring Basis[2]
5c. Construction workforce SCORED BY EXPERT PANEL[4]	Availability of local construction workforce based on State, County, or local planning, zoning and industrial development commission databases. Availability of suitable population within commuting distance from which to draw the construction workforce.	5 = Workforce needed represents less than 5% of construction workforce within 50-mi region. 3 = Workforce needed represents 5 to 20% of construction workforce within 50-mi region. 1 = Workforce needed represents greater than 20% of construction workforce within 50-mi region.
5d. Housing and necessities SCORED BY EXPERT PANEL[4]	Availability of housing units, shopping and other services to support the peak construction workforce	5 = Number of vacant housing units is greater than 10 times the projected peak construction workforce within the counties in a 50-mi radius of the site and population centers of 25,000 people or more are located within 5 mi of the site 3 = Number of vacant housing units is greater than 5 times but less than 10 times the projected peak construction workforce within the counties within a 50-mi radius of the site and population centers of 25,000 people or more are located within 10 mi of the site. 1 = Number of vacant housing units is less than 5 times the projected peak construction workforce within the counties in a 50 mi radius of the site and population centers of 25,000 people or more are located greater than 10 mi from site.

Table 9.3-8 Site Ranking Criteria

Ranking Criteria[1]	Metric[2]	Scoring Basis[2]
5e. Schools SCORED BY EXPERT PANEL[4]	Availability of existing schools to support increased construction and operation workforce	5 = Greater than 1,000 public and/or private high, middle, and elementary schools within a 50 mi radius of the site. 4 = 751 to 1,000 public and/or private high, middle, and elementary schools within a 50 mi radius of the site. 3 = 501 to 750 public and/or private high, middle, and elementary schools within a 50 mi radius of the site. 2 = 251 to 500 public and/or private high, middle, and elementary schools within a 50 mi radius of the site. 1 = Less than or equal to 250 public and/or private high, middle, and elementary schools) within a 50 mi radius of the site.

Table 9.3-8 Site Ranking Criteria

Ranking Criteria[1]	Metric[2]	Scoring Basis[2]
6. Environmental Justice (EJ)		
6a. Minority population SCORED USING SCREENING DATA	Presence of minority population within or abutting site	5 = Minority population in census block group (or adjacent census block group) less than 5 percent and minority population percentage in census block group less than 5 percentage points higher than county or state minority population percentage 4 = Minority population in census block group (or adjacent census block group) greater than 5 but less than 20 percent or minority population percentage in census block group greater than 5 but less than 10 percentage points higher than county or state minority population percentage 3 = Minority population in census block group (or adjacent census block group) greater than 20 but less than 35 percent or minority population percentage in census block group greater than 10 but less than 15 percentage points higher than county or state minority population percentage 2 = Minority population in census block group (or adjacent census block group) greater than 35 but less than 50 percent or minority population percentage in census block group greater than 15 but less than 20 percentage points higher than county or state minority population percentage 1 = Minority population in census block group (or adjacent census block group) greater than 50 percent or minority population percentage in census block group greater than 20 percentage points higher than county or state minority population percentage

Table 9.3-8 Site Ranking Criteria

Ranking Criteria[1]	Metric[2]	Scoring Basis[2]
6b. Low-income population SCORED USING SCREENING DATA	Presence of low-income population within or abutting site	5 = Low income population in census block group (or adjacent census block group) less than 5 percent and low income population percentage in census block group less than 5 percentage points higher than county or state low income population percentage 4 = Low income population in census block group (or adjacent census block group) greater than 5 but less than 20 percent or low income population percentage in census block group greater than 5 but less than 10 percentage points higher than county or state low income population percentage 3 = Low income population in census block group (or adjacent census block group) greater than 20 but less than 35 percent or low income population percentage in census block group greater than 10 but less than 15 percentage points higher than county or state low income population percentage 2 = Low income population in census block group (or adjacent census block group) greater than 35 but less than 50 percent or low income population percentage in census block group greater than 15 but less than 20 percentage points higher than county or state low income population percentage 1 = Low income population in census block group (or adjacent census block group) greater than 50 percent or low income population percentage in census block group greater than 20 percentage points higher than county or state low income population percentage
7. Historic and Cultural Resources		

Table 9.3-8 Site Ranking Criteria

Ranking Criteria[1]	Metric[2]	Scoring Basis[2]
7a. Historic buildings, structures, objects and sites SCORED USING SCREENING DATA	Distance to site and number of National Register of Historic Places (NRHP) listed buildings, structures, objects and sites	5 = 0 NRHP buildings, structures, objects and sites within 1 mi or less from site 3 = Less than 5 NRHP buildings, structures, objects and sites within >1 to 5 mi from site 1 = 5 or more NRHP buildings, structures, objects and sites within >1 to 5 mi from site
7b. Historic districts SCORED USING SCREENING DATA	Distance to mapped NRHP listed historic districts from site	5 = 0 historic districts within 1 mi or less from site 3 = 1 historic district within >1 to 5 mi from site 1 = Greater than 1 historic district within >1 to 5 mi from site
8. Air Quality (Climate & Meteorology)		
8a. Weather risks/conditions SCORED USING SCREENING DATA	Estimation of potential severe weather impacts on operation of a new nuclear station	5 = Area exposed to a low frequency of occurrence or less severe tornadoes[3] and/or hurricanes 4 = Low frequency of occurrence of potentially damaging storms 3 = Moderate frequency of occurrence of area storms 2 = High frequency of occurrence of less severe area storms 1 = Area exposed to a high frequency or more severe tornadoes[3] and/or hurricanes
8b. Prevention of Significant Deterioration (PSD) Class I Area, Attainment / Non-attainment Area SCORED USING SCREENING DATA	In or out of an attainment / non-attainment area and Prevention of Significant Deterioration (PSD) Class I area	5 = In attainment area and outside PSD Class I area 3 = In non-attainment area and not in PSD Class I area 1 = In non-attainment area and/or within PSD Class I area

Table 9.3-8 Site Ranking Criteria

Ranking Criteria[1]	Metric[2]	Scoring Basis[2]
9. Human Health		
9a. Emergency preparedness program– proximity of residences/businesses for exclusion zone SCORED BY EXPERT PANEL[4]	Ability to evacuate area around site in event of an emergency	5 = 25 or less residences or businesses within 1 mi of site, and no schools or hospitals within 1 mi of site 3 = Greater than 25 and less than or equal to 75 residences or businesses within 1 mi of site, and no schools or hospitals within 1 mi of site 1 = Greater than 75 residences or businesses within 1 mi of site, or one or more schools or hospitals within 1 mi of site
9b. Radiological Pathways – Water SCORED USING SCREENING DATA	Based on distance to drinking water supply from site (ground and surface)	5 = Distance to any primary source aquifer or public water supply intake greater than 5 mis from the site 4 = Distance to any primary source aquifer or public water supply intake greater than 3 mi but less than or equal to 5 mi from the site 3 = Distance to any primary source aquifer or public water supply intake greater than 2 mi but less than or equal to 3 mi from the site 2 = Distance to any primary source aquifer or public water supply intake greater than 1 mi but less than or equal to 2 mi from the site 1 = Distance to any primary source aquifer or public water supply intake less than 1 mi from the site

Table 9.3-8 Site Ranking Criteria

Ranking Criteria[1]	Metric[2]	Scoring Basis[2]
9c. Radiological Pathways – Food SCORED USING SCREENING DATA	Distance to food pathways (e.g., shellfish beds, farms,)	5 = Agricultural land (based on land use/zoning map) or shellfish beds (measured by distance to bay) greater than 5 mi from site 4 = Agricultural land or shellfish beds greater than 3 mi and less than or equal to 5 mi from site 3 = Agricultural land or shellfish beds greater than 2 mi and less than or equal to 3 mi from site 2 = Agricultural land or shellfish beds greater than 1 mi and less than or equal to 2 mi from site 1 = Agricultural land or shellfish beds less than or equal to 1 mi from site
10. Postulated Accidents		
10a. Distance to nearby potentially hazardous facilities SCORED USING SCREENING DATA	Distance to hazardous facilities (e.g., military facilities, such as munitions storage or ordnance test ranges; chemical plants; refineries; mining and quarrying operations; oil and gas wells; gas and petroleum product installations; or air, waterway, pipeline or rail transport facilities for hazardous materials) and major airports	5 = No potentially hazardous facilities within 5 mi from site or no major airports within 10 mi from site 3 = Potentially hazardous facilities greater than 2 mi but less than 5 mi from site or major airports 5 mi to less than 10 mi from site 1 = Potentially hazardous facilities less than or equal to 2 mi from site or major airports within 5 mi from site

Table 9.3-8 Site Ranking Criteria

Ranking Criteria[1]	Metric[2]	Scoring Basis[2]
11. Fuel Cycle Impacts (Transport of Radioactive Material)		
11a. Transport of nuclear fuel and wastes SCORED USING SCREENING DATA	Distance and route to low level disposal site(s) and spent fuel repository (i.e., Yucca Mountain) from site	5 = Site is adjacent to disposal sites. 4 = Distance to Yucca Mountain is less than 1000 mi, and distance to low-level waste disposal site(s) is less than 500 mi. 3 = Distance to Yucca Mountain is less than 2000 mi, and distance to low-level waste disposal site(s) is less than 1000 mi. 2 = Distance to Yucca Mountain is greater than 2000 mi, and distance to low-level waste disposal site(s) is greater than 1000 mi. 1 = Distance to Yucca Mountain is greater than 2000 mi, and distance to low-level waste disposal site(s) is greater than 1000 mi, AND population densities within first 10 mi of route(s) are greater than 2601 person/mi2.
12. Transmission corridors (land used, feasibility, and resources affected)		
12a. Environmental impact of proposed transmission interconnection SCORED BY EXPERT PANEL[4]	Length of proposed right-of-way (ROW) from site to point of transmission interconnection, including assessment of environmental impact (i.e., existing ROW vs. greenfield)	5 = 345 kV or greater transmission on site. 4 = Point of interconnection (POI) less than or equal to 5 mi with no existing ROW or less than or equal to 10 mi with existing ROW requiring expansion 3 = POI greater than 5 mi but less than or equal to 10 mi with no existing ROW or greater than 10 mi but less than or equal to 30 mi with existing ROW requiring expansion 2 = POI greater than 10 mi but less than or equal to 20 mi with no existing ROW or greater than or equal to 30 mi with existing ROW requiring expansion 1 = POI less than 30 mi with no existing ROW

Table 9.3-8 Site Ranking Criteria

Ranking Criteria[1]	Metric[2]	Scoring Basis[2]
13. Population distribution and density		
13a. Distance to population centers SCORED USING SCREENING DATA	Distance to population centers (i.e., US Census consolidated cities and incorporated places) of 25,000 or more persons from site	5 = No population centers within 20 mi 4 = One or more population centers greater than 15 mi but less than or equal to 20 mi 3 = One or more population centers greater than 10 mi but less than or equal to 15 mi 2 = One or more population centers greater than 5 mi but less than or equal to 10 mi 1 = One or more population centers within 5 mi
13b. Population density SCORED USING SCREENING DATA	Existing population density within 20 mi radius of site	5 = Population density within 20 mi radius less than or equal to 50 persons per square mile (ppsm) 4 = Population density within 20 mi radius greater than 50 ppsm but less than or equal to 200 ppsm 3 = Population density within 20 mi radius greater than 200 ppsm but less than or equal to 350 ppsm 2 = Population density within 20 mi radius greater than 350 ppsm but less than or equal to 500 ppsm 1 = Population density within 20 mi radius greater than 500 ppsm
14. Facility costs [Transportation Access]		
14a. Barge access and capacity – distance, construction, or upgrade requirements SCORED BY EXPERT PANEL[4]	Availability of nearest barge access or ability to construct new barge landing	5 = Viable barge access existing at site 3 = No existing barge access at site, but existing barge access within 5 mi or landing may be built at site 2 = No existing barge access at site but construction of a landing may be possible within 5 mi of site 1 = No barge access possible at or within 5 mi of site

Table 9.3-8 Site Ranking Criteria

Ranking Criteria[1]	Metric[2]	Scoring Basis[2]
14b. Rail line access and capacity – distance, spur requirements, line capacity, or upgrade requirements SCORED BY EXPERT PANEL[4]	Estimated distance and condition of nearest accessible active rail line	5 = Active rail line less than 1 mi from site 4 = Rail line less than 1 mi from site but inactive or needing refurbishment 3 = Active rail line 1 mi to less than 5 mi from site 2 = Rail line 1 mi to less than 5 mi from site but inactive or needing refurbishment and needing refurbishment 1 = Rail line greater than or equal to 5 mi from site
15. Geology/Seismology		
15a. Vibratory ground motion – seismic peak ground acceleration SCORED USING SCREENING DATA	Peak ground acceleration (PGA)	5 = PGA is < 0.10g with a 2% probability of exceedance in 50 years (4x 10-4) 4 = PGA is 0.10 to 0.15g with a 2% probability of exceedance in 50 years (4x 10-4) 3 = PGA is 0.15 to 0.25g with a 2% probability of exceedance in 50 years (4x 10-4) 2 = PGA is 0.25 to 0.30g with a 2% probability of exceedance in 50 years (4x 10-4) 1 = PGA is > 0.30g with a 2% probability of exceedance in 50 years (4x 10-4)
15b. Depth to bedrock soil stability SCORED USING SCREENING DATA	Depth to bedrock; soil stability including liquefaction potential, bearing strength and general foundation conditions	5 = Bedrock or recognized highly competent soil at or within 20 feet of the ground surface 3 = Tertiary-aged or older soil, or Quaternary-aged glacial till soil, at or within 20 feet of the ground surface 1 = Quaternary-aged soil (other than glacial till) extends greater than 20 feet below the ground surface

Table 9.3-8 Site Ranking Criteria

Ranking Criteria[1]	Metric[2]	Scoring Basis[2]
15c. Surface faulting and deformations SCORED USING SCREENING DATA	Presence of surface faulting based on USGS Quaternary fault database	5 = Site greater than 100 mi from any capable fault 4 = Site 100 to 50 mi from any capable fault 3 = Site 50 to 25 mi from any capable fault 2 = Site 25 to 5 mi from any capable fault 1 = Site with capable or questionable aged fault(s) within 5 mi
15d. Other geological hazards SCORED USING SCREENING DATA	Presence of other geologic hazards, such as karst features, subsurface mines, and volcanoes	5 = Hazards present or likely within 50 mi of the site 4 = Hazards present or likely within 20 mi of the site 3 = Hazards present or likely within 10 mi of the site 2 = Hazards present or likely within 3 mi of the site or a moderate risk 1 = Hazards present or likely at or within 0.5 mi of the site or a serious risk
16. Wetlands		
16a. Total Wetlands Within Property Boundary SCORED USING SCREENING DATA	Percent of wetlands within property boundary	5 = Less than 10% of site classified as wetlands based on National Wetland Inventory (NWI) or state-mapped wetlands 4 = Greater than or equal to 10% and less than 20% of site classified as wetlands based on NWI or state-mapped wetlands 3 = Greater than or equal to 20% and less than 30% of site classified as wetlands based on NWI or state-mapped wetlands 2 = Greater than or equal to 30% and less than 40% of site classified as wetlands based on NWI or state-mapped wetlands 1 = Greater than or equal to 40% of site classified as wetlands based on NWI or state-mapped wetlands

Table 9.3-8 Site Ranking Criteria

Ranking Criteria[1]	Metric[2]	Scoring Basis[2]
16b. Total Acres of Wetlands Within Site SCORED USING SCREENING DATA	Acres of wetlands onsite	5 = Less than 1 acre of site classified as wetlands based on NWI or state-mapped wetlands 3 = Greater than 1 acre and less than 5 acres of site classified as wetlands based on NWI or state-mapped wetlands 1 = Greater than 5 acres of site classified as wetlands based on NWI or state-mapped wetlands
16c. High Quality Wetlands Within Site SCORED USING SCREENING DATA	Presence of state-designated high quality wetlands onsite	5 = No high quality wetlands onsite 1 = High quality wetlands onsite

Notes:

[1] Yellow highlighted row is from Ref NUREG-1555 Subject Areas for Candidate Site Selection and Screening. No fill is Functional Evaluation Elements [Ref EPRI Siting Study].

[2] Unless otherwise indicated, distances are calculated from the center point of a parcel or "site" of approximately 420 acres within the property boundary.

[3] Based on NRC Regulatory Guide 1.76, Table 1 classifications by geography.

[4] Delphi process used to develop score. It should be noted that in some cases the panel could not come to convergence on unanimous score. In these instances the panel chose to use the median value which resulted in fractional values (i.e., not whole numbers) for some scores.

Table 9.3-9 Site Ranking Rationale

Ranking Criteria[1]	Metric	Rationale
1. Land use, including availability, and areas requiring special consideration		
1a. Land Area and Existing Facilities: Ability to support the combined EPR footprint including the protected area, cooling towers, ponds, switchyard, construction support areas	Size and configuration of plot	Adequate land area within a single location to accommodate EPR development is critical to avoiding impacts to greenfield sites, fragmentation of natural habitat, safety during facility construction and operation, and for optimization of plant operations, including appropriately designed features to protect the environment such as stormwater management systems, wastewater treatment facilities, waste storage areas, and emissions control systems.
1b. Hazardous waste or spoils areas	Based on the site's anticipated need for environmental remediation due to known current or previous uses.	Avoidance of unremediated hazardous waste facilities prevents inadvertent release of toxic materials to the environment and disruptions to the site development process resulting from discovery of unanticipated waste sources.
1c. Zoning	Current Zoning and Ownership based on the site's existing zoning classification(s) by area community(ies)	Individual communities implement zoning ordinances to protect the integrity and character of a town, including environmental resources. Conformance with zoning preserves lands with documented values to a community and socioeconomic benefits associated with designated land uses.

Table 9.3-9 Site Ranking Rationale

Ranking Criteria[1]	Metric	Rationale
1d. Distance to dedicated land	Proximity to federal, state, county and local parks, forests, preserves, historic sites, Native American Reservations, National Parks, Monuments, Forests, wildlife refuges, scenic river parkways, recreation areas and other significant sites based on the linear distance from the site boundary.	In accordance with regulatory standards, the siting of industrial facilities such as a nuclear power station is preferred at locations not encroaching upon dedicated lands whose aesthetics, recreational opportunities, access, or integrity may be diminished in perception or in fact by nearby development.
1e. Topography	Site topography and resulting cut-and fill requirements for amount of site preparation required for proposed facility construction	Flat to moderate relief is critical to avoidance of large scale land disturbance (cut and fill) actions requiring excessive blasting, earth management including off site materials disposal, and potential secondary impacts such as erosion and sedimentation.
2. Hydrology, water quality, and water availability		
2a. Water Quality	Ground and surface water intake water quality (salt, brackish, fresh, polluted) based on US EPA or State classifications Candidate site must have access to 50 MGD or more makeup	Increased water source purity lends to reduced particulate emissions, and avoids the need to pre-treat the cooling water source via desalinization or other energy-requiring filtration operations.
2b. Receiving Body Water Quality	Applicable State water quality classification Tier I, Tier II (as described and defined in COMAR 28.02.08.04-1) and Tier III (Outstanding National Resource Waters [ONRW] as described and defined in COMAR 28.02.08.04-2)	Consideration of cooling water source quality is made to discourage impacts to protected or high quality water bodies, as well as those waters already impaired by other uses or contaminant sources.

Table 9.3-9 Site Ranking Rationale

Ranking Criteria[1]	Metric	Rationale
2c. Water availability	Metric based on lowest 7-day average flow with a ten year return frequency (i.e., 7Q10) and need for 50 MGD water supply	Adequate water volume is necessary to accommodate the consumptive use proposed and to avoid potential impacts to aquatic biota, wetlands, water quality, and other downstream uses when a water source is drawn beyond its safe yield.
3. Terrestrial resources (including endangered species)		
3a. Endangered/threatened habitats	Existence of mapped T&E species habitat on or adjacent to site	Documented T&E species and their habitats must be avoided in accordance with state and federal law and to respect their intrinsic value.
3b. Floodplains	Existence of mapped FEMA 100 or 500 year floodplain affecting site footprint	Federally mapped floodplains serve to accommodate floodwaters and protect downstream property, and represent a potential safety risk.
4. Aquatic biological resources (including endangered species)		
4a. Endangered/threatened habitats	Existence of mapped T&E species habitat in makeup/ cooling water supply, or on or adjacent to site	Documented T&E species and their habitats must be avoided in accordance with state and federal law and to respect their intrinsic value.
4b. Thermal Discharge Sensitivity	Designated finfish/shellfish and/or other resource areas within intake or discharge waters	Considers potential impacts to sensitive aquatic biota that may be impacted by a high temperature discharge to a cooling water a source.
5. Socioeconomics (including aesthetics, demography, and infrastructure)		
5a. Emergency services	Availability of existing emergency services (police, fire, EMS, hospital services) based on full-time, part-time or volunteer local or county police, fire and emergency response services	Emphasizes project siting in communities with increasingly comprehensive emergency services.

Table 9.3-9 Site Ranking Rationale

Ranking Criteria[1]	Metric	Rationale
5b. Construction traffic	Ability of existing transportation infrastructure to support construction traffic	Evaluates the infrastructure and efficacy of existing roadways and traffic to prioritize siting within areas where construction traffic will not exacerbate poor transportation infrastructure conditions.
5c. Construction workforce	Availability of local construction workforce based on State, County, or local planning, zoning and industrial development commission databases Availability of suitable population within commuting distance from which to draw the construction workforce	Evaluates construction workforce available and ranks sites based on worker availability, emphasizing use of local labor forces.
5d. Housing and necessities	Availability of housing units, shopping and other services to support the peak construction workforce	Considers existing available housing, prioritizing sites with increasing nearby housing facilities (based on vacancy) and supporting infrastructure availability.
5e. Schools	Availability of existing schools to support increased construction and operation workforce	Prioritizes sites with comprehensive or high ranking educational facilities to accommodate needs of construction workforce.
6. Environmental Justice (EJ)		
6a. Minority population	Presence of minority population within or abutting site	Seeks to avoid unnecessary impacts to minority populations by prioritizing development outside of areas with predominant minority residents based on census block group data.
6b. Low-income population	Presence of low-income population within or abutting site	Seeks to avoid unnecessary impacts to low-income populations by prioritizing development outside of areas with predominant low-income residents based on census block group data.

Table 9.3-9 Site Ranking Rationale

Ranking Criteria[1]	Metric	Rationale
7. Historic and Cultural Resources		
7a. Historic buildings, structures, objects and sites	Distance to site and number of National Register of Historic Places (NRHP) listed buildings, structures, objects and sites	Considers potential aesthetic and other associated impacts to historic sites based upon nearby facility siting, and prioritizes site selection in areas lacking in documented NHRP listed buildings, structures, objects and sites.
7b. Historic districts	Distance to mapped NRHP listed historic districts from site	Considers potential aesthetic and other associated impacts to a historic district based upon nearby facility siting, and prioritizes site selection in areas lacking in/further from listed historic districts.
8. Air Quality (Climate & Meteorology)		
8a. Weather risks/conditions	Estimation of potential severe weather impacts on operation of a new nuclear station	Prioritizes plant siting in locations with reduced frequency of weather conditions potentially hazardous to nuclear plant operation.
8b. Prevention of Significant Deterioration (PSD) Class I Area, Attainment / Non-attainment Area	In or out of an attainment / non-attainment area and Prevention of Significant Deterioration (PSD) Class I area	Seeks to preserve air quality by discouraging plant siting within a non-attainment area for one or more pollutants or within a Class I PSD mapped location.
9. Human Health		
9a. Emergency preparedness program– proximity of residences/businesses for exclusion zone	Ability to evacuate area around site in event of an emergency	Prioritizes plant siting in areas where a full exclusion zone may be established without inclusion of nearby residences or businesses.
9b. Radiological pathways - water	Distance to drinking water supply from site (ground and surface)	Promotes avoidance of potential human ingestion of contaminated water in the case of an accident.
9c. Radiological pathways - food	Distance to food pathways from site (e.g., shellfish beds, farms)	Promotes avoidance of potential human ingestion of contaminated food sources in the case of an accident.

Table 9.3-9 Site Ranking Rationale

Ranking Criteria[1]	Metric	Rationale
10. Postulated Accidents(a)		
10a. Distance to nearby potentially hazardous facilities	Distance to hazardous facilities (e.g., military facilities, such as munitions storage or ordnance test ranges; chemical plants; refineries; mining and quarrying operations; oil and gas wells; gas and petroleum product installations; or air, waterway, pipeline or rail transport facilities for hazardous materials) and major airports	Prioritizes plant siting in locations where risk of exacerbating an accident starting at the generation facility from a missile impact or inadvertent release of hazardous materials may affect nearby hazardous facilities.
11. Fuel Cycle Impacts (Transport of Radioactive Material)		
11a. Support/challenges to transport of nuclear fuel and wastes	Distance and route to low level disposal site(s) and spent fuel repository (i.e., Yucca Mountain) from site	Ease of transport based on road conditions and distance to disposal locations is evaluated with the assumption that shorter routes on major arteries have less potential hazard to human health and the environment.
12. Transmission corridors (land used, feasibility, and resources affected)		
12a. Proximity/availability of power corridors	Based upon proximity of adequate (345/500 kV) transmission.	Considers the likely potential for expanded land clearing and impact to undeveloped lands and biota resulting from construction of new or significantly widened transmission corridor.

Table 9.3-9 Site Ranking Rationale

Ranking Criteria[1]	Metric	Rationale
13. Population distribution and density		
13a. Distance to population centers	Distance to US Census Populated Places population centers of 25,000 people or more persons from site	In accordance with regulatory standards, the siting of a nuclear power station is discouraged nearby centers of high population.
13b. Population density	Existing population density within 20 mi radius of site	In accordance with regulatory standards, the siting of a nuclear power station is discouraged nearby regions with high population density.
14. Facility costs [Transportation Access]		
14a. Barge access and capacity – distance, construction, or upgrade requirements	Based upon availability of nearest barge access or ability to construct new landing.	Use of existing barge slips reduces environmental impact associated with the need for slip construction of alternate means of site access. Criteria promote sites with existing barge access.
14b. Rail line access and capacity – distance, spur requirements, line capacity, or upgrade requirements	Based upon estimated distance and condition of nearest active rail line.	Use of existing rail lines reduces environmental impact associated with the need for line construction of alternate means of site access. Criteria promote sites with existing active rail access.
15. Geology/Seismology		
15a. Vibratory ground motion – seismic peak ground acceleration	Peak ground acceleration (PGA)	Criteria promote siting in locations where PGA does not represent a significant potential hazard to reactor stability.
15b. Depth to bedrock, soil stability, and compaction	Depth to bedrock; soil stability including liquefaction potential, bearing strength and general foundation conditions	Criteria promote siting in locations where bedrock and soil conditions are optimal for reactor construction and safety.

Table 9.3-9 Site Ranking Rationale

Ranking Criteria[1]	Metric	Rationale
15c. Surface faulting and deformations	Presence of surface faulting based on USGS Quaternary fault database	Criteria promote siting in locations where surface faults and fault activity do not represent a significant potential hazard to reactor stability.
15d. Other geological hazards	Presence of other geologic hazards, such as karst features, subsurface mines, and volcanoes	Criteria promote avoidance of locations considered intrinsically hazardous based upon subsurface conditions.
16. Wetlands		
16a. Total Wetlands Within Property Boundary	Percent of wetlands within property boundary	Considers net total acreage of wetlands for comparison among sites and prioritization of sites without regulatory wetlands and waterways.
16b. Total Acres of Wetlands Within Site	Acres of wetlands onsite	In order to avoid sites comprised predominantly of wetlands, percent wetlands is considered to allow promotion of locations with reduced wetland acreage in comparison to the entire property.
16c. High Quality Wetlands Within Site	Presence of state-designated high quality wetlands onsite	Considers wetlands of exceptional value and promotes impact avoidance in site selection.

Notes:

[1] Yellow highlighted row is from Ref NUREG-1555 Subject Areas for Candidate Site Selection and Screening. No fill is Functional Evaluation Elements [Ref EPRI Siting Study]

Table 9.3-10 Weighted Scoring of Candidate Sites

	BBNPP	Bainbridge	Conowingo	Humboldt	Martins Creek	Montour	Peach Bottom	Seedco	Wallenpaupack	Indian River
1. Land Use	23.34	14.80	18.00	19.58	20.12	20.93	14.54	21.47	8.93	17.74
2. Hydrology	39.00	42.00	42.00	39.00	39.00	39.00	39.00	39.00	39.00	30.00
3. Terrestrial Resources	31.50	17.50	17.50	35.00	35.00	31.50	17.50	31.50	21.00	35.00
4. Aquatic Biological Resources	28.00	7.00	7.00	28.00	14.00	28.00	14.00	28.00	28.00	21.00
5. Socioeconomics	16.50	22.00	22.00	22.00	23.10	13.20	20.90	22.00	15.40	15.40
6. Environmental Justice	22.50	17.50	20.00	22.50	22.50	22.50	20.00	5.00	17.50	12.50
7. Historical and Cultural Resources	20.00	5.00	5.00	20.00	15.00	20.00	10.00	20.00	20.00	15.00
8. Air Quality	20.00	14.00	14.00	20.00	16.00	20.00	16.00	20.00	20.00	14.00
9. Human Health	18.00	8.00	16.00	16.00	6.00	18.00	14.00	14.00	14.00	18.00
10. Postulated Accidents	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
11. Transport of Radioactive Material	3.00	3.00	6.00	3.00	3.00	6.00	6.00	3.00	6.00	6.00
12. Transmission Corridors	38.24	32.00	32.00	24.00	24.00	16.00	32.00	24.00	16.00	16.00
13. Population	31.50	27.00	31.50	36.00	18.00	36.00	31.50	40.50	40.50	40.50
14. Facility costs	16.20	27.20	8.25	16.50	13.75	8.55	17.71	16.50	16.20	15.13
15. Geology	28.00	28.00	31.50	29.75	19.25	33.25	33.25	26.25	28.00	28.00
16. Wetlands	29.33	40.00	34.67	34.67	40.00	40.00	40.00	40.00	34.67	18.67

Table 9.3-10 Weighted Scoring of Candidate Sites

	BBNPP	Bainbridge	Conowingo	Humboldt	Martins Creek	Montour	Peach Bottom	Seedco	Wallenpaupack	Indian River
Total:	**370.1**	**310.0**	**310.4**	**371.0**	**313.7**	**357.9**	**331.4**	**356.2**	**330.2**	**307.9**

Notes:
The scoring for the *Proposed Site* (BBNPP) is not required when ranking the *Candidate Sites* to select the *Alternative Sites* but is included here for reference.

Table 9.3-11 Ecologically Important Species in Pennsylvania

Common Name	Scientific Name	Habitat Type	Source
Acadian Flycatcher	*Empidonax virescens*	Riparian forests/thickets	Peterson, 2002
Alder Flycatcher	*Empidonax alnorum*	Riparian forests/thickets	Peterson, 2002
Alder Flycatcher	*Empidonax alnorum*	Emergent wetlands/marshes; scrub-shrub swamps; forested wetlands and bogs	Peterson, 2002
Allegheny Woodrat	*Neotoma magister*	Deciduous/mixed forests; barren habitats; riparian forests/thickets	Whitaker and Hamilton, 1998
American Bittern	*Botaurus lentiginosus*	Emergent wetlands/marshes; Lakes and ponds	Peterson, 2002
American Black Duck	*Anas rubripes*	Emergent wetlands/marshes; Scrub-shrub swamps; forested wetlands and bogs; lakes and ponds	Peterson, 2002
American Brook Lamprey	*Lampetra appendix*	Streams and rivers	Page and Burr, 1991
American Coot	*Fulica americana*	Emergent wetlands/marshes	Peterson, 2002
American Woodcock	*Scolopax minor*	Temporal shrublands/early successional forest; barren habitats; riparian forests/ thickets; emergent wetlands/ marshes; scrub-shrub swamps; forested wetlands and bogs	Peterson, 2002
Appalachian Cottontail	*Sylvilagus obscurus*	Deciduous/Mixed Forests; temporal shrublands/early successional forest; barren habitats; scrub-shrub swamps	Whitaker and Hamilton, 1998
Atlantic Sturgeon	*Acipenser oxyrinchus*	Streams and rivers	Page and Burr, 1991
Bald Eagle	*Haliaeetus leucocephalus*	Riparian forests/thickets; emergent wetlands/marshes; lakes and ponds	Peterson, 2002
Banded Sunfish	*Enneacanthus obesus*	Streams and rivers	Page and Burr, 1991
Barn Owl	*Tyto alba*	Human structures	Peterson, 2002
Bigmouth Buffalo	*Ictiobus cyprinellus*	Lakes and ponds; streams and rivers	Page and Burr, 1991
Bigmouth Shiner	*Notropis dorsalis*	Streams and rivers	Page and Burr, 1991
Black Buffalo	*Ictiobus niger*	Streams and rivers	Page and Burr, 1991

Table 9.3-11 Ecologically Important Species in Pennsylvania

Common Name	Scientific Name	Habitat Type	Source
Black Bullhead	*Ameiurus melas*	Streams and rivers	Page and Burr, 1991
Black Tern	*Chlidonias niger*	Emergent wetlands/marshes	Peterson, 2002
Blackchin Shiner	*Notropis heterodon*	Lakes and ponds; streams and rivers	Page and Burr, 1991
Black-crowned Night Heron	*Nycticorax nycticorax*	Emergent wetlands/marshes; lakes and ponds	Peterson, 2002
Black-crowned Night-Heron	*Nycticorax nycticorax*	Riparian forests/thickets	Peterson, 2002
Blackpoll Warbler	*Dendroica striata*	Riparian forests/thickets	Peterson, 2002
Blackpoll Warbler	*Dendroica striata*	Forested wetlands and bogs	Peterson, 2002
Blanding's Turtle	*Emys blandingii*	Emergent wetlands/marshes; lakes and ponds	Ohio Department of Natural Resources (DNR), 2009a
Bluebrest Darter	*Etheostoma camurum*	Streams and rivers	Page and Burr, 1991
Blue-headed Vireo	*Vireo solitarius*	Riparian forests/thickets	Peterson, 2002
Blue-winged Warbler	*Vermivora pinus*	Deciduous/Mixed Forests; temporal shrublands/early successional forest	Peterson, 2002
Bog Turtle	*Clemmys muhlenbergii*	Emergent wetlands/marshes	Virginia Department of Game and Inland Fisheries (VADGIF), 2009a
Bowfin	*Amia calva*	Emergent wetlands/marshes; Scrub-shrub swamps; lakes and ponds; streams and rivers	Page and Burr, 1991
Bridle Shiner	*Notropis bifrenatus*	Streams and rivers	Page and Burr, 1991
Brindled Madtom	*Noturus miurus*	Streams and rivers	Page and Burr, 1991
Brook Silverside	*Labidesthes sicculus*	Streams and rivers	Page and Burr, 1991
Brook Stickleback	*Culea inconstans*	Emergent wetlands/marshes; scrub-shrub swamps; forested wetlands and bogs; lakes and ponds; streams and rivers	Page and Burr, 1991

Table 9.3-11 Ecologically Important Species in Pennsylvania

Common Name	Scientific Name	Habitat Type	Source
Brown Thrasher	*Toxostoma rufum*	Temporal shrublands/early successional forest; barren habitats	Peterson, 2002
Burbot (Lake Erie population)	*Lota lota*	Lakes and ponds; Streams and rivers	Page and Burr, 1991
Burbot(Allegheny River population)	*Lota lota*	Streams and rivers	Page and Burr, 1991
Canada Warbler	*Wilsonia canadensis*	Riparian forests/thickets ; Scrub-shrub swamps; Forested wetlands and bogs	Peterson, 2002
Central Mudminnow	*Umbra limi*	Emergent wetlands/marshes; scrub-shrub swamps; forested wetlands and bogs; lakes and ponds; streams and rivers	Page and Burr, 1991
Cerulean Warbler	*Dendroica cerulea*	Deciduous/mixed forests; riparian forests/thickets	Peterson, 2002
Channel Darter	*Percina copelandi*	Streams and rivers	Page and Burr, 1991
Cheat Minnow	*Pararhinichthys bowersi*	Streams and rivers	Page and Burr, 1991
Checkered Sculpin	*Cottus sp. 7* – not described	Streams and rivers	PNHP, 2009m
Chesapeake Logperch	*Percina caprodes*	Streams and rivers	Page and Burr, 1991
Chimney Swift	*Chaetura pelagica*	Human structures	Peterson, 2002
Cisco	*Coregonus artedi*	Streams and rivers	Page and Burr, 1991
Coastal Plain Leopard Frog	*Rana sphenocephala*	Emergent wetlands/marshes; lakes and ponds	TxPW, 2009
Common Moorhen	*Gallinula chloropus*	Emergent wetlands/marshes	Peterson, 2002
Common Nighthawk	*Chordeiles minor*	Human structures	Peterson, 2002
Eastern Box Turtle	*Terrapene carolina*	Emergent wetlands/marshes	VADGIF, 2009b
Eastern Brook Trout (native populations)	*Salvelinus fontinalis*	Streams and rivers	Page and Burr, 1991
Eastern Hellbender	*Cryptobranchus alleganiensis*	Streams and Rivers	VADGIF, 2009c
Eastern Massasauga	*Sistrurus catenatus catenatus*	Emergent wetlands/marshes	Ohio DNR, 2009b

Table 9.3-11 Ecologically Important Species in Pennsylvania

Common Name	Scientific Name	Habitat Type	Source
Eastern Mudminnow	*Umbra pygmaea*	Emergent wetlands/marshes; scrub-shrub swamps; forested wetlands and bogs; lakes and ponds; streams and rivers	Page and Burr, 1991
Eastern Ribbon Snake	*Thamnophis sauritus sauritus*	Riparian forests/thickets; emergent wetlands/marshes; scrub-shrub swamps; forested wetlands and bogs; lakes and ponds	VADGIF, 2009d
Eastern Sand Darter	*Ammocrypta pellucida*	Streams and rivers	Page and Burr, 1991
Eastern Small-footed Bat	*Myotis leibii*	Deciduous/mixed forests	Whitaker and Hamilton, 1998
Eastern Spotted Skunk	*Spilogale putorius*	Barren habitats	Whitaker and Hamilton, 1998
Four-toed Salamander	*Hemidactylium scutatum*	Forested wetlands and bogs	VADGIF, 2009e
Fowler's Toad	*Bufo fowleri*	Barren habitats	VADGIF, 2009f
Fowler's Toad	*Bufo fowleri*	Emergent wetlands/marshes; lakes and ponds	VADGIF, 2009f
Ghost Shiner	*Notropis buchanani*	Streams and rivers	Page and Burr, 1991
Gilt Darter	*Percina evides*	Streams and rivers	Page and Burr, 1991
Golden-winged Warbler	*Vermivora chrysoptera*	Deciduous/mixed forests; temporal shrublands/early successional forest; forested wetlands and bogs	Peterson, 2002
Goldeye	*Hiodon alosoides*	Lakes and ponds; streams and rivers	Page and Burr, 1991
Gravel Chub	*Erimystax x-punctatus*	Streams and rivers	Page and Burr, 1991
Great Blue Heron	*Ardea herodias*	Riparian forests/thickets; emergent wetlands/marshes; forested wetlands and bogs; lakes and ponds	Peterson, 2002
Great Egret	*Ardea alba*	Emergent wetlands/marshes; riparian forests/thickets; lakes and ponds	Peterson, 2002
Green-winged Teal	*Anas discolor*	Emergent wetlands/marshes; lakes and ponds	Peterson, 2002
Hickory Shad	*Alosa mediocris*	Streams and rivers	Page and Burr, 1991

Table 9.3-11 Ecologically Important Species in Pennsylvania

Common Name	Scientific Name	Habitat Type	Source
Highfin carpsucker	*Carpiodes velifer*	Streams and rivers	Page and Burr, 1991
Hoary Bat	*Lasiurus cinereus*	Riparian forests/thickets	Whitaker and Hamilton, 1998
Horneyhead Chub	*Nocomis biguttatus*	Streams and rivers	Page and Burr, 1991
Indiana Bat	*Myotis sodalis*	Riparian forests/thickets; human structures	Whitaker and Hamilton, 1998
Iowa Darter	*Etheostoma exile*	Lakes and ponds; streams and rivers	Page and Burr, 1991
Ironcolor Shiner	*Notropis chalybaeus*	Streams and rivers	Page and Burr, 1991
Jefferson Salamander	*Vermivora pinus*	Deciduous/mixed forests	Ohio DNR, 2009c
Kentucky Warbler	*Oporornis formosus*	Riparian forests/thickets	Peterson, 2002
King Rail	*Rallus elegans*	Emergent wetlands/marshes	Peterson, 2002
Kirtland's Snake	*Clonophis kirtlandii*	Riparian forests/thickets; human structures; emergent wetlands/marshes; forested wetlands and bogs	Ohio DNR, 2009d
Lake Sturgeon	*Acipenser fulvescens*	Lakes and ponds; streams and rivers	Page and Burr, 1991
Least Bittern	*Ixobrychus exilis*	Emergent wetlands/marshes	Peterson, 2002
Least brook lamprey	*Lampetra aepyptera*	Streams and rivers	Page and Burr, 1991
Longear Sunfish	*Lepomis megalotis*	Streams and rivers	Page and Burr, 1991
Long-Eared Owl	*Asio otus*	Barren habitats	Peterson, 2002
Longhead darter	*Percina macrocephala*	Streams and rivers	Page and Burr, 1991
Longnose Gar	*Lepisosteus osseus*	Lakes and ponds; streams and rivers	Page and Burr, 1991
Longnose sucker	*Catostomus catostomus*	Streams and rivers	Page and Burr, 1991
Louisiana Waterthrush	*Seiurus motacilla*	Deciduous/mixed forests; riparian forests/thickets	Peterson, 2002
Map Turtle	*Graptemys geographica*	Lakes and ponds	MDNR, 2009
Marsh Wren	*Cistothorus palustris*	Emergent wetlands/marshes	Peterson, 2002
Mooneye	*Hiodon tergisus*	Lakes and ponds; streams and rivers	Page and Burr, 1991
Mountain Brook Lamprey	*Ichthyomyzon greeleyi*	Streams and rivers	Page and Burr, 1991

Table 9.3-11 Ecologically Important Species in Pennsylvania

Common Name	Scientific Name	Habitat Type	Source
Mountain Chorus Frog	*Pseudacris brachyphona*	Deciduous/mixed forests	Ohio DNR, 2009e
Mountain Earth Snake	*Virginia valeriae pulchra*	Deciduous/mixed forests; barren habitats	VADGIF, 2009g
Mountain Madtom	*Noturus eleutherus*	Streams and rivers	Page and Burr, 1991
New Jersey Chorus Frog	*Pseudacris triseriata kalmi*	Emergent wetlands/marshes; forested wetlands and bogs	VADGIF, 2009h
Northern Bobwhite Quail	*Colinus virginianus*	Temporal shrublands/early successional forest; barren habitats	Peterson, 2002
Northern Brook Lamprey	*Ichthyomyzon fossor*	Streams and rivers	Page and Burr, 1991
Northern Coal Skink	*Eumeces anthracinus anthracinus*	Deciduous/mixed forests; barren habitats	PFBC, 2002
Northern Cricket Frog	*Acris crepitans*	Emergent wetlands/marshes; forested wetlands and bogs; lakes and ponds	New York Department of Environmental Conservatoin (NYDEC), 2009
Northern Flying Squirrel	*Glaucomys sabrinus*	Riparian forests/thickets	Whitaker and Hamilton, 1998
Northern Harrier	*Circus cyaneus*	Emergent wetlands/marshes; scrub-shrub swamps; forested wetlands and bogs	Peterson, 2002
Northern Leopard Frog	*Rana pipiens*	Emergent wetlands/marshes; lakes and ponds	Ohio DNR, 2009f
Northern Madtom	*Noturus stigmosus*	Streams and rivers	Page and Burr, 1991
Northern Myotis	*Myotis septentrionalis*	Deciduous/mixed forests	Whitaker and Hamilton, 1998
Ohio Lamprey	*Ichthyomyzon bdellium*	Streams and rivers	Page and Burr, 1991
Olive-sided Flycatcher	*Contopus cooperi*	Barren habitats; scrub-shrub swamps; forested wetlands and bogs	Peterson, 2002
Osprey	*Pandion haliaetus*	Riparian forests/thickets Emergent wetlands/marshes; Lakes and ponds	Peterson, 2002
Paddlefish	*Polydon spathula*	Streams and rivers	Page and Burr, 1991
Peregrine Falcon	*Falco peregrinus*	Human structures	Peterson, 2002

Table 9.3-11 Ecologically Important Species in Pennsylvania

Common Name	Scientific Name	Habitat Type	Source
Pied-billed Grebe	*Podilymbus podiceps*	Emergent wetlands/marshes; lakes and ponds	Peterson, 2002
Prairie Warbler	*Dendroica discolor*	Barren habitats	Peterson, 2002
Prothonotary Warbler	*Protonaria citrea*	Forested wetlands and bogs	Peterson, 2002
Queen Snake	*Regina septemvittata*	Riparian forests/thickets; emergent wetlands/marshes; lakes and ponds	Ohio DNR, 2009g
Rainbow Smelt	*Osmerus mordax*	Streams and rivers	Page and Burr, 1991
Red Crossbill	*Loxia curvirostra*	Barren habitats	Peterson, 2002
Redbelly Turtle	*Pseudemys rubriventris*	Emergent wetlands/marshes; lakes and ponds	VADGIF, 2009i
Redfin Shiner	*Lythrurus umbratilis*	Streams and rivers	Page and Burr, 1991
Red-headed Woodpecker	*Melanerpes erythrocephalus*	Forested wetlands and bogs	Peterson, 2002
Red-shouldered Hawk	*Buteo lineatus*	Emergent wetlands/marshes; forested wetlands and bogs	Peterson, 2002
River Carpsucker	*Carpiodes carpio*	Streams and rivers	Page and Burr, 1991
River Redhorse	*Moxostoma carinatum*	Streams and rivers	Page and Burr, 1991
River Shiner	*Notropis blennius*	Streams and rivers	Page and Burr, 1991
Rock Vole	*Microtus chrotorrhinus*	Riparian forests/thickets	Whitaker and Hamilton, 1998
Rough Green Snake	*Opheodrys aestivus*	Riparian forests/thickets	Ohio DNR, 2009h
Ruddy Duck	*Oxyura jamaicensis*	Emergent wetlands/marshes; lakes and ponds	Peterson, 2002
Scarlet Tanager	*Piranga olivacea*	Deciduous/mixed forests	Peterson, 2002
Sedge Wren	*Cistothorus platensis*	Emergent wetlands/marshes	Peterson, 2002
Short-eared Owl	*Asio flammeus*	Emergent wetlands/marshes	Peterson, 2002
Shorthead Garter Snake	*Thamnophis brachystoma*	Riparian forests/thickets	Medaille College, 2009
Shorthead Garter Snake	*Thamnophis brachystoma*	Emergent wetlands/marshes	Medaille College, 2009
Shortnose sturgeon	*Acipenser brevirostrum*	Streams and rivers	Page and Burr, 1991
Silver Chub	*Macrhybopsis storeriana*	Lakes and ponds; streams and rivers	Page and Burr, 1991

Table 9.3-11 Ecologically Important Species in Pennsylvania

Common Name	Scientific Name	Habitat Type	Source
Silver-haired Bat (migrant)	*Lasionycteris noctivagans*	Riparian forests/thickets	Whitaker and Hamilton, 1998
Skipjack Herring	*Alosa chrysochloris*	Streams and rivers	Page and Burr, 1991
Smallmouth Buffalo	*Ictiobus bubalus*	Streams and rivers	Page and Burr, 1991
Snowshoe Hare	*Lepus americanus*	Temporal shrublands/early successional forest; barren habitats; scrub-shrub swamps	Whitaker and Hamilton, 1998
Solitary Sandpiper	*Tringa solitarius*	Emergent wetlands/marshes; lakes and ponds	Peterson, 2002
Sora	*Porzana carolina*	Emergent wetlands/marshes; lakes and ponds	Peterson, 2002
Southern Redbelly Dace	*Phoxinus erythrogaster*	Streams and rivers	Page and Burr, 1991
Spotted Darter	*Etheostoma maculatum*	Streams and rivers	Page and Burr, 1991
Spotted Gar	*Lepisosteus oculatus*	Scrub-shrub swamps; lakes and ponds; streams and rivers	Page and Burr, 1991
Spotted Sucker	Minytrema melanops aculeatus	Lakes and ponds; streams and rivers	Page and Burr, 1991
Spotted Turtle	*Clemmys guttata*	Temporal shrublands/early successional forest; barren habitats; emergent wetlands/ marshes; scrub-shrub swamps; forested wetlands and bogs	Ohio DNR, 2009i
Streamline Chub	*Erimystax dissimilis*	Streams and rivers	Page and Burr, 1991
Tadpole Madtom	*Noturus gyrinus*	Streams and rivers	Page and Burr, 1991
Threespine Stickleback	*Gasterosteus aculeatus*	Lakes and ponds; streams and rivers	Page and Burr, 1991
Timber Rattlesnake	*Crotalus horridus*	Deciduous/mixed forests; barren habitats; riparian forests/thickets	PFBC, 2004
Tippecanoe darter	*Etheostoma tippecanoe*	Streams and rivers	Page and Burr, 1991
Touogue-tied Minnow	*Exoglossum laurae*	Streams and rivers	Page and Burr, 1991
Tundra Swan (migr. Popn)	*Cygnus columbianus columbianus*	Lakes and ponds	Peterson, 2002

Table 9.3-11 Ecologically Important Species in Pennsylvania

Common Name	Scientific Name	Habitat Type	Source
Upland Chorus Frog	*Pseudacris feriarum*	Emergent wetlands/marshes	VADGIF, 2009j
Virginia Rail	*Rallus limicola*	Emergent wetlands/marshes	Peterson, 2002
Warmouth	*Lepomis gulosus*	Lakes and ponds; streams and rivers	Page and Burr, 1991
West Virginia Water Shrew	*Sorex palustris punctulatus*	Riparian forests/thickets	Whitaker and Hamilton, 1998
Western Chorus Frog	*Pseudacris triseriata*	Emergent wetlands/marshes	Ohio DNR, 2009j
Whip-poor-will	*Caprimulgus vociferus*	Temporal shrublands/early successional forest; barren habitats	Peterson, 2002
White Catfish	*Ameiurus catus*	Streams and rivers	Page and Burr, 1991
Willow Flycatcher	*Empidonax traillii*	Temporal shrublands/early successional forest; barren habitats; riparian forests/ thickets emergent wetlands/ marshes; scrub-shrub swamps; lakes and ponds	Peterson, 2002
Wilson's Snipe	*Gallinago delicata*	Temporal shrublands/early successional forest	Peterson, 2002
Wilson's Snipe	*Gallinago delicata*	Emergent wetlands/marshes	Cornell Laboratory of Ornithology, 2009
Winter Wren	*Troglodytes troglodytes*	Forested wetlands and bogs	Peterson, 2002
Wood Thrush	*Hylocichla mustelina*	Deciduous/mixed forests	Peterson, 2002
Wood Turtle	*Glyptemys insculpta*	Deciduous/mixed forests; riparian forests/thickets; emergent wetlands/marshes; scrub-shrub swamps; forested wetlands and bogs	Ohio DNR, 2009k
Worm-eating Warbler	*Limnothlypis swainsonii*	Deciduous/mixed forests	Peterson, 2002
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Temporal shrublands/early successional forest; riparian forests/thickets forested wetlands and bogs	Peterson, 2002
Yellow-Breasted Chat	*Icteria virens*	Temporal shrublands/early successional forest; barren habitats; riparian forests/thickets scrub-shrub swamps	Peterson, 2002

Table 9.3-11 Ecologically Important Species in Pennsylvania

Common Name	Scientific Name	Habitat Type	Source
Yellow-crowned Night Heron	*Nyctanassa violacea*	Riparian forests/thickets; emergent wetlands/marshes; forested wetlands and bogs; lakes and ponds	Peterson, 2002
Yellow-throated Vireo	*Vireo flavifrons*	Forested wetlands and bogs	Peterson, 2002

Table 9.3-12 Comparison of Wetland and Waterway Impacts: BBNPP vs. Alternative Sites

	BBNPP[1]		Humboldt		Montour		Seedco	
Property Acreage	882 ac (356.9 ha)		3,796 ac (1,536.2 ha)		3,538 ac (1,431.8 ha)		1,061 ac (429.4 ha)	
Wetlands – Total Property[2]	39.6 ac (16.0 ha)		119.3 ac (48.3 ha)		137.3 ac (55.6 ha)		1.9 ac (0.7 ha)	
Wetlands – Site[3]	28.8 ac (11.7 ha)		3.8 ac (1.5 ha)		0 ac (0 ha)		0.7 ac (0.3 ha)	
Streams – Total Property[4]	5,044 lf (1,537.4 m)		23,391 lf (7,129.6 m)		42,463 lf (12,942.7 m)		21,101 lf (6,431.6 m)	
Streams – Site[5]	2,519 lf (767.8 m)		5,057 lf (1,541.4 m)		3,891 lf (1,186.0 m)		3,284 lf (1,001.0 m)	
Wetlands Affected – Site[6]	28.8 ac (16.0 ha)		3.8 ac (1.5 ha)		0 ac (0 ha)		0.7 ac (0.3 ha)	
Streams Affected – Site[7]	2,519 lf (767.8 m)		5,057 lf (1,541.4 m)		3,891 lf (1,186.0 m)		3,284 lf (1,001.0 m)	
Offsite Wetlands/Waterways Affected – ROWs and Interconnects[8]	**Wetlands**	**Streams**	**Wetlands**	**Streams**	**Wetlands**	**Streams**	**Wetlands**	**Streams**
CWIS (in-water components)[9]	0.2 ac (0.08 ha)	0 (streams classified as wetlands)	0.2 ac (0.08 ha)	0 (streams classified as wetlands)	0.2 ac (0.08 ha)	0 (streams classified as wetlands)	0.2 ac (0.08 ha)	0 (streams classified as wetlands)
CW Pump House[10]	0	0	0	0	0	0	0	0
Water Line ROW[11]	0	0	23.4 ac (9.5 ha)	8,924 lf (2,720 m)	3.3 (1.3 ha)	1,724 lf (525.5 m)	35.7 ac (14.4 ha)	7,182 lf (2,189.1 m)
Transmission Line ROW[12]	0	0	0.2 ac (0.08 ha)	2,773 lf (845.2 m)	6.3 ac (2.5 ha)	2,587 lf (788.5 m)	6.1 ac (2.5 ha)	3,062 lf (933.3 m)
Railroad Spur/Improvements[11, 13]	NA	NA	NA	NA	0	0	0	208 lf (63.3 m)
Access Roadways[11, 13]	NA	NA	NA	NA	0.5 ac (0.2 ha)	246 lf (75.0 m)	0	120 lf (36.6 m)

Table 9.3-12 Comparison of Wetland and Waterway Impacts: BBNPP vs. Alternative Sites

	BBNPP[1]		Humboldt		Montour		Seedco	
Other Offsite Uses[14]	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
[1]ER Section 4.1.1.1 states the BBNPP and supporting facilities will be located on 882 acres; ER Section 4.3.1.3 states the construction of BBNPP will permanently fill approximately 340 LF of stream and 36 acres of delineated wetland areas. This table provides data primarily for the approximate 420-acre EPR Site (see Footnote 2) for consistent comparison with the alternative sites and, therefore, some data in this table will be different from quantities of affected acreage stated in the ER.
[2]"*Total Property*" includes the entirety of the alternate site facility contiguous land holdings (black outline).
[3]"*Site*" includes the 420 parcel on the Total Property selected for EPR development (red outline).
[4]Describes the total length of all streams on the Total Property in linear feet. Includes both mapped perennial and intermittent waterways and obvious drainage ways observed during site inspections or interpreted from desktop mapping.
[5]Describes streams within the 420 EPR Site, calculated in the same manner as streams for "Total Property".
[6] An assumption has been made that any wetlands within the 420 acre Site would be affected by construction
[7]An assumption has been made that any streams within the 420 acre Site would be affected by construction.
[8]An assumption has been made that any wetlands or streams within the ROWs or interconnects would be affected by construction. Impacts associated with ROW construction and some in-water construction activities are temporary in nature.
[9]An assumption has been made to allow a 100'x100' area of impact for in-water cooling water intake system (CWIS) components. No alternate sites are proposed to use shoreline intake structures; all intake/discharge structures are proposed to be sited at a depth of -20' mean low water (MLW) or greater. Horizontal directional drilling (HDD) is proposed to access off shore locations.
[10]A cooling water pump house would be located alongshore to the selected cooling water source, and would occupy 0.5 acre total area. It is assumed that the pump house would be located in an upland area near the shore.
[11]For the purposes of this evaluation, it has been assumed that any water line ROW would require a 120' width for construction to allow installation of 2-60" pipes. The same width corridor was assumed for the road and railroad access.
[12]For new transmission line construction or reconductoring of existing circuits to accommodate the EPR, a 300' wide cleared ROW is assumed to be required.
[13]NA (Not Applicable) because there is existing road or railroad access to the site.
[14]Other offsite uses include any required parking, laydown, staging requiring land alteration.
Sources:
USFWS, 2008b; ESRI, 2005

Table 9.3-13 Summary of Potential Onsite and Offsite Wetland Impacts, BBNPP and Alternative Sites

Site	Number of discrete wetlands or systems	Wetland types (NWI classification)[1]	Description
BBNPP[2]	3	1) Freshwater Pond (Onsite) 2) Freshwater Forested/Shrub Wetland (Onsite) 3) Freshwater Emergent Wetland (Onsite)	1) 3.2 ac (1.3 ha) 2) 19.1 ac (7.7 ha) 3) 6.5 ac (2.6 ha)
Humboldt	11	1) Freshwater Pond (Onsite) 2) Freshwater Emergent Wetland 3) Freshwater Pond 4) Freshwater Pond 5) Freshwater Emergent Wetland 6) Freshwater Forested/Shrub Wetland 7) All Riverine 8) Freshwater Forested/Shrub Wetland 9) Freshwater Pond 10) Freshwater Emergent Wetland 11) Freshwater Forested/Shrub Wetland	1) 3.8 ac (1.5 ha) 2) 0.2 ac (0.08 ha) 3) 1.7 ac (0.7 ha) 4) 1.0 ac (0.4 ha) 5) 0.2 ac (0.08 ha) 6) 0.3 ac (0.12 ha) 7) 16 ac (6.5 ha) 8) 1.2 ac (0.5 ha) 9) 1.9 ac (0.8 ha) 10) 0.4 ac (0.16 ha) 11) 0.7 ac (0.3 ha)
Montour	7	1) Freshwater Emergent Wetland (Onsite) 2) Freshwater Pond 3) Riverine 4) Freshwater Forested/Shrub Wetland 5) Freshwater Emergent Wetland 6) Freshwater Emergent Wetland 7) Freshwater Forested/Shrub Wetland	1) 0.5 ac (0.2 ha) 2) 0.1 ac (0.004 ha) 3) 6.2 ac (2.5 ha) 4) 1.3 ac (0.5 ha) 5) 0.6 ac (0.24 ha) 6) 0.8 ac (0.32 ha) 7) 0.6 ac (0.24 ha)
Seedco	18	1) Freshwater Pond (Onsite) 2) Freshwater Pond 3) Freshwater Emergent Wetland	1) 0.7 ac (0.3 ha) 2) 0.7 ac (0.30 ha) 3) 1.0 ac (0.4 ha)

Table 9.3-13 Summary of Potential Onsite and Offsite Wetland Impacts, BBNPP and Alternative Sites

Site	Number of discrete wetlands or systems	Wetland types (NWI classification)[1]	Description
		4) Freshwater Forested/Shrub Wetland	4) 1.8 ac (0.7 ha)
		5) Freshwater Emergent Wetland	5) 2.6 ac (1.1 ha)
		6) Freshwater Pond	6) 0.2 ac (0.08 ha)
		7) Freshwater Forested/Shrub Wetland	7) 0.6 ac (0.24 ha)
		8) Freshwater Emergent Wetland	8) 0.3 ac (0.12 ha)
		9) Freshwater Forested/Shrub Wetland	9) 6.7 ac (2.7 ha)
		10) Freshwater Emergent Wetland	10) 3.2 ac (1.3 ha)
		11) Freshwater Pond	11) 0.4 ac (0.16 ha)
		12) Freshwater Emergent Wetland	12) 0.4 ac (0.16 ha)
		13) Freshwater Forested/Shrub Wetland	13) 4.8 ac (1.9 ha)
		14) Freshwater Emergent Wetland	14) 1.8 ac (0.7 ha)
		15) Freshwater Forested/Shrub Wetland	15) 0.6 ac (0.24 ha)
		16) Riverine	16) 15.8 ac (ha)
		17) Freshwater Pond	17) 0.7 ac (0.3 ha)
		18) Freshwater Forested/Shrub Wetland	18) 0.2 ac (0.08 ha)

Notes:
[1]Unless otherwise indicated, the wetland listed is located offsite.
[2]ER Section 4.1.1.1 states the BBNPP and supporting facilities will be located on 882 acres; ER Section 4.3.1.3 states the construction of BBNPP will permanently fill approximately 340 lf of stream and 36 acres of delineated wetland areas. This table provides data primarily for the approximate 420-acre EPR Site for consistent comparison with the alternative sites and, therefore, some data in this table will be different from quantities of affected acreage stated in the ER.
Source: USFWS, 2008b

Table 9.3-14 Summary of Potential Onsite and Offsite Waterway Impacts, BBNPP and Alternative Sites

	Number of/names of streams[1]	Stream type	Description
BBNPP[2]	A. Walker Run (Onsite)	A. Perennial	A. 2519 lf (767.8 m)
Humboldt	A. Stony Creek (Onsite)	A. Perennial	A. 5,057 lf (1541.4 m)
	B. Stony Creek	B. Perennial	B. 324 lf (98.8 m)
	C. Black Creek	C. Perennial	C. 300 lf (91.4 m)
	D. Tributary of Little Nescopeck Creek	D. Intermittent	D. 309 lf (94.2 m)
	E. Tributary of Black Creek	E. Perennial	E. 356 lf (108.5 m)
	F. Big Wapwallopen Creek	F. Perennial	F. 425 lf (129.5 m)
	G. Tributary of Big Wapwallopen Creek	G. Perennial	G. 316 lf (96.3 m)
	H. Tributary of Big Wapwallopen Creek	H. Perennial	H. 417 lf (127.1 m)
	I. Stony Creek	I. Perennial	I. 120 lf (36.6 m)
	J. Black Creek (along water corridor)	J. Perennial	J. 8564 lf (2610.3 m)
	K. Tributary of Black Creek	K. Perennial	K. 120 lf (36.6 m)
	L. Tributary of Black Creek	L. Perennial	L. 120 lf (36.6 m)
	M. Susquehanna River	M. Perennial	M. 326 lf (99.4 m)
Montour	A. East Branch Chillisquaque Creek (Onsite)	A. Perennial	A. 3,891 lf (1186.0 m)
	B. Mahoning Creek	B. Perennial	B. 302 lf (92.0 m)
	C. Tributary of Mahoning Creek	C. Intermittent	C. 541 lf (198.4 m)
	D. Frozen Run	D. Perennial	D. 612 lf (186.5 m)
	E. Tributary of Frozen Run	E. Perennial	E. 468 lf (142.6 m)
	F. Montour Run	F. Perennial	F. 347 lf (105.8 m)
	G. Susquehanna River	G. Perennial	G. 317 lf (96.6 m)
	H. County Line Branch	H. Perennial	H. 132 lf (40.2 m)
	I. Beaver Run	I. Perennial	I. 486 lf (148.1 m)
	J. Tributary of Warrior Run	J. Perennial	J. 138 lf (42.0 m)
	K. Warrior Run	K. Perennial	K. 838 lf (255.4 m)
	L. Tributary of Warrior Run	L. Intermittent	I. 130 lf (39.6 m)

Table 9.3-14 Summary of Potential Onsite and Offsite Waterway Impacts, BBNPP and Alternative Sites

	Number of/names of streams[1]	Stream type	Description
	M. Tributary of Mud Creek	M. Intermittent	M. 122 lf (37.2 m)
	N. Mud Creek	N. Perennial	N. 124 lf (37.8 m)
Seedco	A. Shamokin Creek	A. Perennial	A. 208 lf (63.4 m)
	B. Shamokin Creek (Onsite)	B. Perennial	B. 3790 lf (1155.2 m)
	C. Quaker Run	C. Perennial	C. 120 lf (36.6 m)
	D. Tributary of Shamokin Creek	D. Perennial	D. 300 lf (91.4 m)
	E. Tributary of Mugser Run	E. Intermittent	E. 702 lf (214.0 m)
	F. Mugser Run	F. Intermittent	F. 301 lf (91.7 m)
	G. Tributary of Roaring Creek	G. Intermittent	G. 503 lf (153.3 m)
	H. Tributary of Roaring Creek	H. Perennial	H. 317 lf (96.6 m)
	I. Roaring Creek	I. Perennial	I. 612 lf (186.5 m)
	J. Tributary of Roaring Creek	J. Intermittent	J. 327 lf (99.7 m)
	K. Shamokin Creek (All northern water corridor)	K. Perennial	K. 5814 lf (1772.1 m)
	L. Bennys Rub	L. Perennial	L. 234 lf (71.3 m)
	M. Tributary of Shamokin Creek	M. Perennial	M. 134 lf (40.8 m)
	N. Tributary of Shamokin Creek	N. Perennial	N. 135 lf (41.1 m)
	O. Tributary of Shamokin Creek	O. Intermittent	O. 164 lf (50.0 m)
	P. Tributary of Shamokin Creek	P. Perennial	P. 120 lf (36.6 m)
	Q. Tributary of Shamokin Creek	Q. Intermittent	Q. 121 lf (36.9 m)
	R. Tributary of Shamokin Creek	R. Perennial	R. 145 lf (44.2 m)
	S. Little Shamokin Creek	S. Perennial	S. 315 lf (96.0 m)

Notes:
[1]Unless otherwise indicated, the stream/creek listed is located offsite.
[2]Onsite water bodies were obtained from ESRI, 2005. However, COLA ER Sections 2.3.1.1 and 2.4.2 identify three unnamed tributaries in the Walker Run watershed.
Source: ESRI, 2005

Figure 9.3-1 Region of Interest

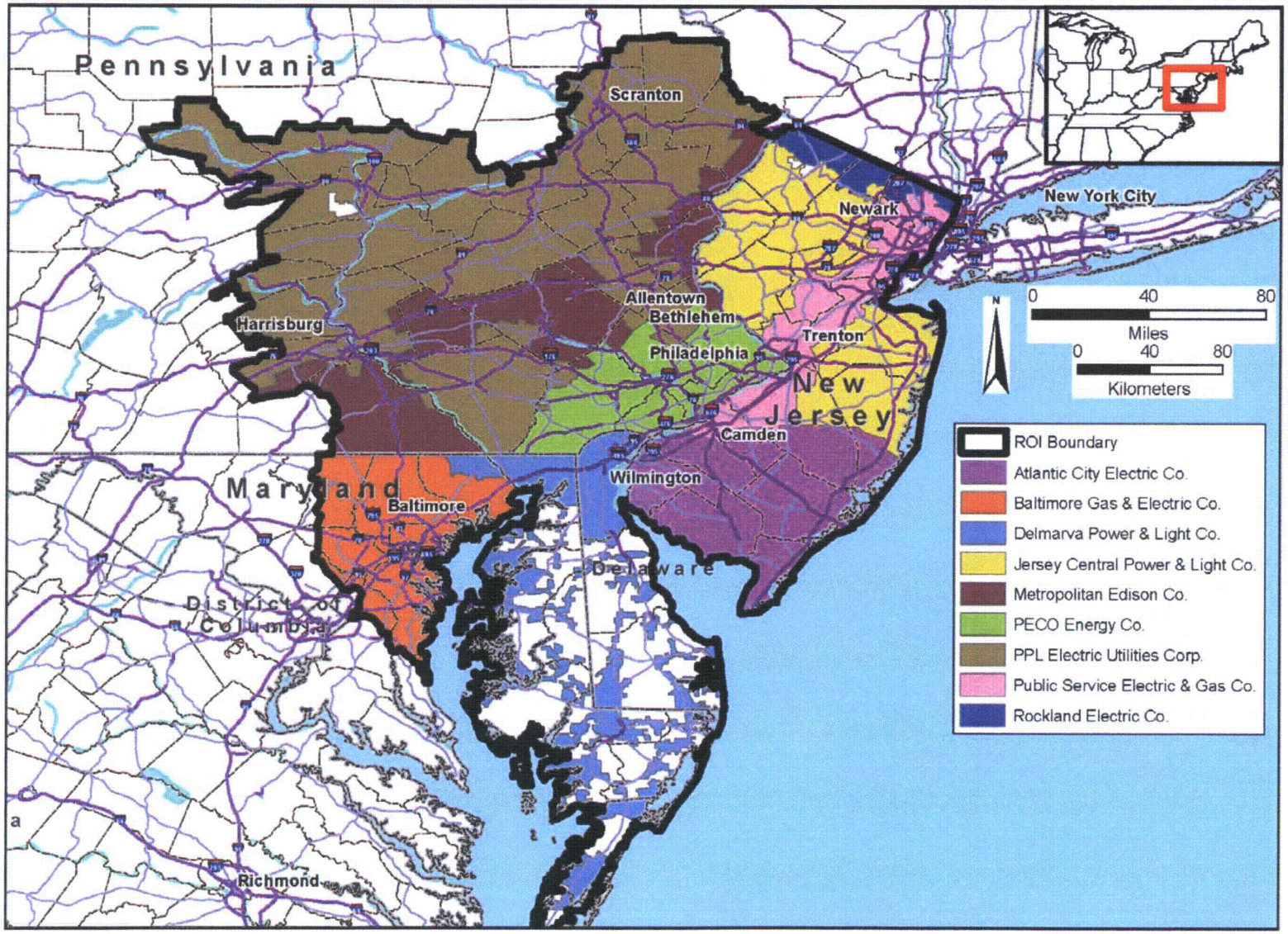


Figure 9.3-2 Candidate Area Exclusionary Criteria

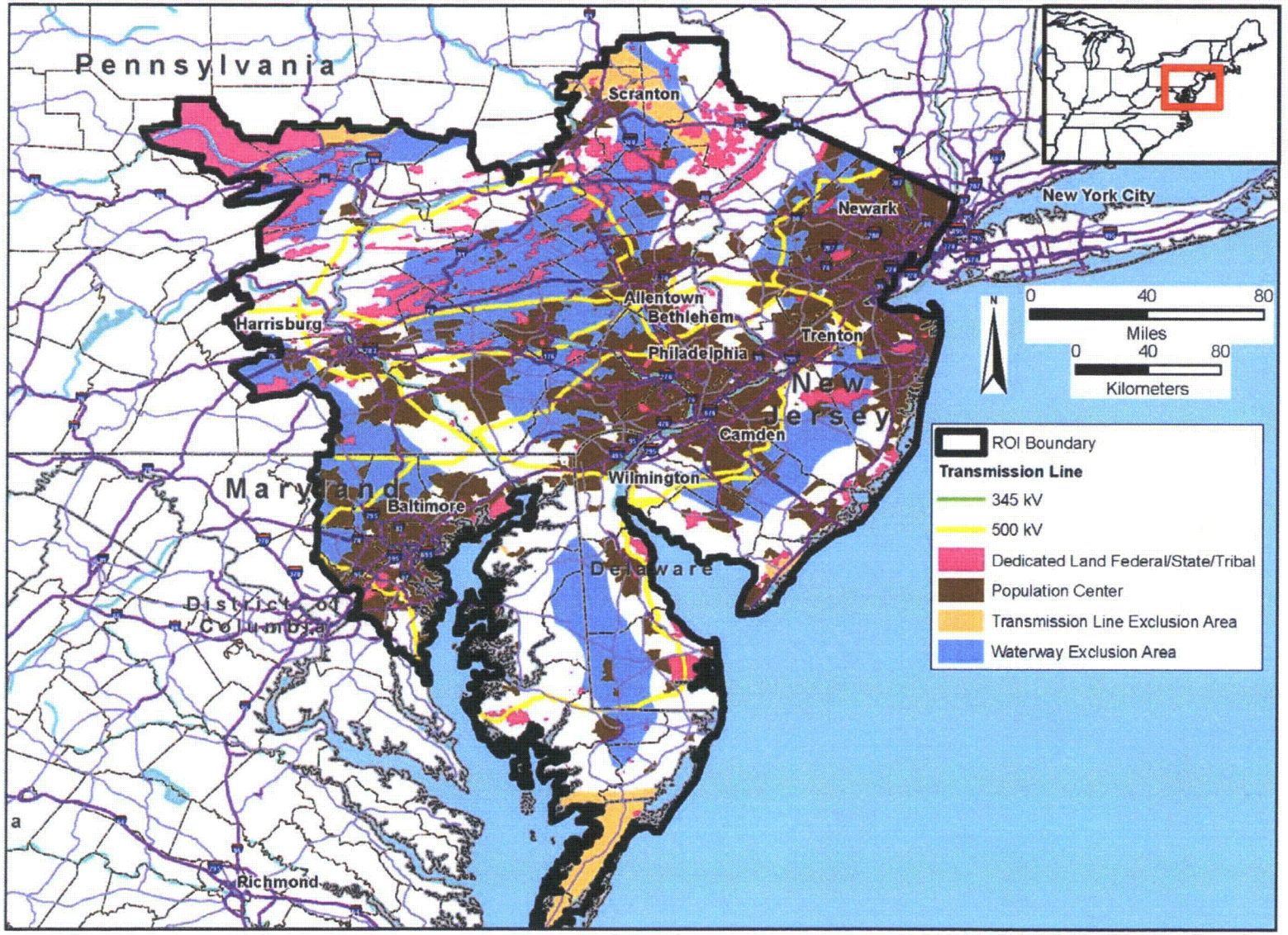


Figure 9.3-3 Candidate Areas

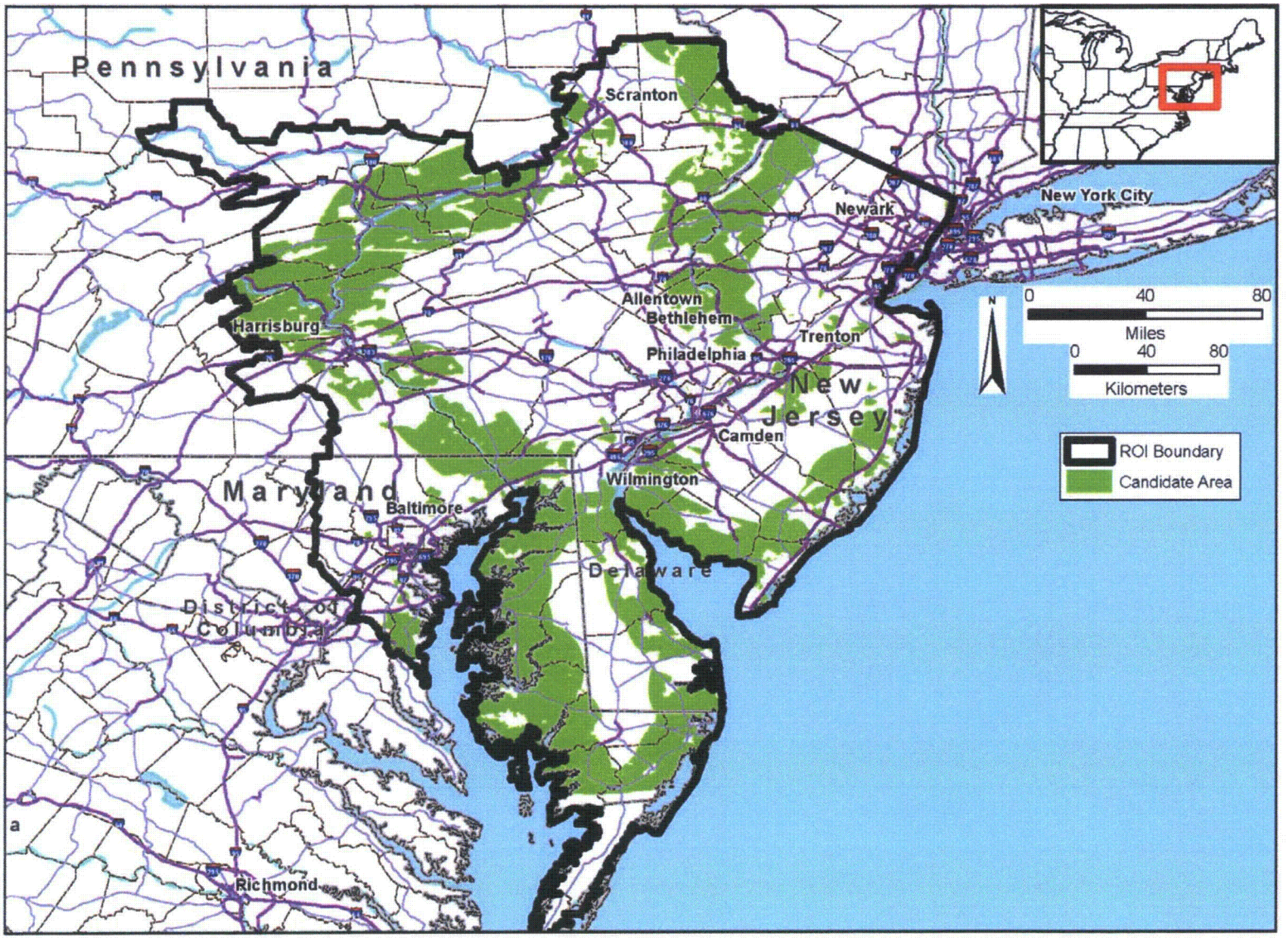


Figure 9.3-4 Not Used

Figure 9.3-5 Candidate Sites

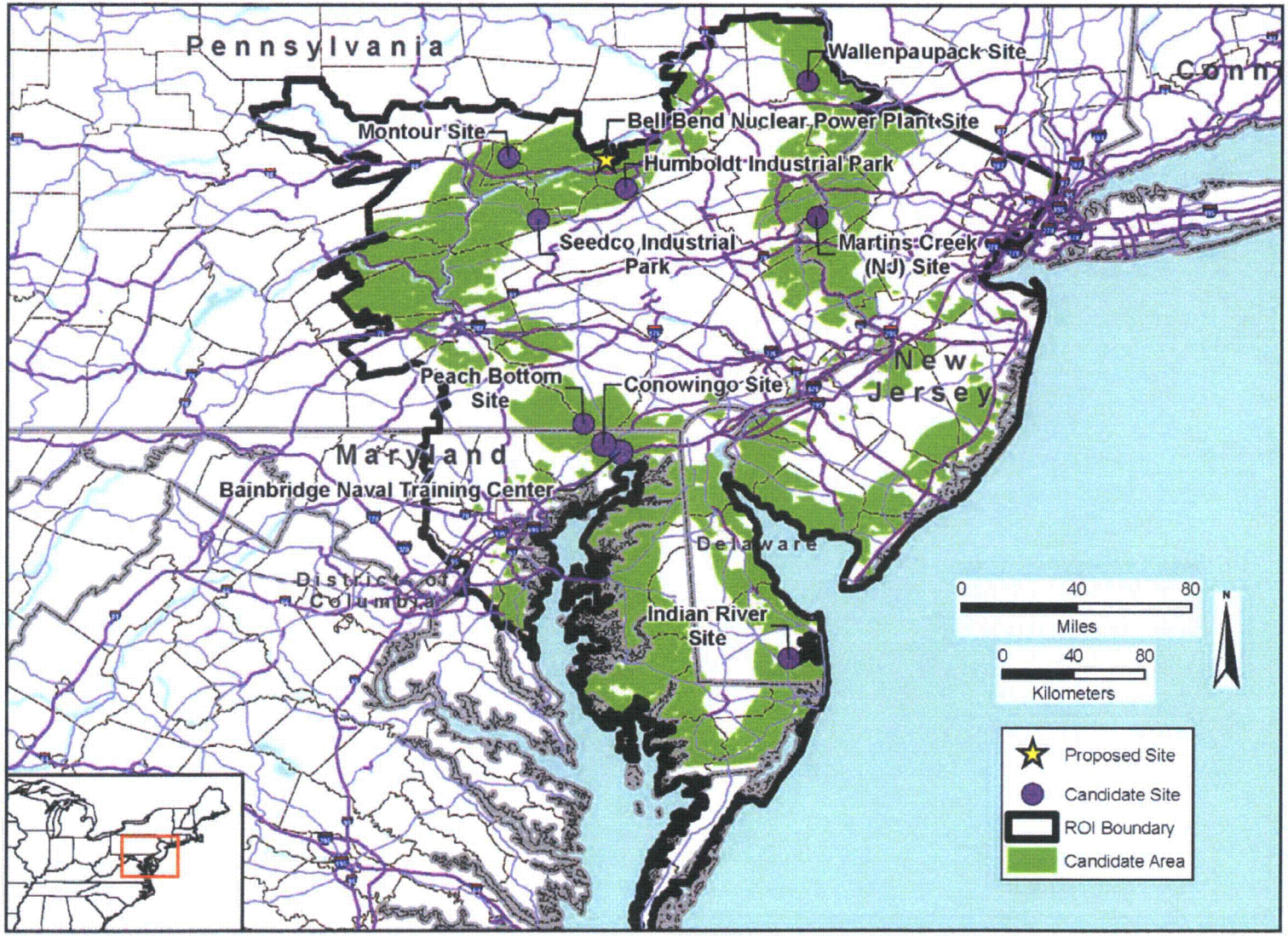


Figure 9.3-6 BBNPP Location Map

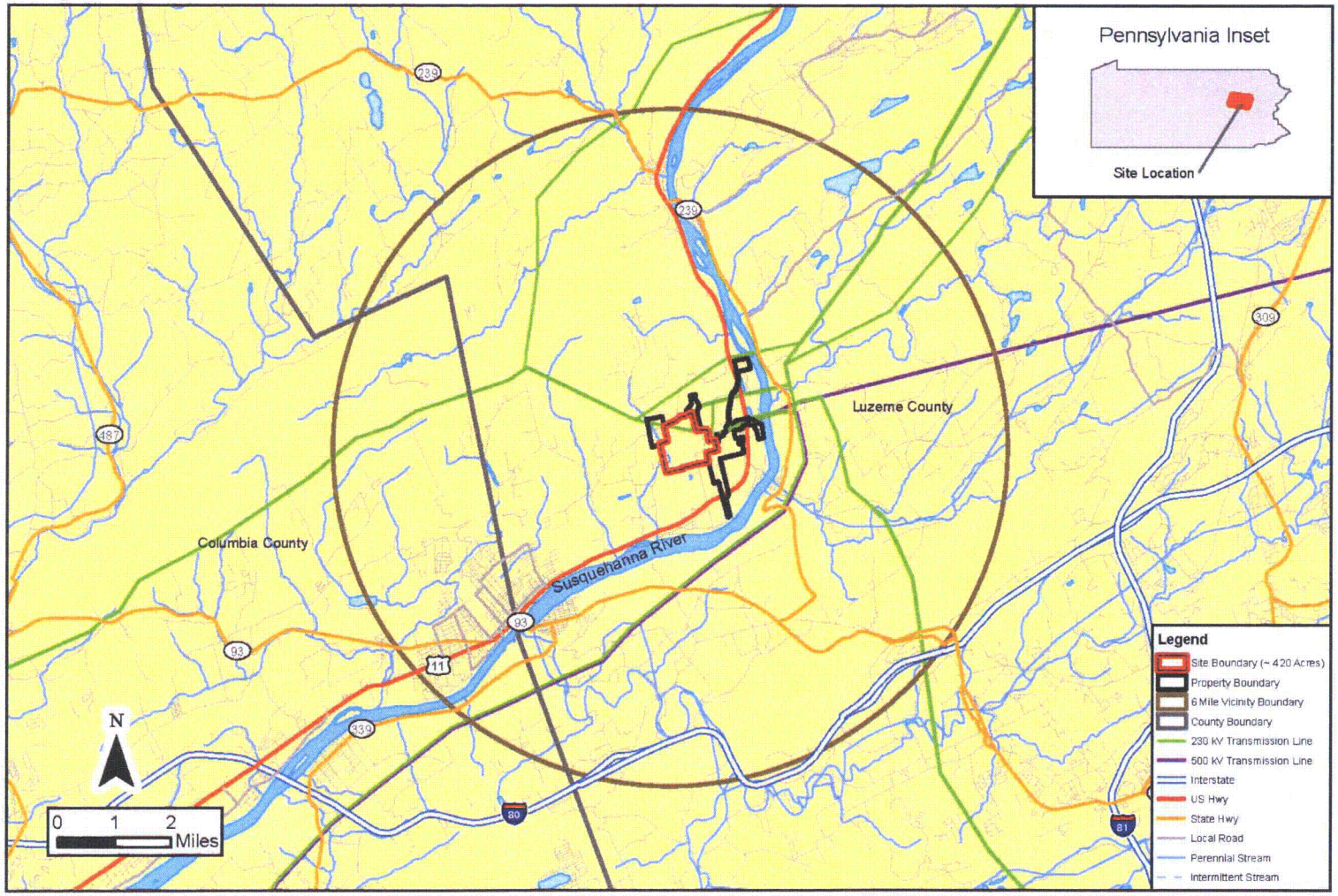


Figure 9.3-7 Montour Site Location Map

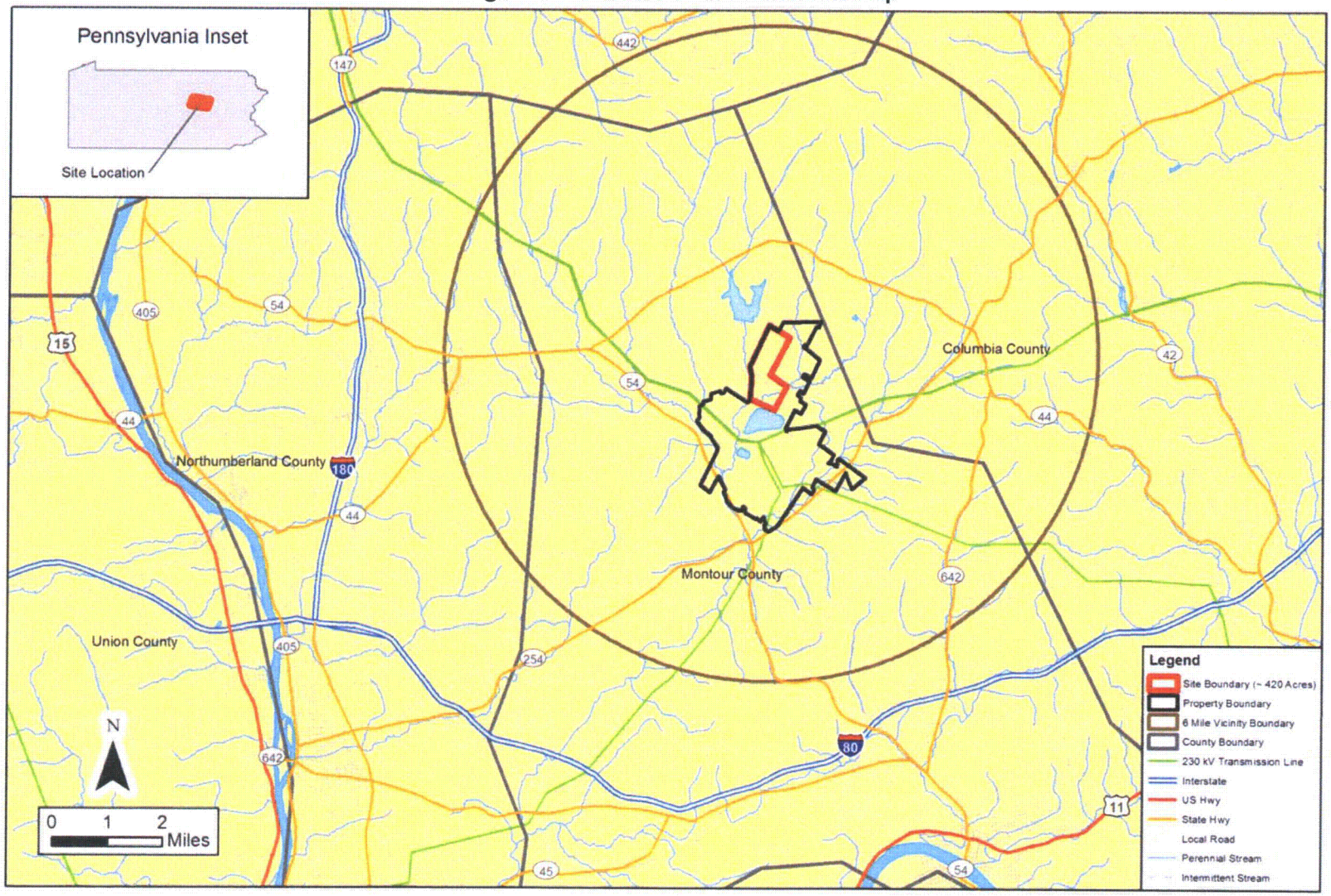


Figure 9.3-8 Not Used

Figure 9.3-9 Humboldt Industrial Park Location Map

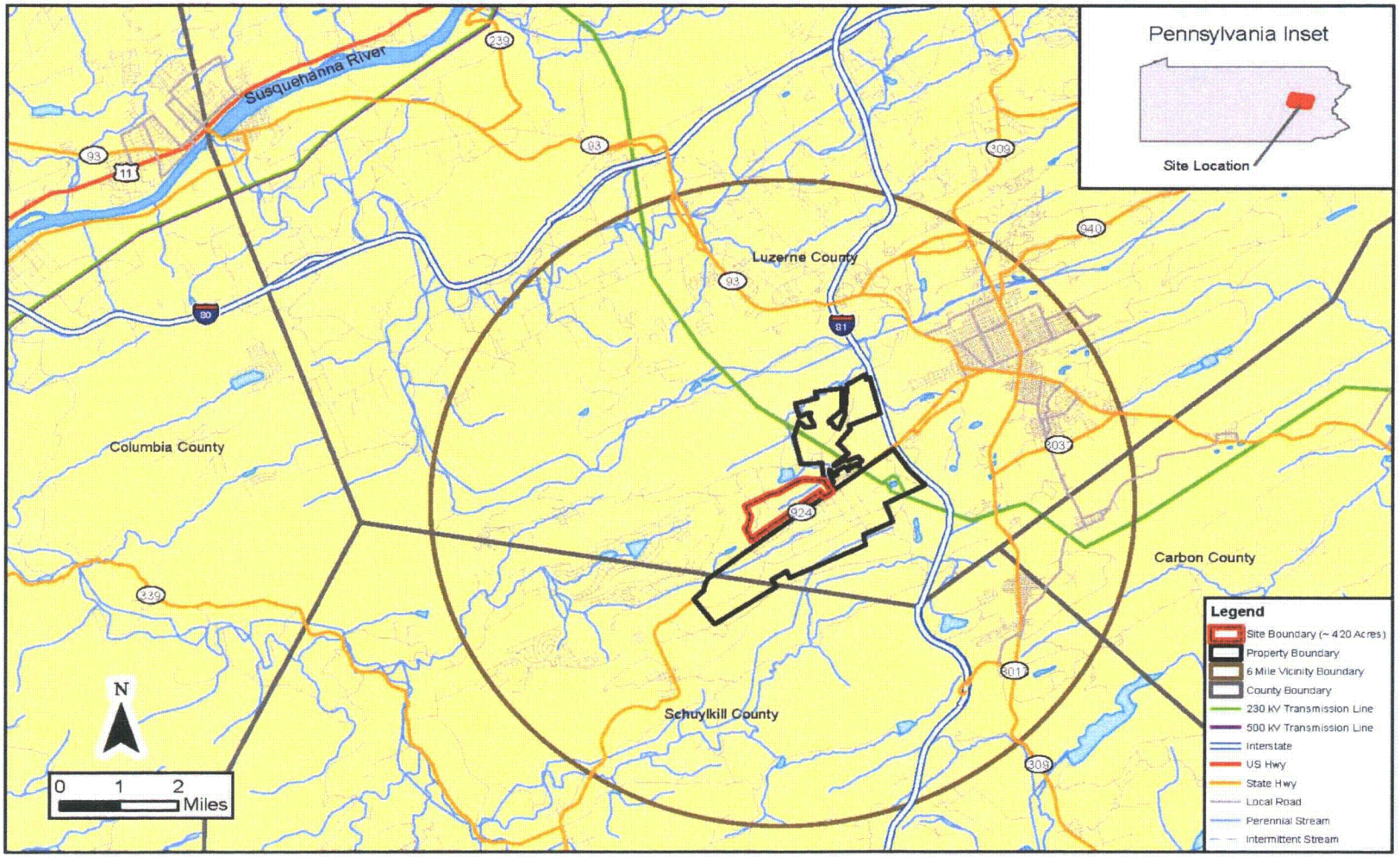


Figure 9.3-10 Not Used

Figure 9.3-11 Seedco Industrial Park Location Map

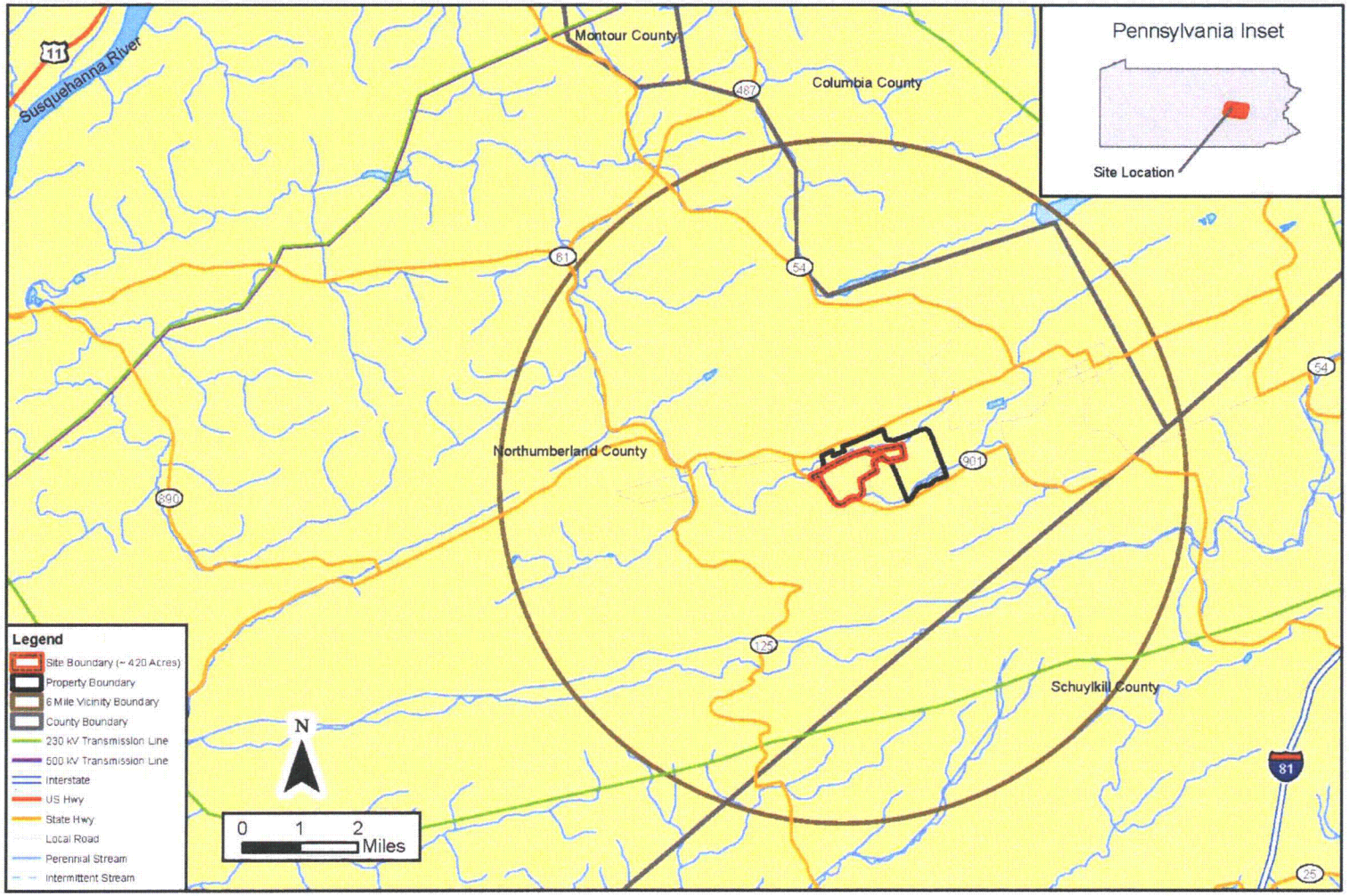


Figure 9.3-12 Not Used

Figure 9.3-13 Alternative Site Evaluation Process Overview

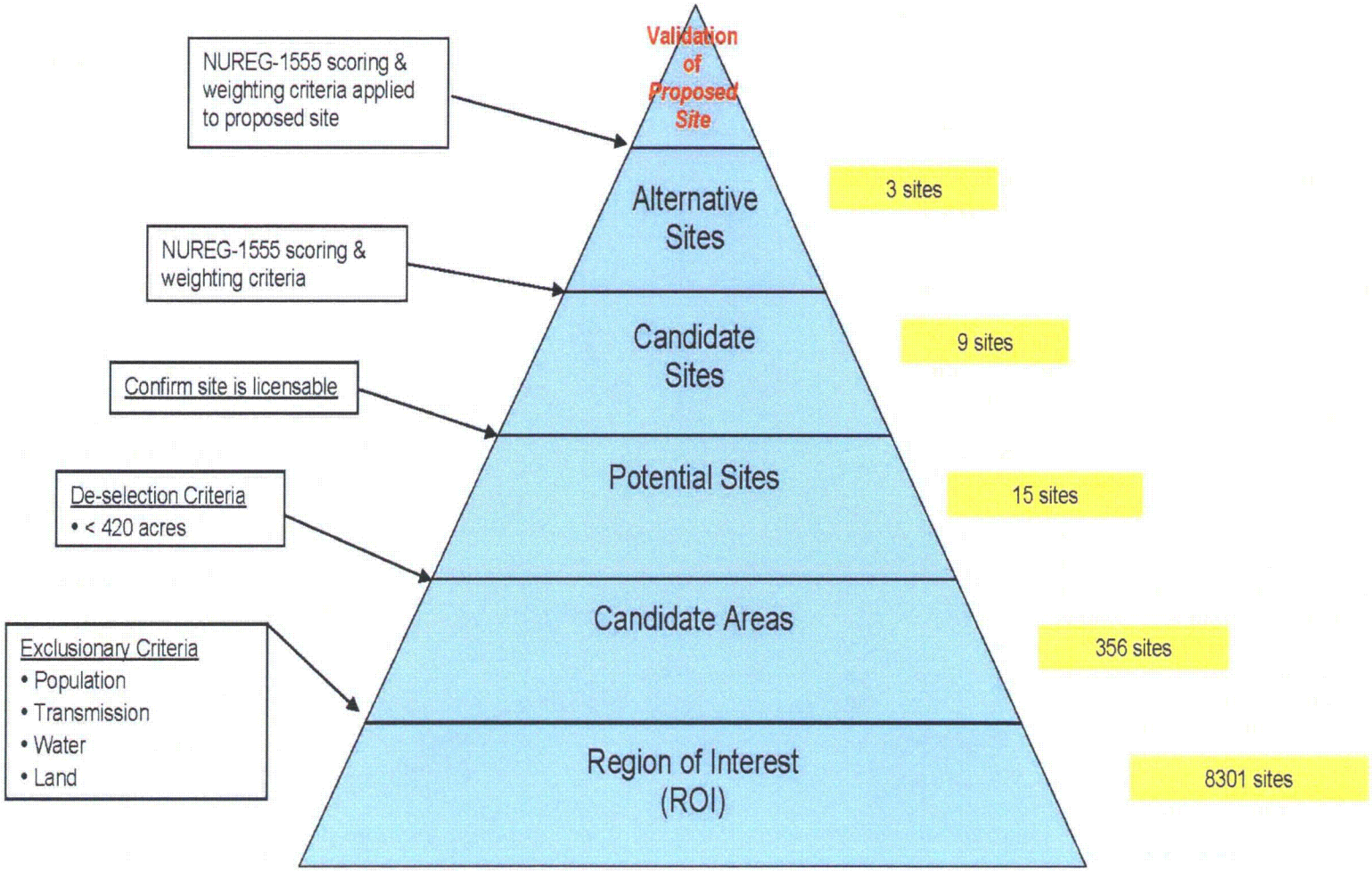


Figure 9.3-14 Candidate Area Exclusionary Criteria – Population

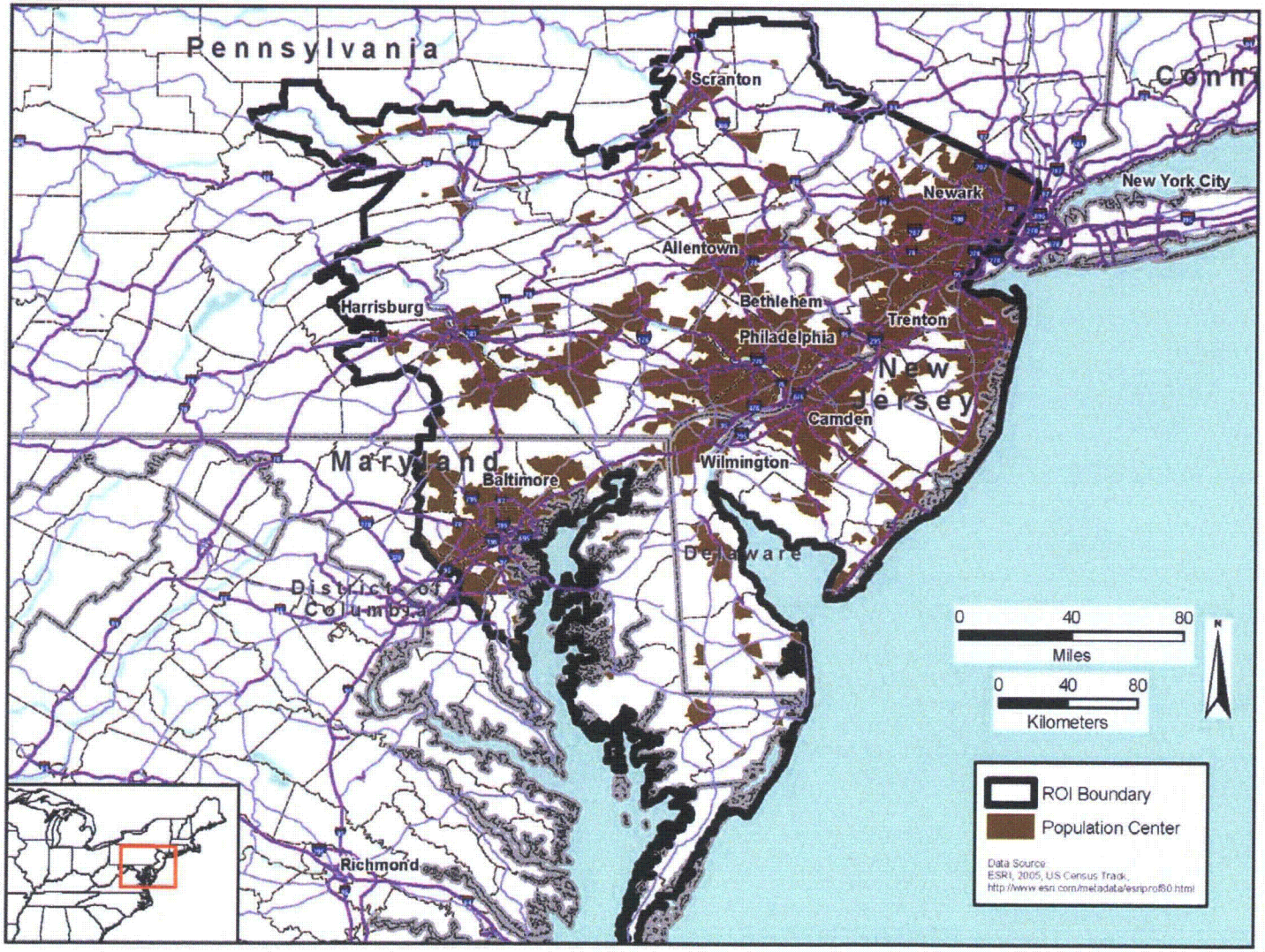


Figure 9.3-15 Candidate Area Exclusionary Criteria – Transmission

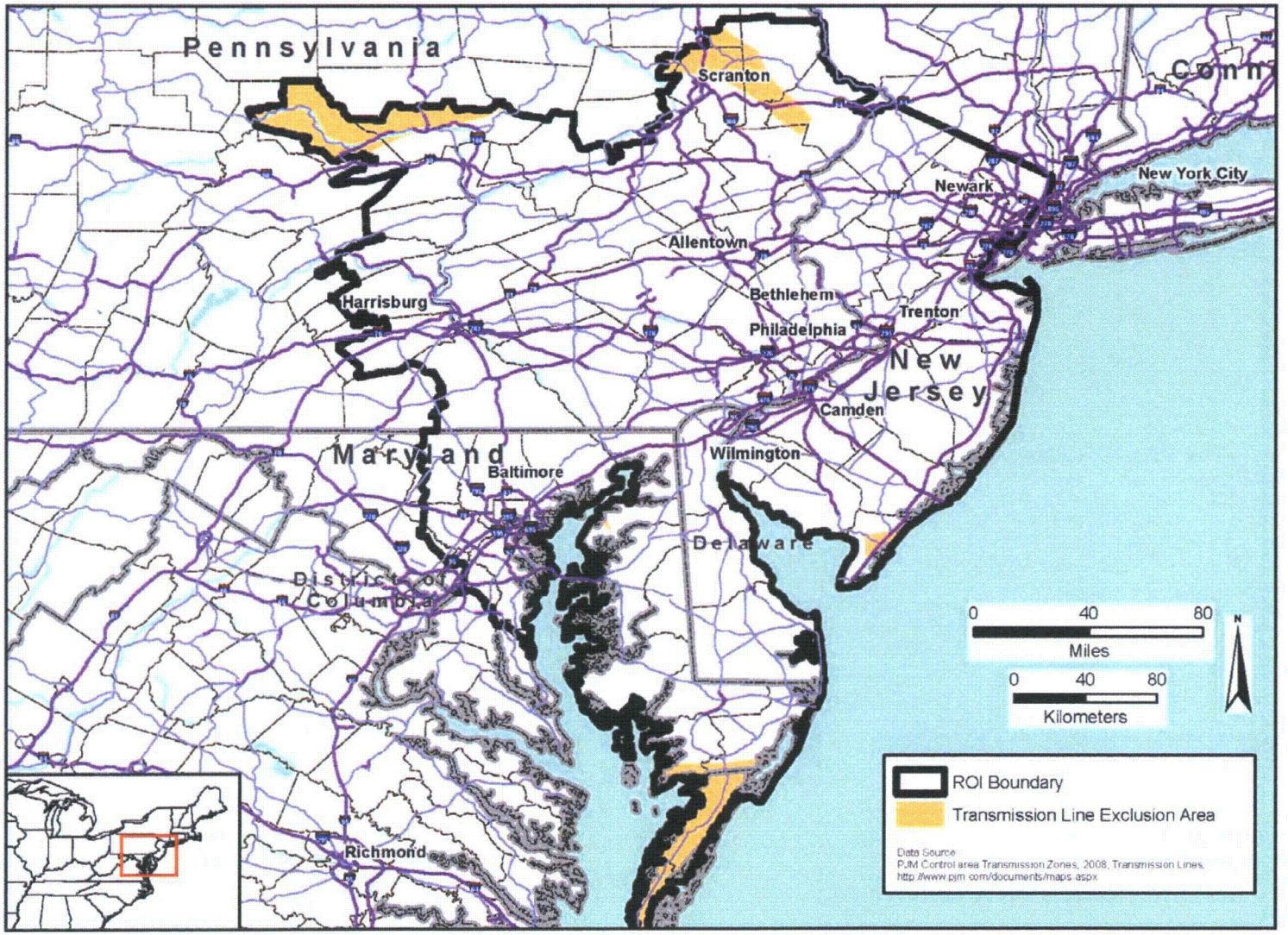


Figure 9.3-16 Candidate Area Exclusionary Criteria – Dedicated Lands

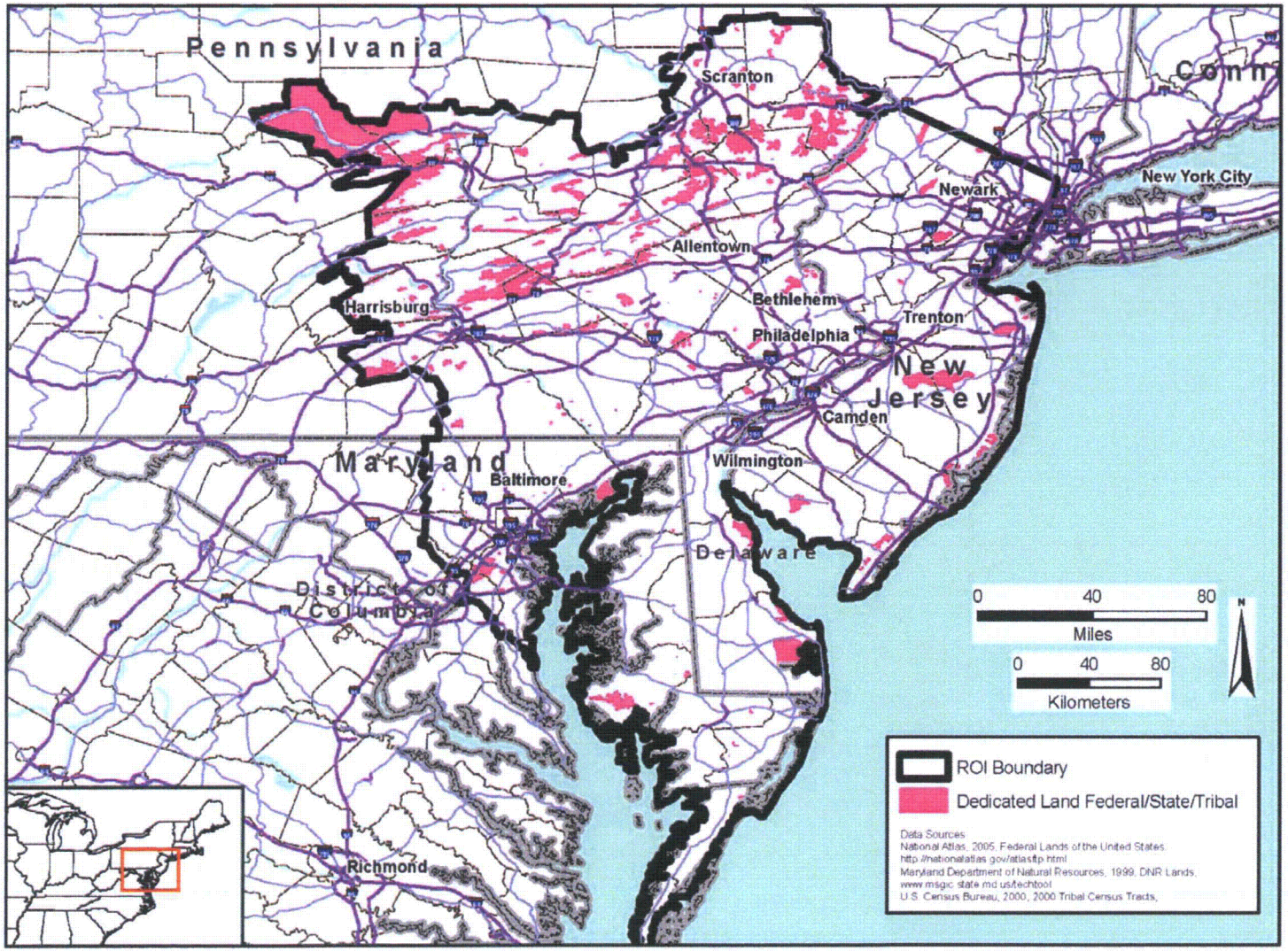


Figure 9.3-17 Candidate Area Exclusionary Criteria – Waterway

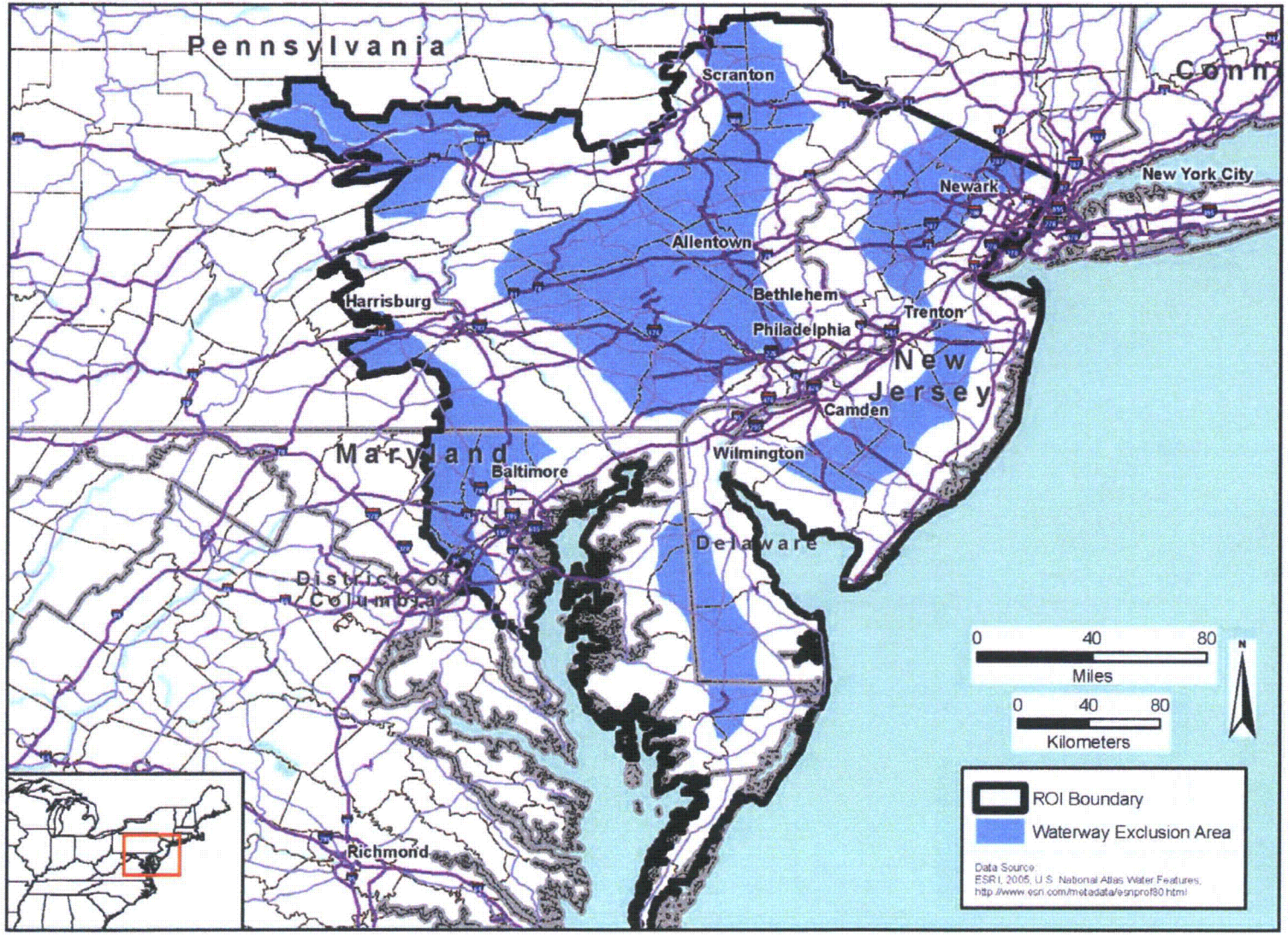


Figure 9.3-18 Locations of Sites within Candidate Areas

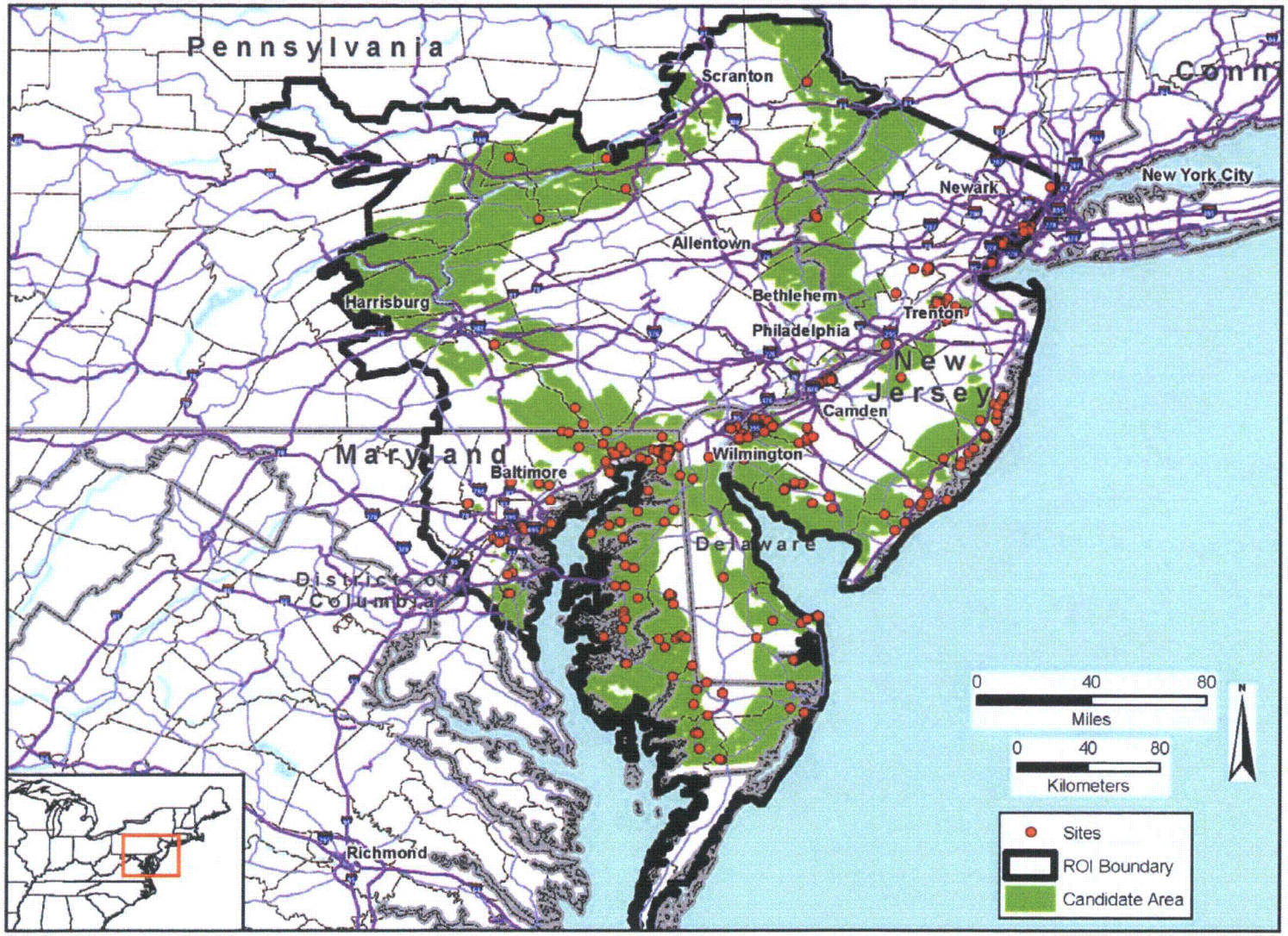


Figure 9.3-19 Alternative Sites and Proposed Site

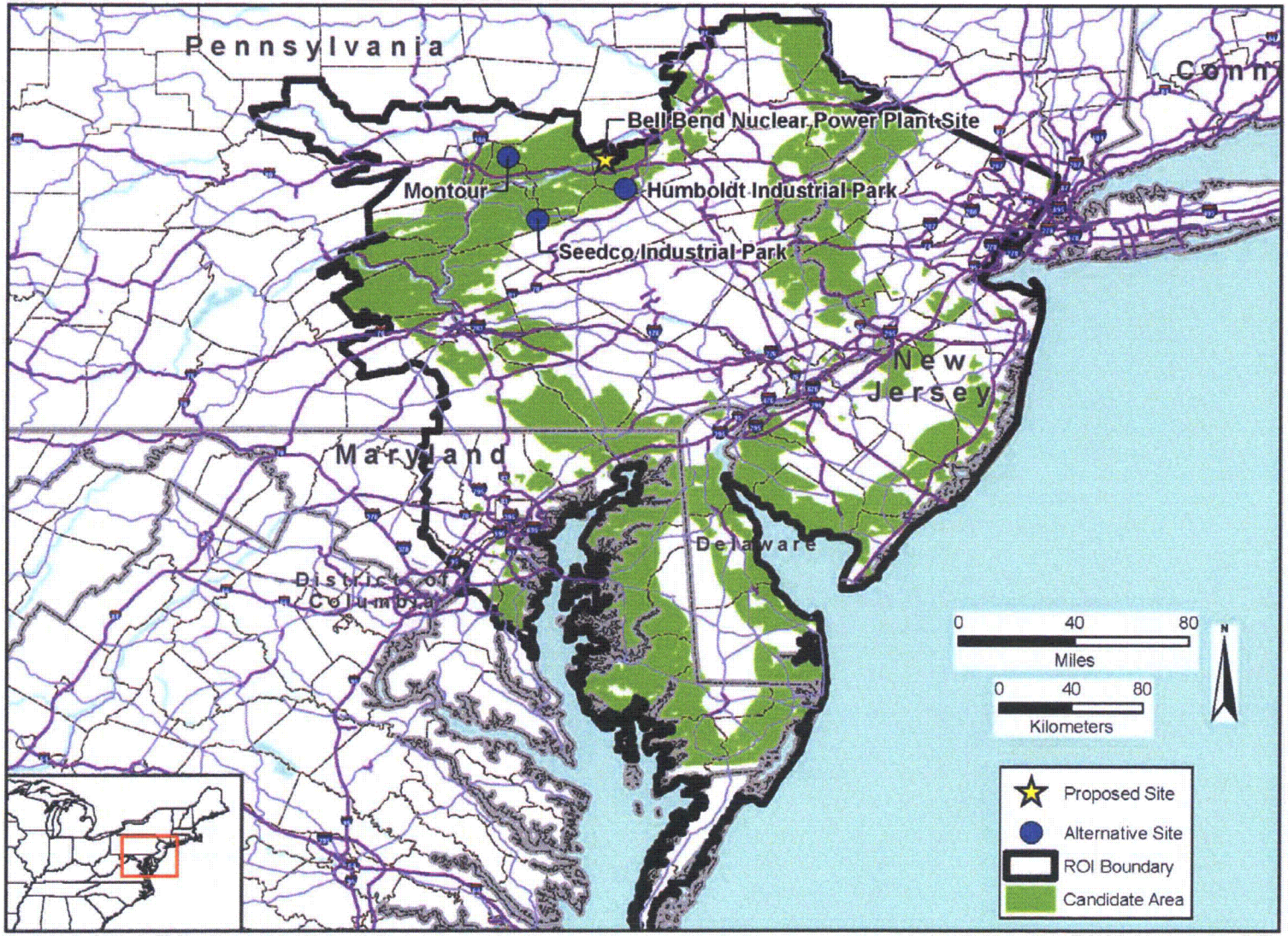


Figure 9.3-20 BBNPP Vicinity Map

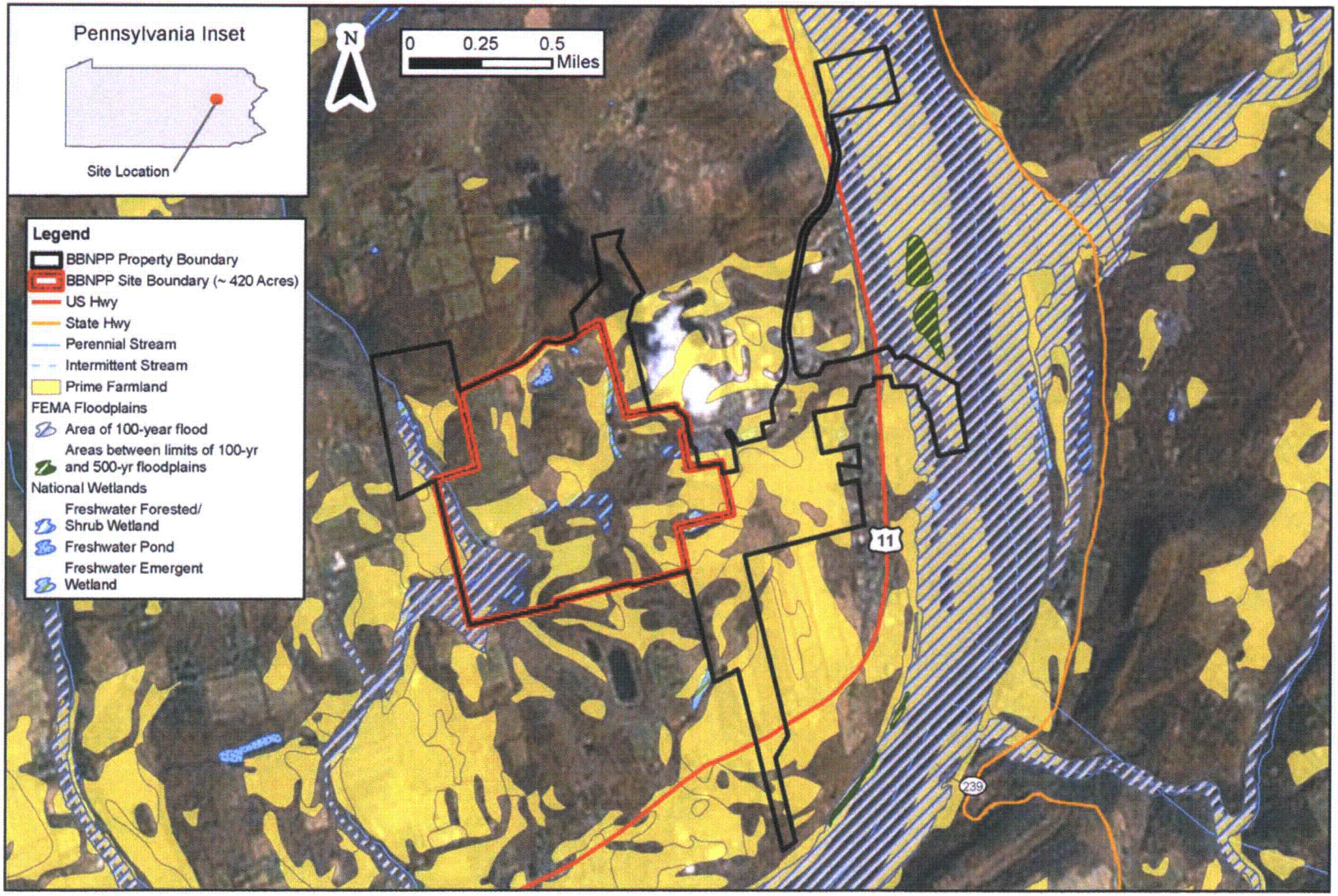


Figure 9.3-21 Montour Site Vicinity Map

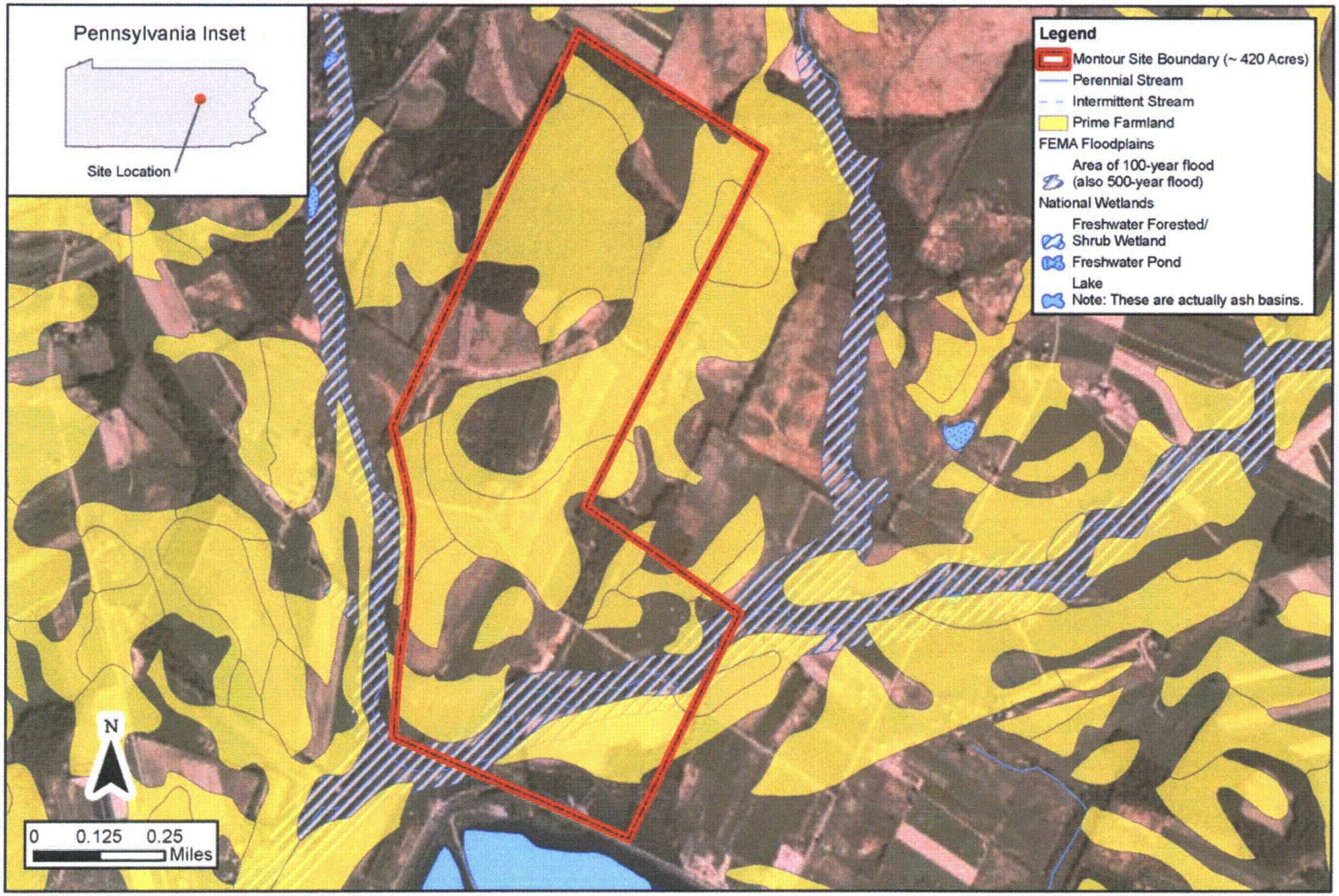


Figure 9.3-22 Black Minority Block Groups within 50-Mile Radius of Montour Site

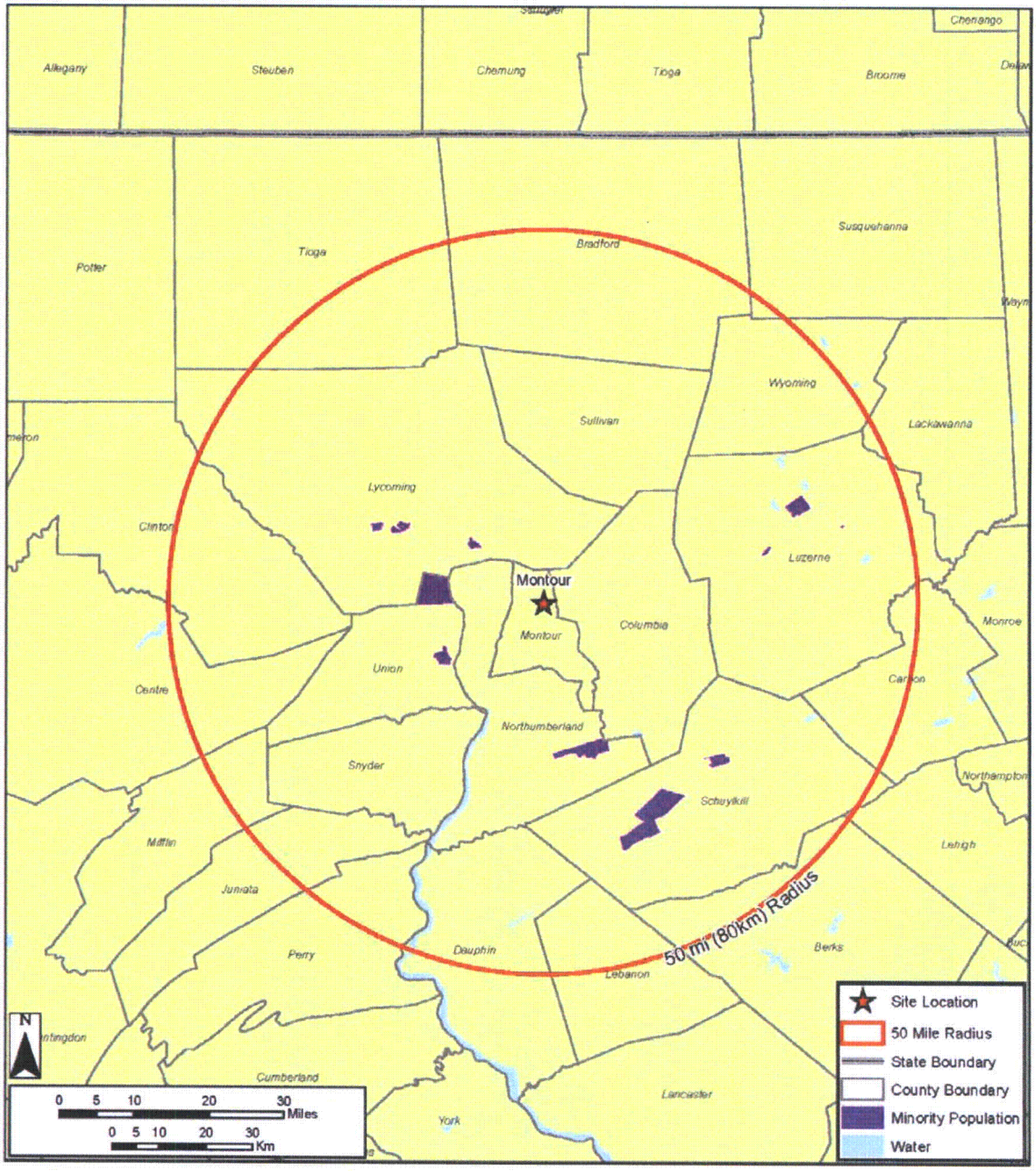


Figure 9.3-23 American Indian Minority Block Groups within 50-Mile Radius of Montour Site

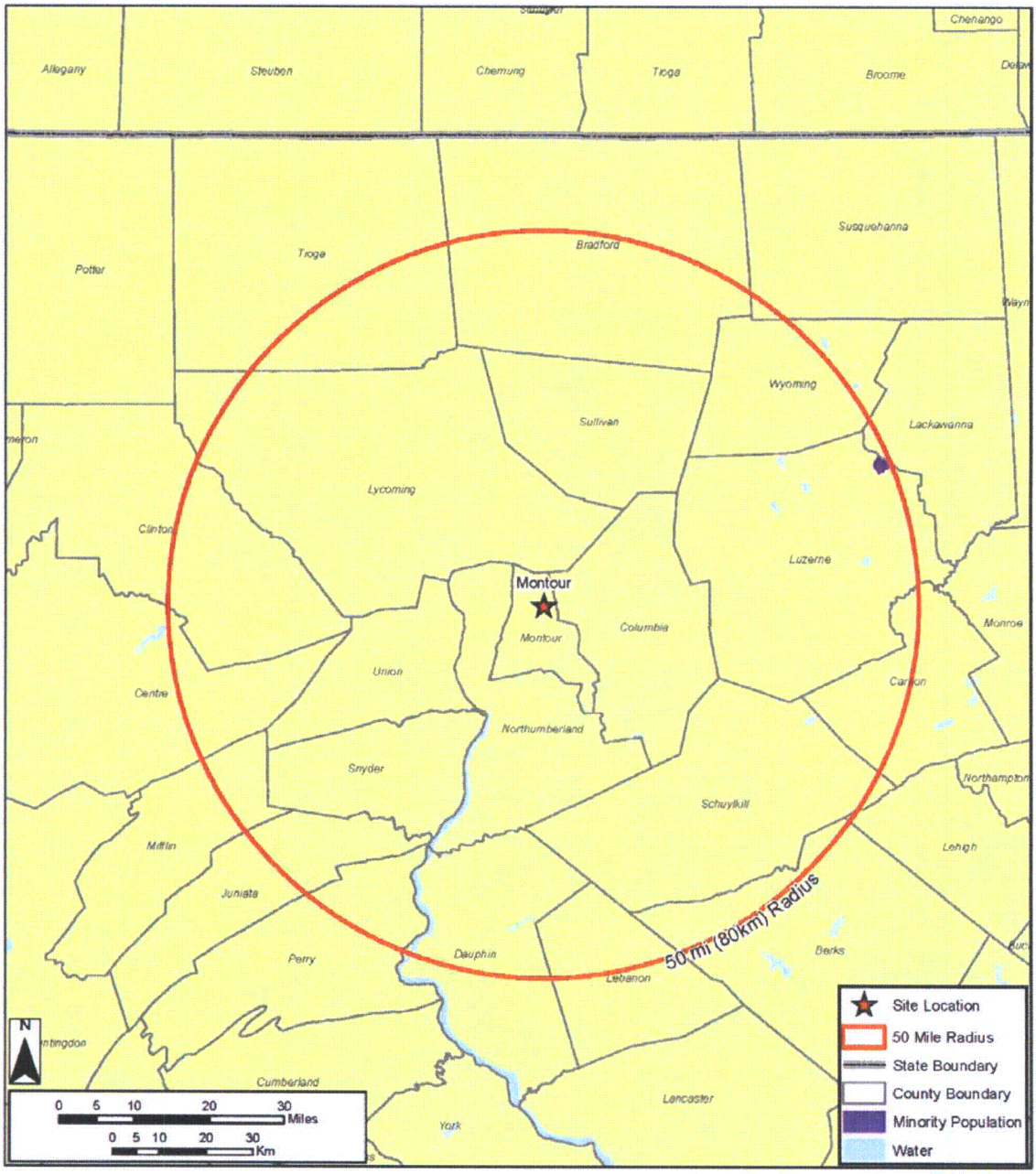


Figure 9.3-24 Aggregate Minority Block Groups within 50-Mile Radius of Montour Site

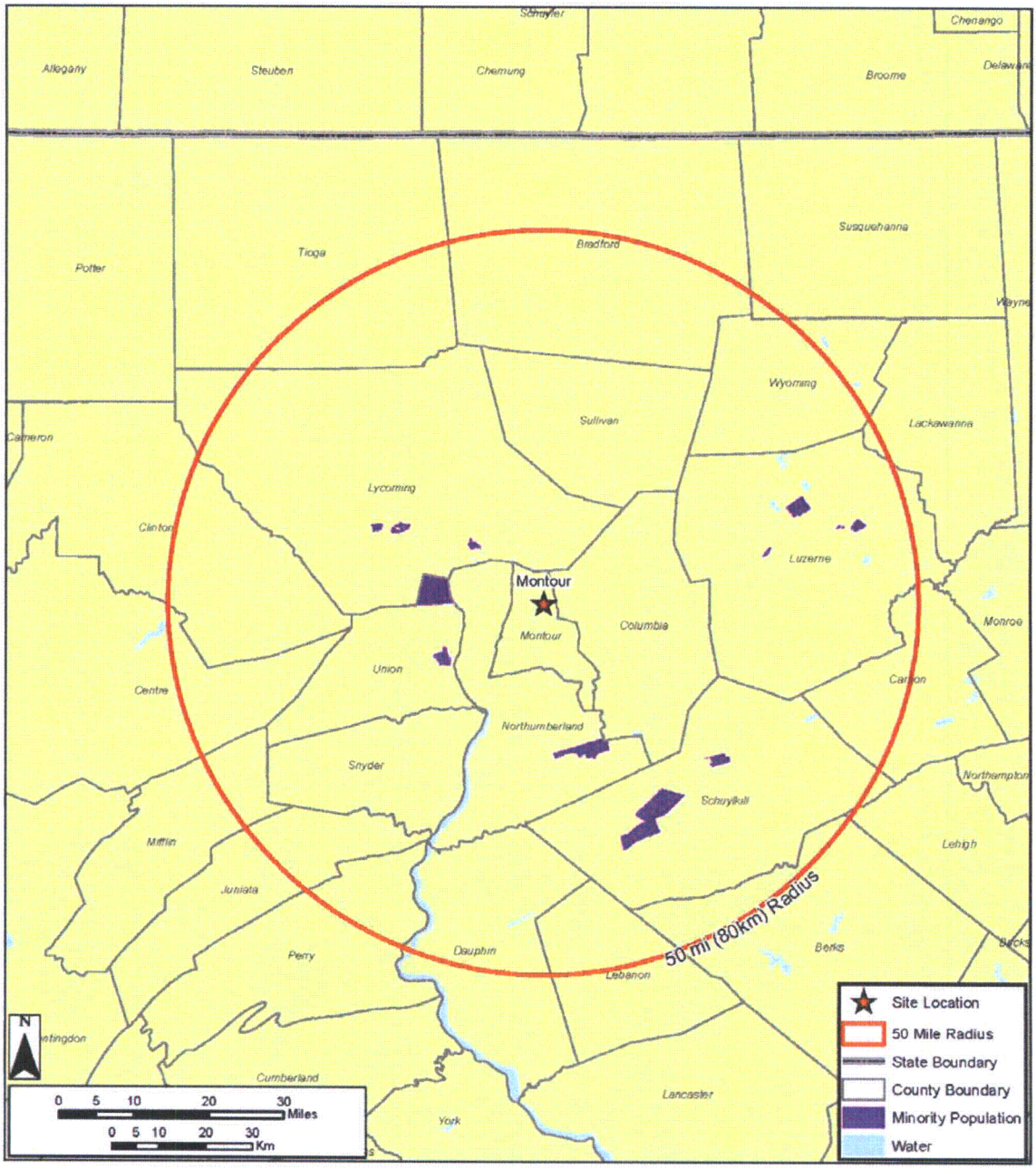


Figure 9.3-25 Low Income Block Groups within 50-Mile Radius of Montour Site

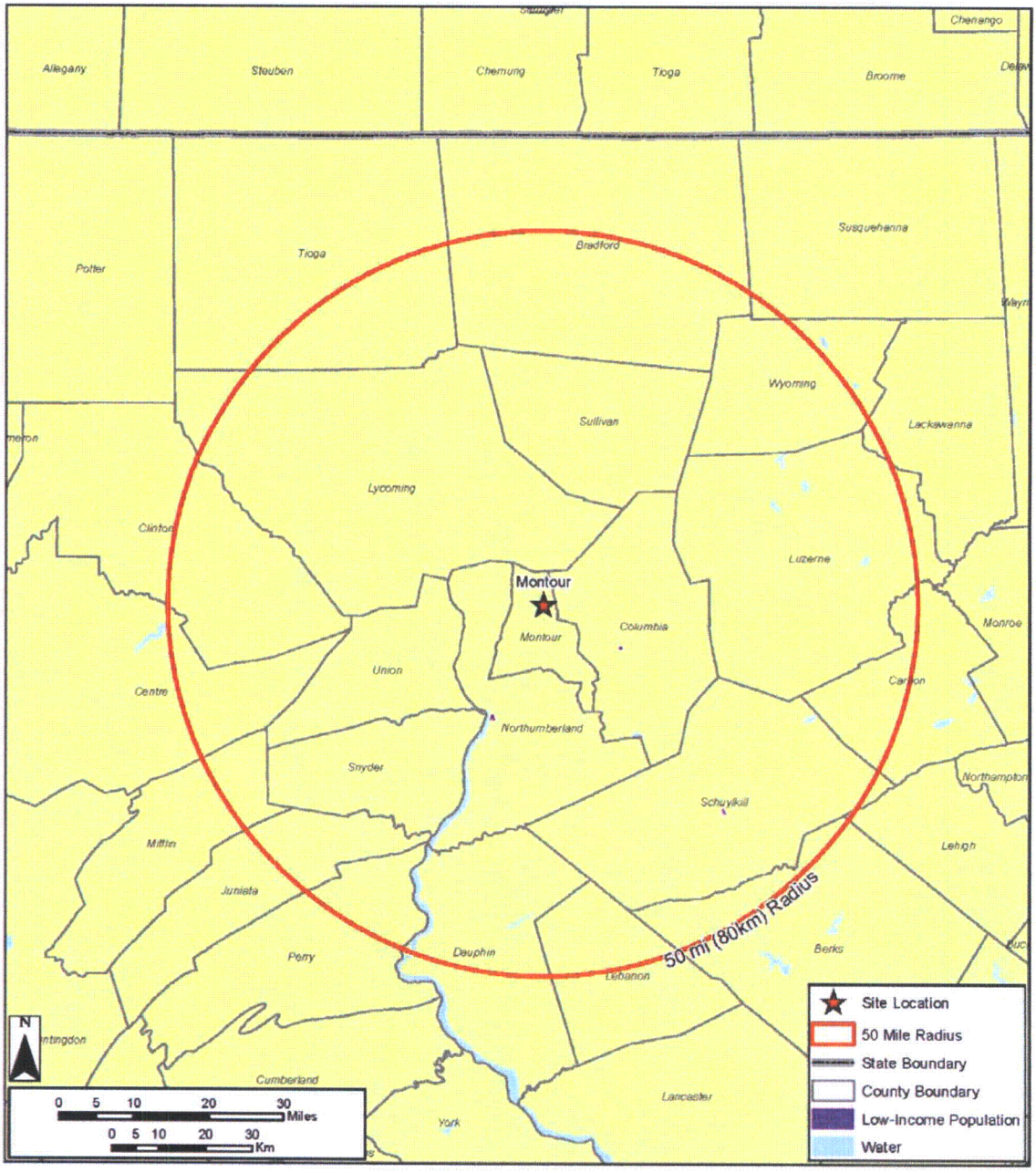


Figure 9.3-26 Humboldt Industrial Park Vicinity Map

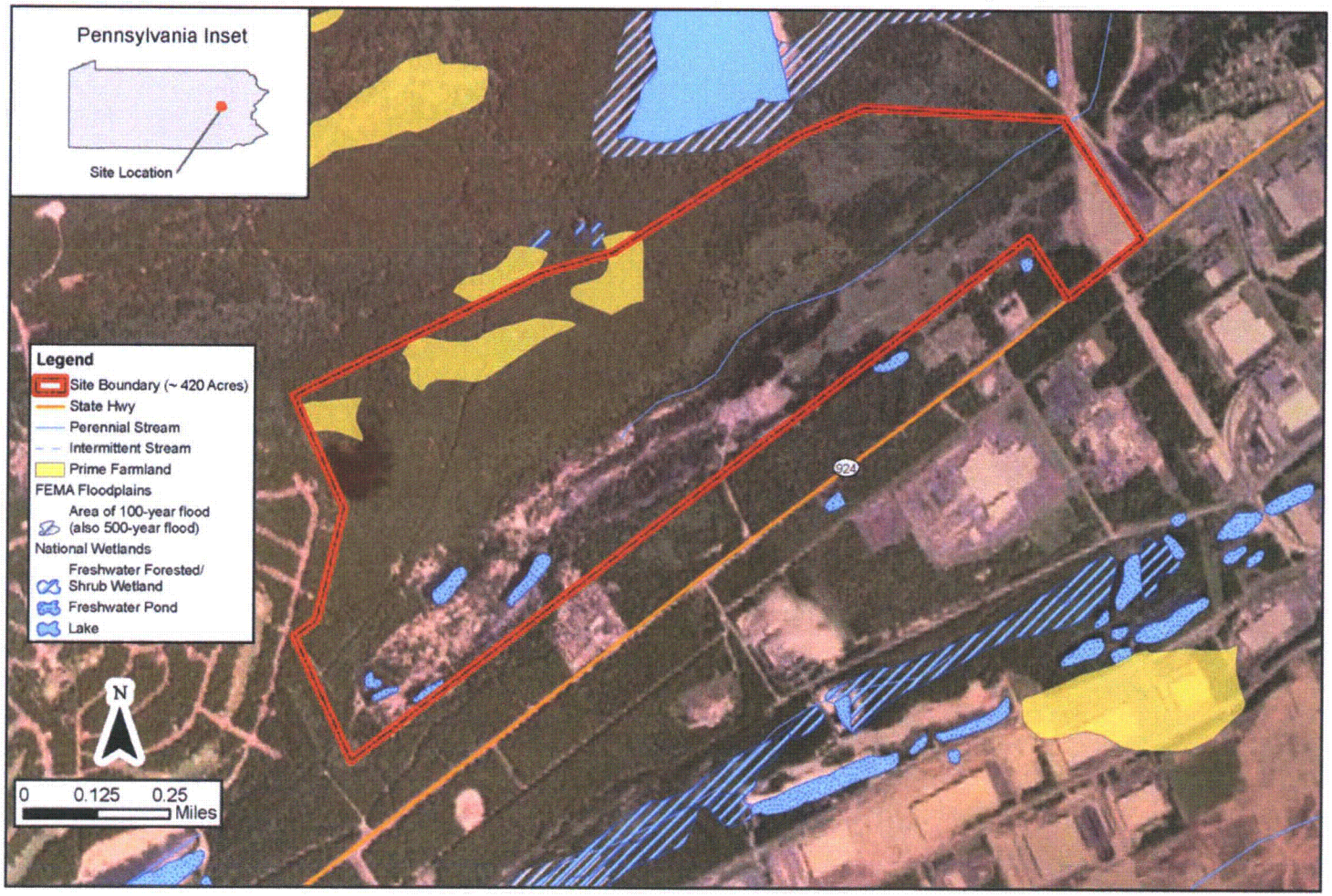


Figure 9.3-27 Black Minority Block Groups within 50-Mile Radius of Humboldt Industrial Park

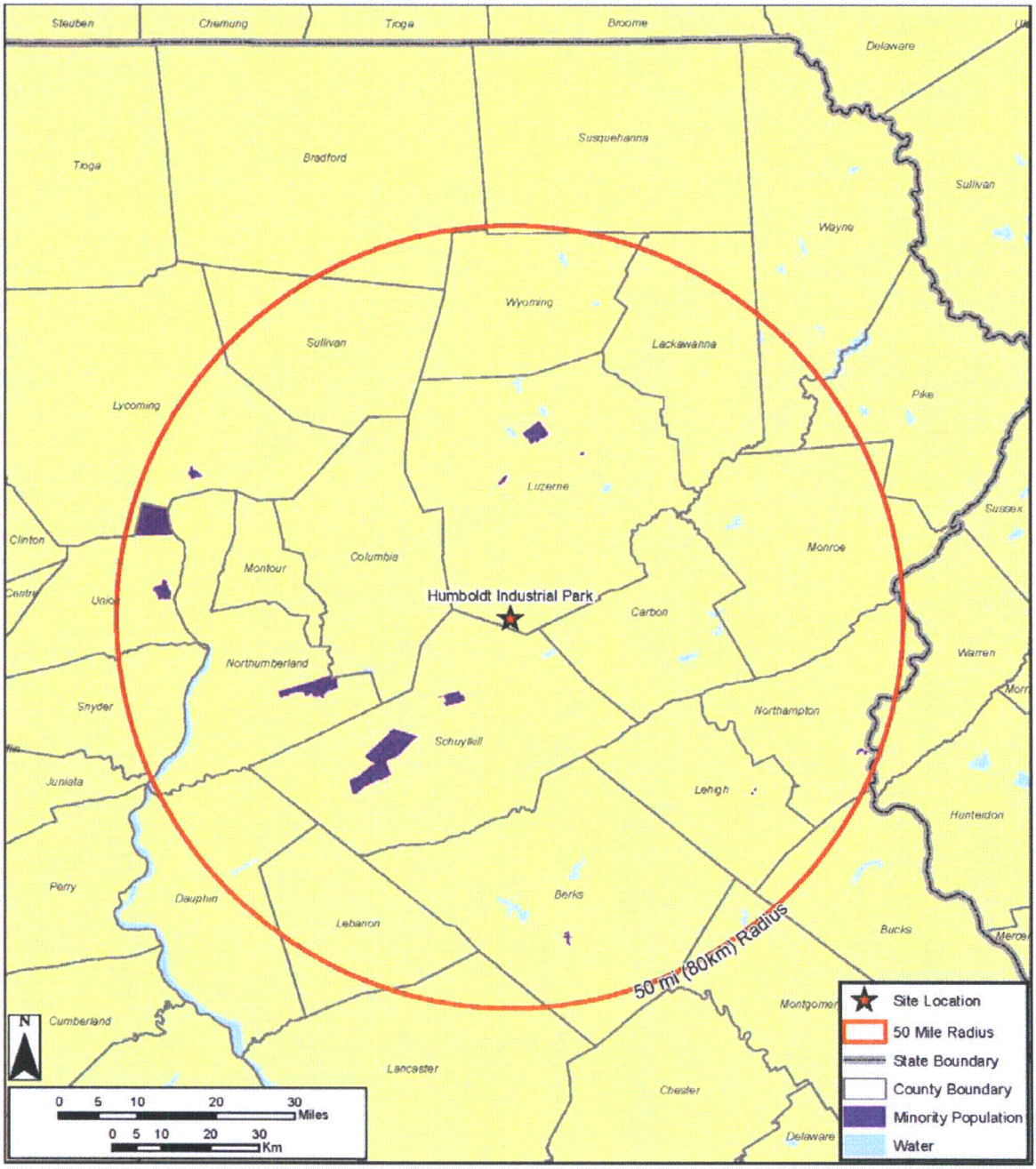


Figure 9.3-28 Asian Minority Block Groups within 50-Mile Radius of Humboldt Industrial Park

Figure 9.3-29 Other Race Minority Block Groups within 50-Mile Radius of Humboldt Industrial Park

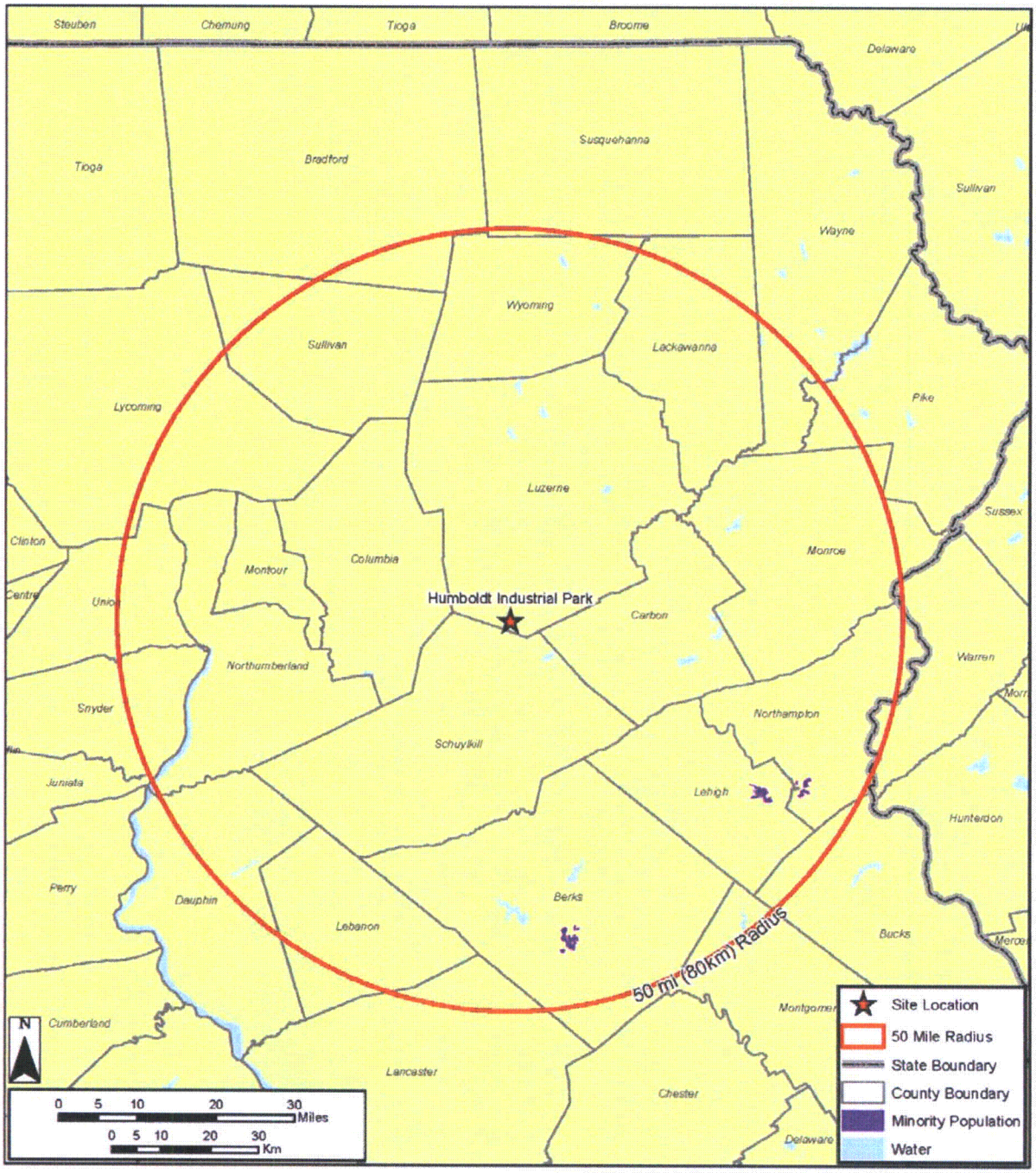


Figure 9.3-30 Aggregate Minority Block Groups within 50-Mile Radius of Humboldt Industrial Park

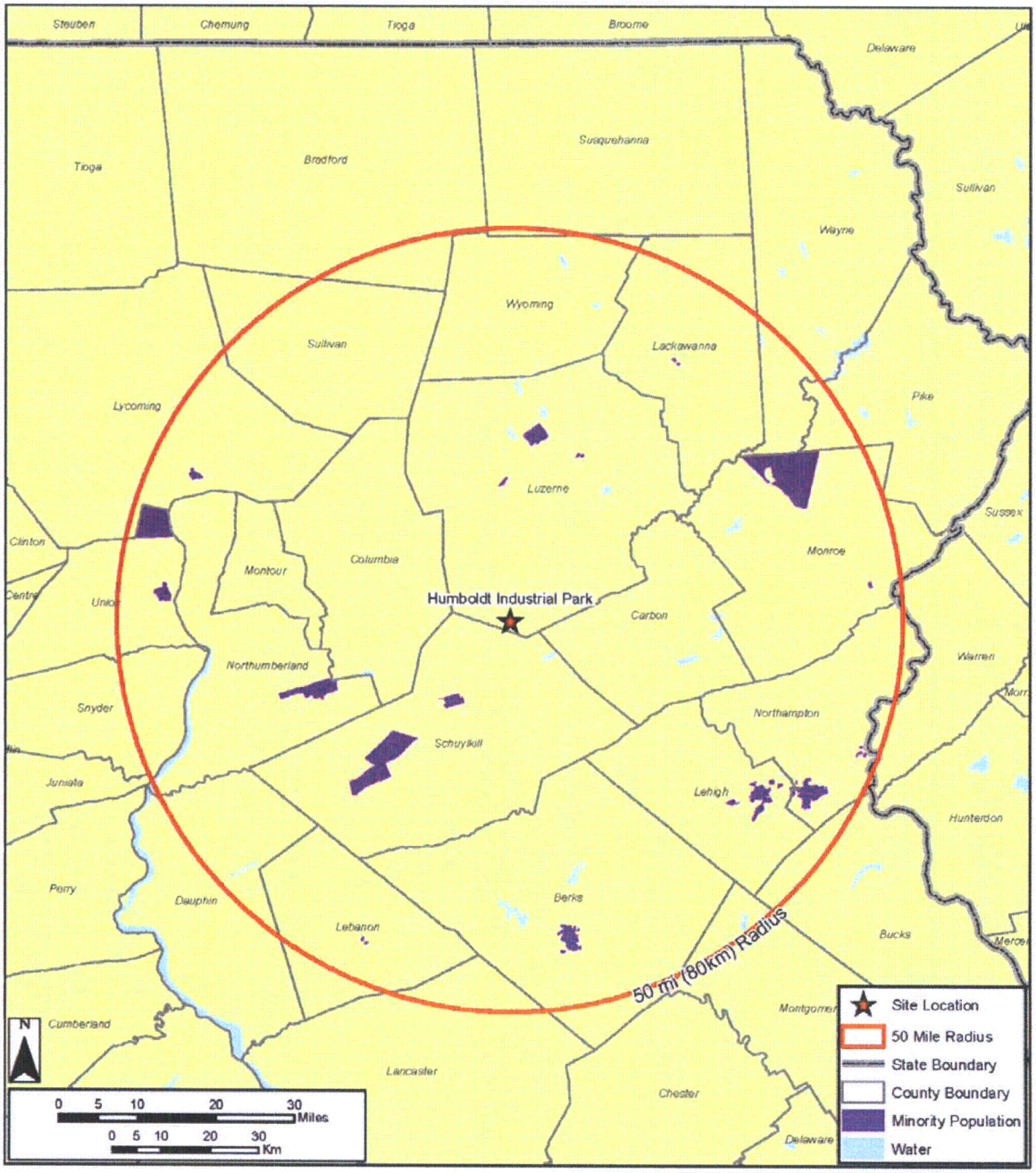


Figure 9.3-31 Hispanic Minority Block Groups within 50-Mile Radius of Humboldt Industrial Park

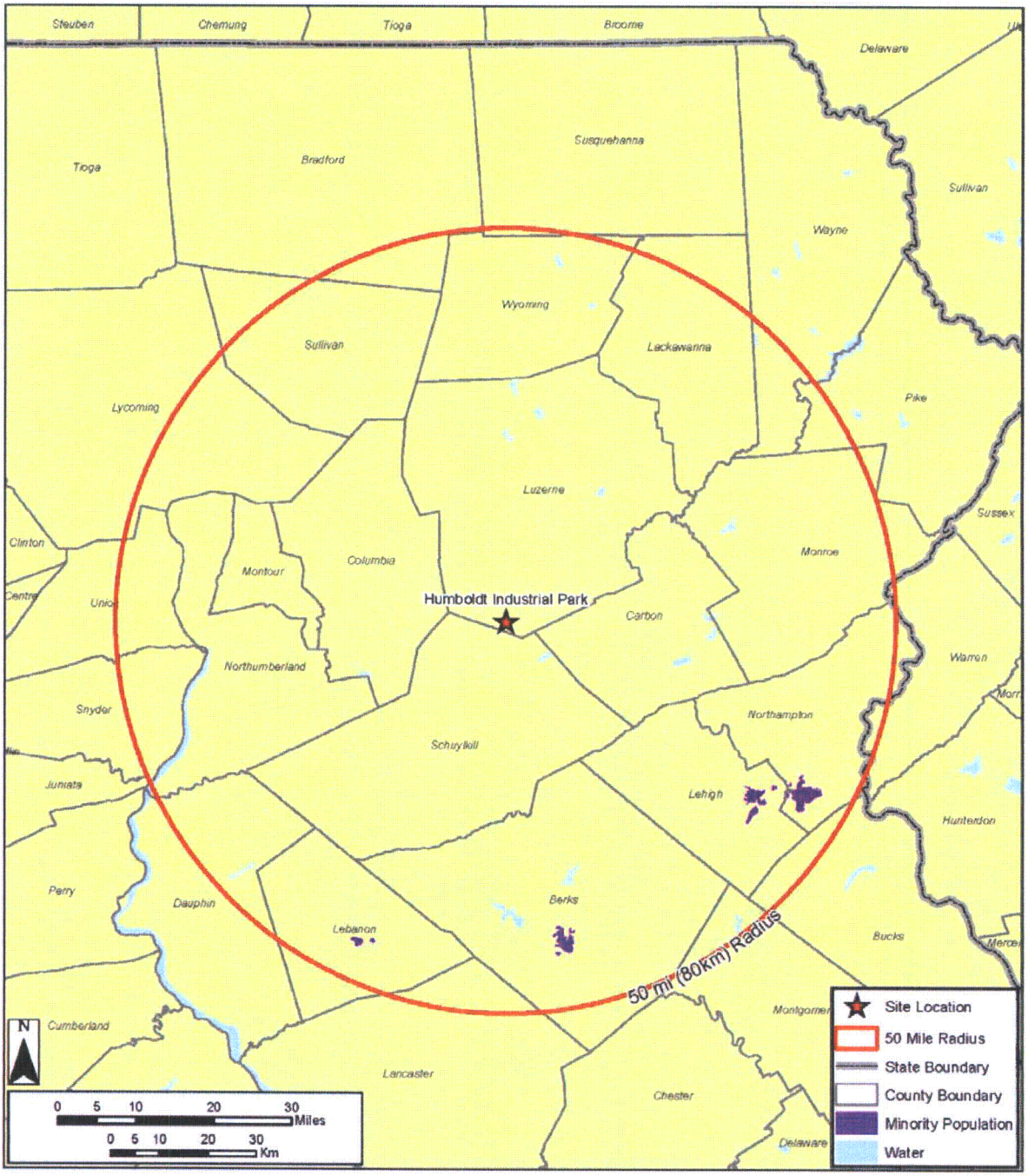


Figure 9.3-32 Low Income Block Groups within 50-Mile Radius of Humboldt Industrial Park

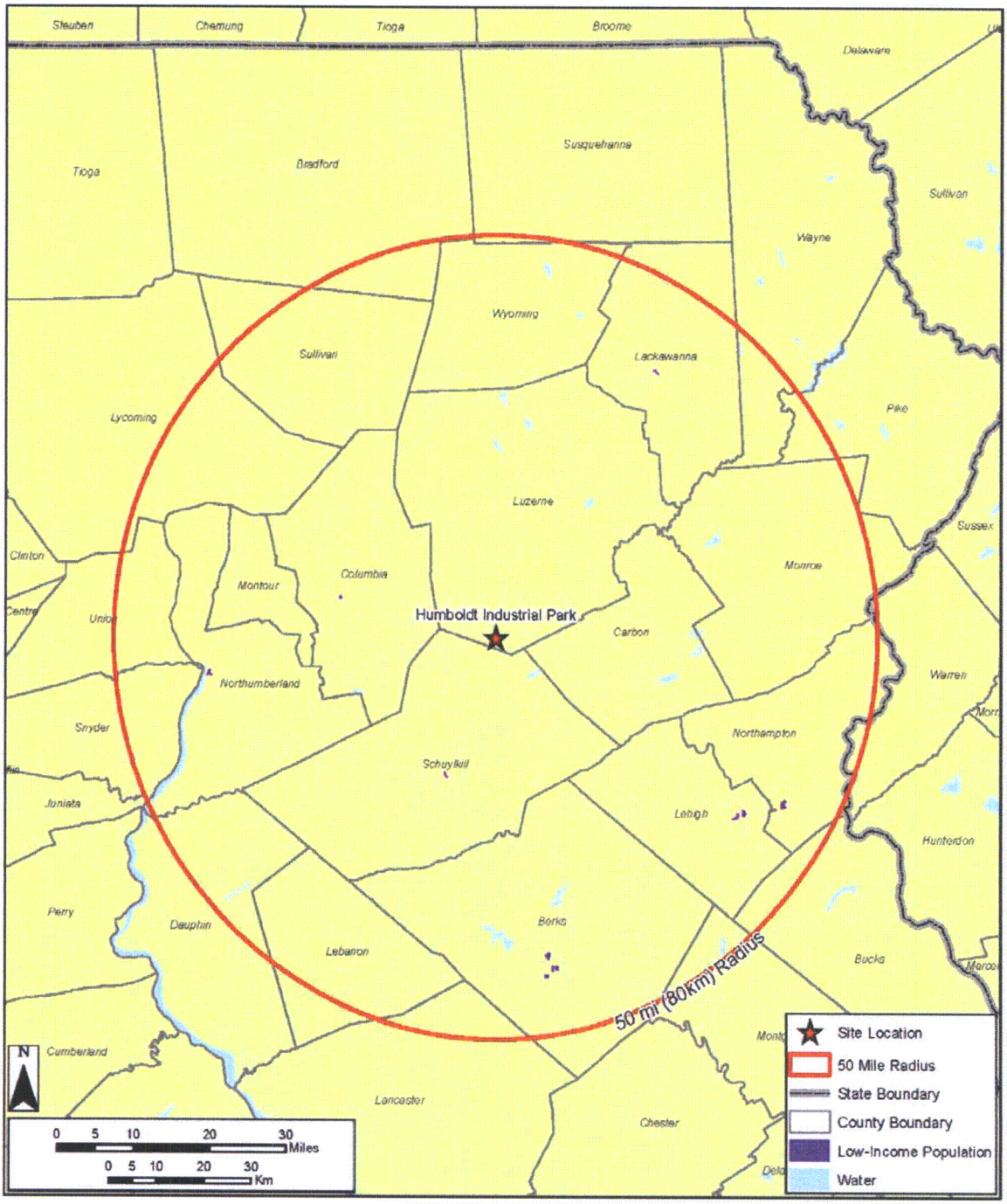


Figure 9.3-33 Seedco Industrial Park Vicinity Map

Figure 9.3-34 Black Minority Block Groups Within 50 Mile Radius of Seedco Industrial Park

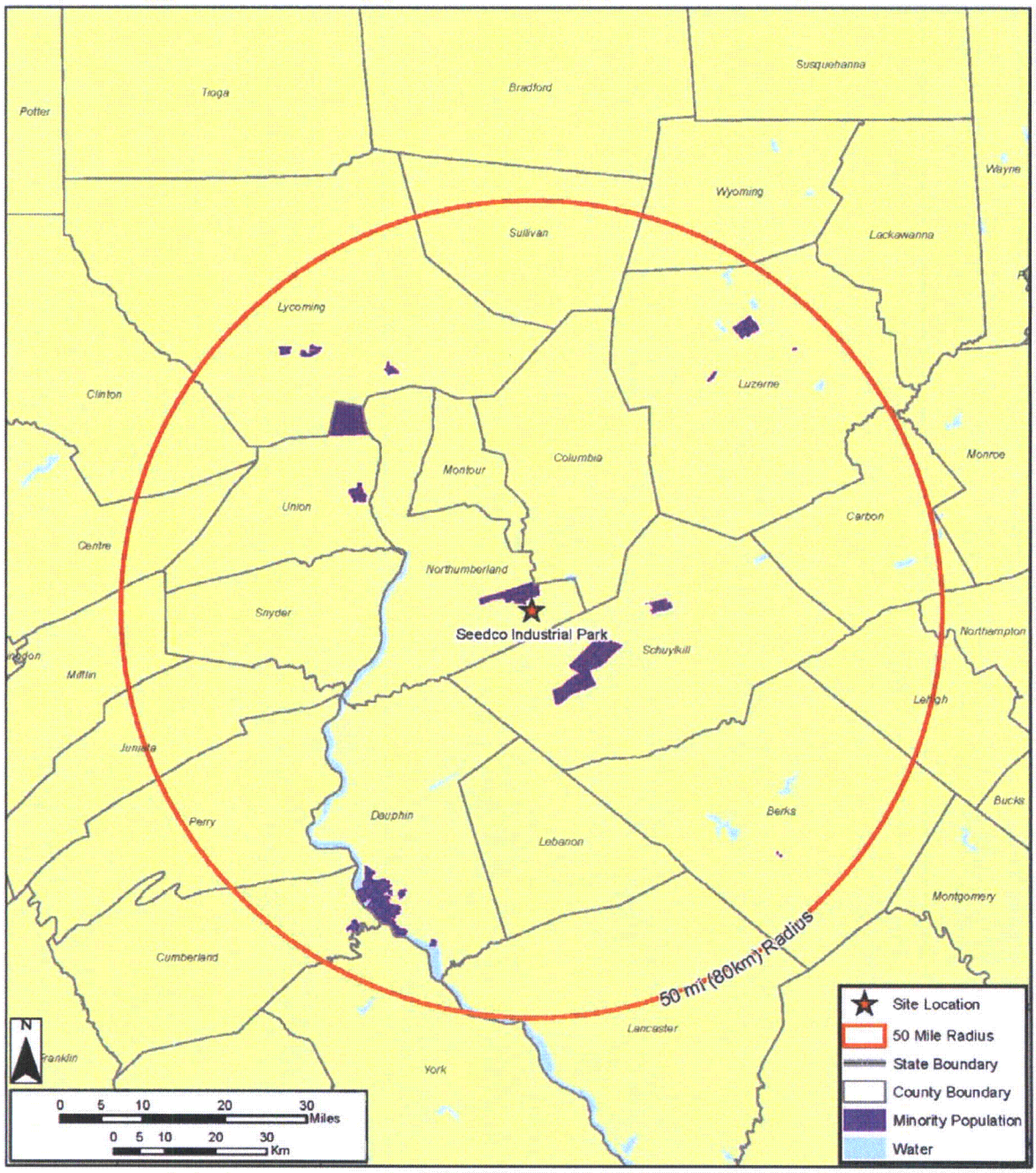


Figure 9.3-35 Other Race Minority Block Groups within 50-Mile Radius of Seedco Industrial Park

Figure 9.3-36 Aggregate Minority Block Groups within 50-Mile Radius of Seedco Industrial Park

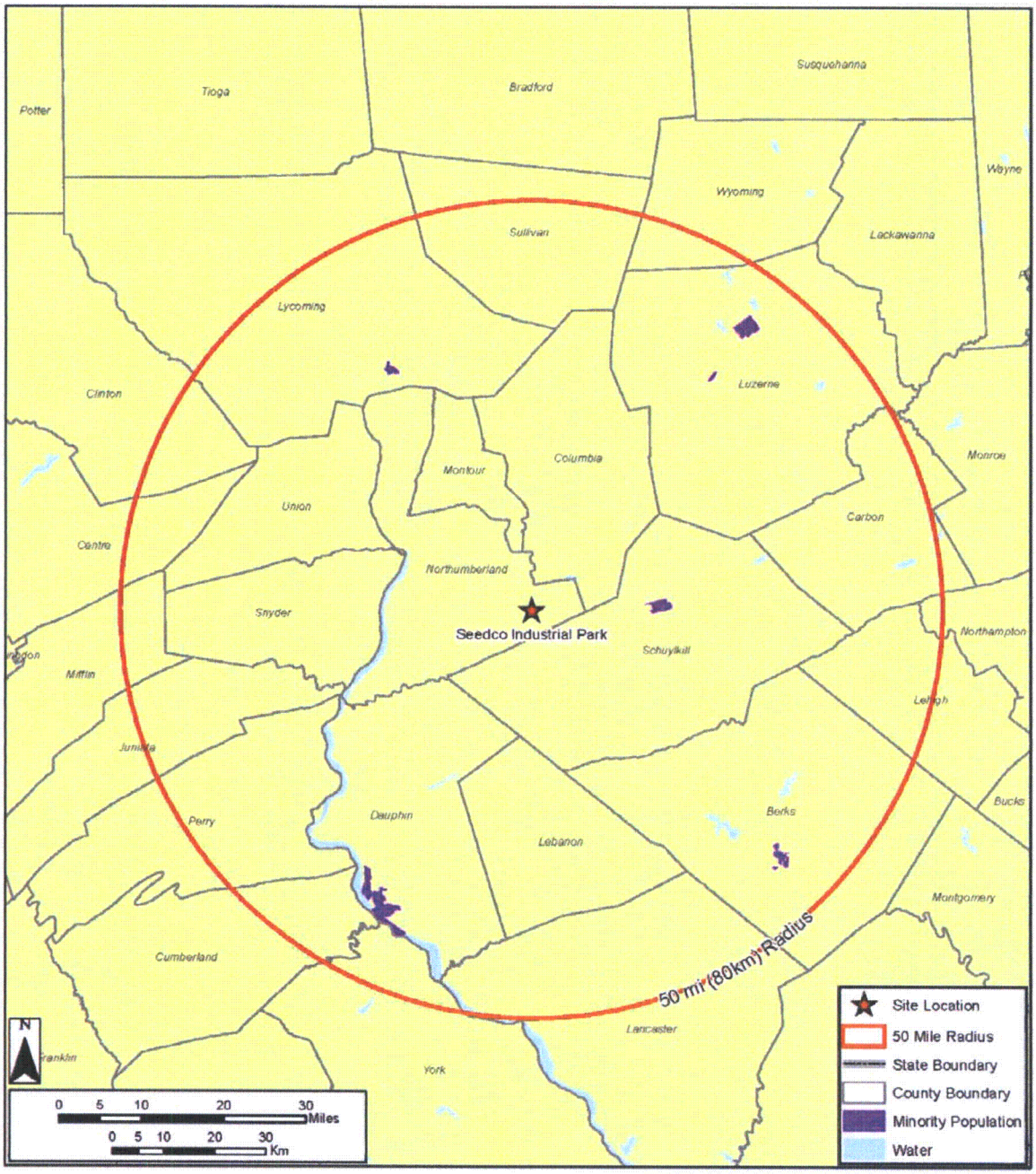


Figure 9.3-37 Hispanic Minority Block Groups within 50-Mile Radius of Seedco Industrial Park

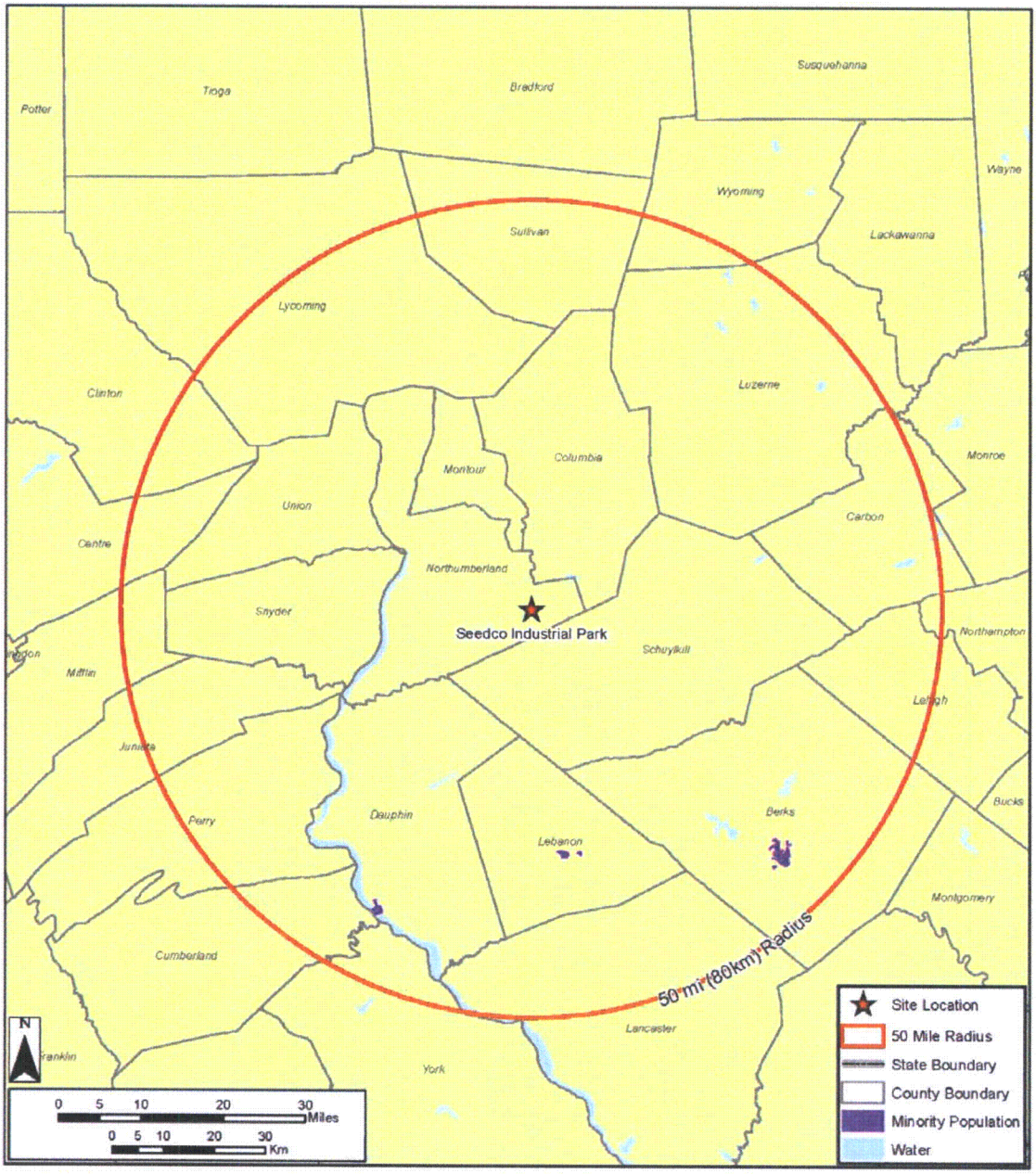
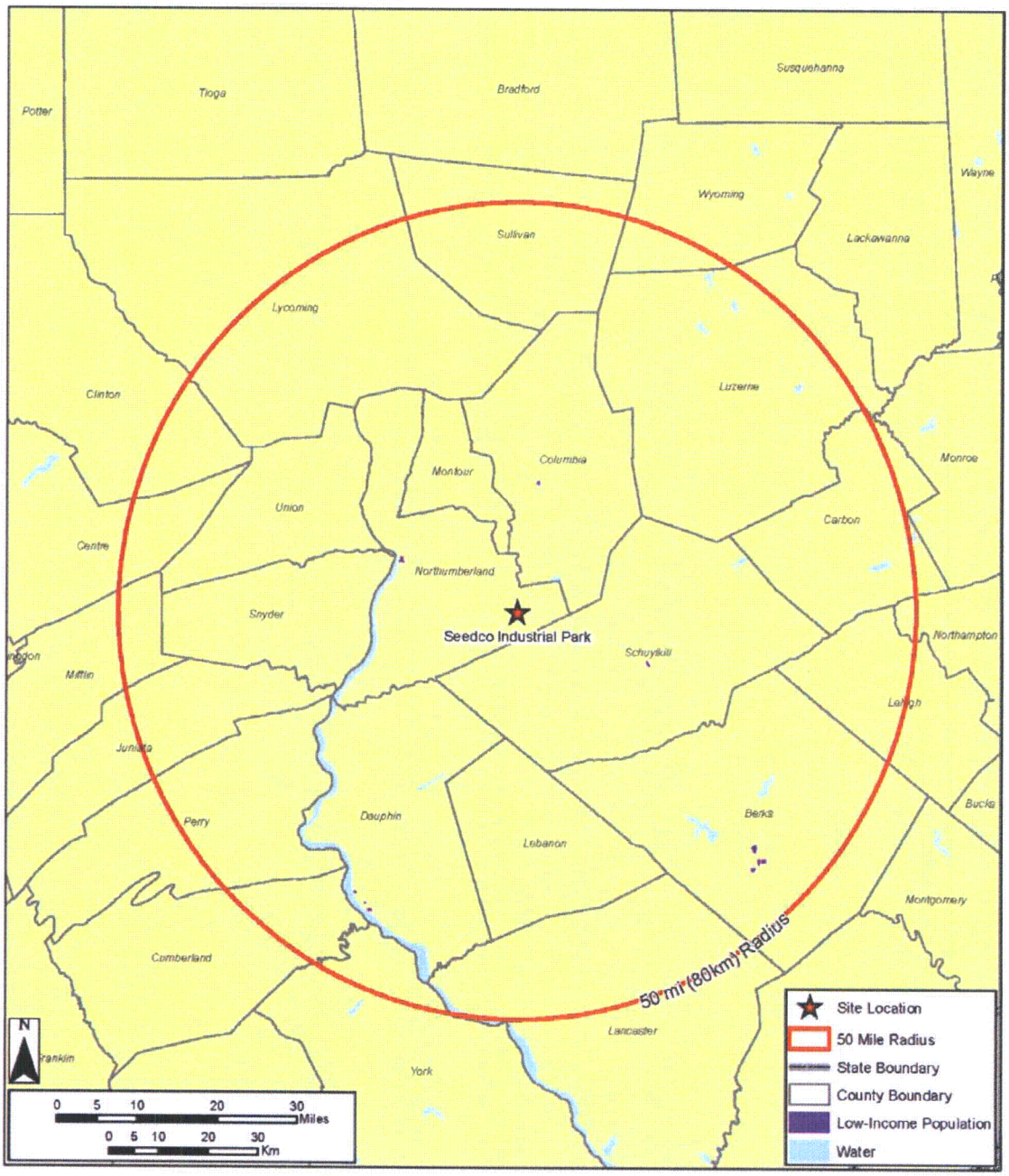


Figure 9.3-38 Low Income Block Groups within 50-Mile Radius of Seedco Industrial Park



Enclosure 2

Bell Bend Nuclear Power Plant
ER Section 10.4 Benefit Cost Balance

10.4 BENEFIT-COST BALANCE

This section describes the benefit-cost balance resulting from the proposed construction and operation of the Bell Bend Nuclear Power Plant (BBNPP). It was prepared in accordance with the guidance provided in NUREG-1555 (NRC, 1999) i.e., "Environmental Standard Review Plan" (ESRP). Section 10.4.1 describes the benefits of the proposed project; Section 10.4.2 discusses the costs associated with the proposed project; and Section 10.4.3 provides a benefit-cost balance summary.

The information contained in this Section satisfies the requirements of 10 CFR 51.45(d) (CFR, 2007a) and 10 CFR 51, Appendix A to Subpart A (CFR, 2007b), with respect to consideration of irreversible and irretrievable commitment of resources.

10.4.1 BENEFITS

This section discusses the benefits resulting from the proposed construction and operation of BBNPP. The information provided in this section was prepared in accordance with the guidance provided in NUREG-1555, ESRP 10.4.1 (NRC, 1999). Information provided in this section includes a summary of the following information:

- The evaluation that was performed to determine if there is sufficient demand for new electric power in the eastern part of the PJM classic area, which is the Region of Interest (ROI)/primary market area;
- The evaluation that was performed to determine an electric power generation source (i.e., coal, gas, nuclear, solar, wind);
- The evaluation that was performed to choose a location for the selected electric power generation source; and
- Benefits that the new electric power generation facility will provide.

Table 10.4-1 summarizes the benefits and costs of the proposed action. These benefits and costs include:

- Identification of appropriate plant production benefits;
- Calculation of the plant average annual electrical-energy generation in kilowatt-hours (kWh);
- Evaluation of the reliability of the electrical distribution system;
- Identification of other project benefits, including state and local tax revenues, regional productivity, enhancement of recreational and aesthetic values, environmental enhancement, creation and improvement of local roads or other facilities, and intangible benefits (e.g., reduced dependence on scarce fossil fuels);
- Quantification of benefits in monetary or other appropriate terms;
- Evaluation of the significance of the benefits on a political boundary or regional basis; and

- Assessment of any potential social or economic impacts as a result of the proposed project construction and operation

The potential cumulative adverse impacts at the site resulting from construction of a new power plant are summarized in Section 10.5.

10.4.1.1 Need for Power

As discussed in Section 8.4, PJM planning is subject to review by its Board of Directors and advisory board. The PJM reliability planning processes are also confirmable by comparing forecasts to ReliabilityFirst Corporation (RFC) composite forecasts. Although the PJM forecasts are included in the RFC regional composite, the regional composite includes forecasts by many other generators and suppliers.

PJM uses commercially developed software to perform uncertainty analyses to account for forecasting uncertainty. Each uses econometric modeling that enables them to perform analyses of the sensitivity of results to changes in model inputs and to create high and low range forecasts. Uncertainty analysis is also used in establishing planning reserve margins, themselves an acknowledgement of uncertainty.

PPL Bell Bend, LLC concludes that PJM has the kind of reliability planning process that meets the NRC criteria for an acceptable regional need for power analysis. Similarly, PPL Bell Bend, LLC concludes that the RFC process for gathering need for power data provides further satisfaction of NRC criteria at the regional level. At the regional level, growth projections support the need for the power that the BBNPP would produce.

The purpose of the BBNPP is to satisfy the need for baseload power identified by PJM. The result of No Action, or not constructing the new facility, would mean that the need for power has not been satisfied, and other electricity generating sources would be needed to meet the forecasted electricity demands.

In summary, the benefits of the BBNPP include the following:

- The BBNPP would alleviate existing congestion in the west-to-east transmission of energy across the Alleghany Mountains.
- The BBNPP would provide much needed baseload power for an area that is expected to have the average annual peak forecast grow between 1.2 and 1.5 percent per year over the next 10 years.
- The BBNPP would allow PJM to continue to meet the growing demand for an average of 1,654 megawatts (MW) per year of added capacity.
- The BBNPP would enable PJM to sustain the reserve margins necessary to prevent a reduction in the supply of energy and to meet the expected future demand trends.
- Given concerns in Pennsylvania and throughout the northeastern United States about climate change and carbon emissions, the BBNPP will serve another important function by reducing carbon emissions in the state. The BBNPP would displace significant amounts of carbon as soon as the plant becomes operational, as compared to a coal fired power generating facility.

10.4.1.2 Energy Alternatives

This section provides a summary of the evaluation that was conducted in Section 9.2, to determine a suitable electric generating power source to meet the demand for new power in the ROI/primary market area. The evaluation identified alternatives that would require the construction of new generating capacity-such as wind, geothermal, oil, natural gas, hydropower, municipal solid wastes (MSW), coal, photovoltaic (PV) cells, solar power, wood waste/biomass, and energy crops, as well as any combination of these alternatives. In addition, alternatives that would not require new generating capacity were evaluated, including initiating energy conservation measures (including implementing Demand-Side Management actions), reactivating or extending the service life of existing plants within the power system, and purchasing electric power from other sources.

The evaluation indicated that neither a coal-fired nor a gas-fired facility would appreciably reduce overall environmental impacts relative to a new nuclear plant. A. ~~Furthermore, a~~ coal-fired ~~and a~~or gas-fired facility would entail a significantly greater environmental impact on air quality than would a new nuclear plant. The analysis indicated that wind and solar facilities in combination with fossil facilities could be used to generate baseload power. However, wind and solar facilities in combination with fossil facilities would have higher costs and larger land requirements than a new nuclear plant and therefore are not preferable to a new nuclear plant.

Based on environmental impacts, it has been concluded that neither a coal-fired, nor a gas-fired, nor a combination of alternatives, including wind and solar facilities, would appreciably reduce overall environmental impacts relative to a new nuclear plant; therefore making nuclear power a suitable electric power generation source.

10.4.1.3 Alternative Locations for the Proposed Facility

The following paragraphs provide a summary of the evaluation that was conducted in Section 9.3 to identify a preferred location for the new nuclear power facility. The objective of the evaluation was to verify that no obviously superior location for the siting of a new nuclear unit exists.

Four alternative sites were chosen for analysis: the BBNPP site located near an existing nuclear facility, the Susquehanna Steam Electric Station (SSES)~~,~~; a greenfield site located adjacent to an existing coal-fired facility (Montour site)~~,~~; ~~a brownfield site (Sandy Bend site), and a greenfield site (Martins Creek site)~~and two brownfield sites, Humboldt Industrial Park (Humboldt site) and Seedco Industrial Park (Seedco site). These sites were chosen because, based on the site selection process implemented, they met the site selection criteria and are among the best possible sites available. The sites were evaluated based on potential impacts to land use, air quality, water, terrestrial ecology and sensitive species, aquatic ecology and sensitive species, demographics, socioeconomics and environmental justice, and historic, cultural, and archeological resources.

The evaluation concluded that the preferred location for the new nuclear plant is located adjacent to an existing nuclear facility at the BBNPP site. Siting a new reactor at an existing nuclear facility offers a number of benefits:

- By collocating nuclear reactors, the total number of generating sites is reduced.

- Minimal additional land acquisitions are necessary, and the applicant can readily obtain control of the property. This reduces both initial costs to the applicant and the degree of impact to the surrounding anthropogenic and ecological communities.
- Site characteristics, including geologic/seismic suitability, are already known, and the site has already undergone substantial review through the National Environmental Policy Act (NEPA) process during the original selection procedure.
- The ~~-~~environmental impacts of both construction and operation of the existing units are known. It can be expected that the impacts of a new unit should be comparable to those of the operating nuclear plant.
- Collocated sites can share existing infrastructure, reducing both development costs and environmental impacts associated with construction of new access roads, waste disposal areas, and other important supporting facilities and structures. Construction of new transmission corridors may be eliminated or reduced because of the potential use of existing corridors.
- Existing nuclear plants have nearby markets, the support of the local community, and the availability of experienced personnel.

10.4.1.4 Benefits of the Proposed Facility

Locating the proposed new nuclear facility at the existing BBNPP property will afford benefits to the local economy. The BBNPP owners will pay property taxes on the proposed new unit for the duration of the operating license. BBNPP owners estimate that annual property tax payments could reach approximately $ [Proprietary Information - Withheld Under 10 CFR 2.390(a)(4) - See Part 9 of this COL Application] in 2018, the year of plant startup. Most people consider large tax payments a benefit to the taxing entity because they support the development of infrastructure that supports further economic development and growth.

The existing SSES employs a nuclear-related permanent workforce of approximately 1,200 employees and up to an additional 260 contract and matrixed employees (PPL, 2006a). As stated in Section 5.8.2, it is anticipated that construction and operation of the new facility would add a total of 363 direct employees to the onsite workforce. New jobs within approximately a 50 mi (80 km) radius of the plant would be created by the construction and operation of the new facility. Many of these jobs would be in the service sector and could be filled by unemployed local residents, lessening demands on social service agencies in addition to strengthening the economy. It is anticipated that the new jobs would be maintained throughout the life of the plant.

Construction and operation of the new nuclear facility at BBNPP would generate an economic multiplier effect in the area. The economic multiplier effect means that for every dollar spent an additional $0.85~~60~~ of indirect economic revenue would be generated over the construction period within the region of influence (BEA, 2008). The economic multiplier effect is one way of measuring direct and secondary effects. Direct effects reflect expenditures for goods, services, and labor, while secondary effects include subsequent spending in the community. ~~T~~As stated in ER Sections 4.4.2 and 5.8.2, the economic multiplier effect due to the increased spending by the direct and indirect labor force created as a result of the construction and operation of the new nuclear reactor unit would increase economic activity in the region, most noticeably in Luzerne and Columbia Counties.

Given concerns in the ROI/primary market area about climate change and carbon emissions, BBNPP serves an important environmental benefit need by reducing carbon emissions in the State. Upon operation, BBNPP would displace significant amounts of carbon compared to a coal-fired generating plant. The costs of climate change, which have been quantified, will have a significant impact on the global and national economies.

10.4.2 COSTS

This section summarizes estimated costs for construction and operation of BBNPP. The information provided in this section was prepared in accordance with the guidance provided in NUREG-1555 (NRC, 1999), ESRP 10.4.2). The discussion below provides sufficient economic information to assess and predict costs and benefits.

Table 10.4-1 summarizes the potential cumulative adverse environmental impacts at the proposed project site.

Internal costs are the monetary costs of construction and operation of the proposed new reactor unit. Internal costs can include capital costs of the facility, transmission lines, and operating costs (staffing, maintenance, and fuel), as well as decommissioning costs.

Construction costs and operation costs are generally discussed using established cost information developed by several resources. Many cost studies are available in the literature with a wide range of cost estimates. Four studies are believed to be the most authoritative because of the breadth and depth of their analyses. These four studies are as follows:

- Organization for Economic Co-operation and Development (OECD) study of projected electricity generating costs (NEA, 2005)
- University of Chicago (UC) study on the economic future of nuclear power (UC, 2004)
- Massachusetts Institute of Technology (MIT) study on the future of nuclear power (MIT, 2003)
- Energy Information Administration (EIA) annual energy outlook (EIA, 2004)

The four economic studies identified above provide sufficient economic information to assess and predict costs of the proposed project. By conducting a systematic review of the economics of nuclear power, the studies were able to generate a financial model that estimated the costs of new nuclear plants coming online in the future. To develop that model, several factors were investigated:

- Factors affecting the competitiveness of nuclear power, including leveled costs, comparisons with international nuclear costs, capital costs, effects of learning by doing, and financing issues
- An analysis of technologies that could reduce the costs of gas and coal fired electricity, future changes in fuel price, and the potential economic impact of greenhouse gas control policies and technology
- An analysis of several federal financing policy alternatives designed to make nuclear power competitive in the future

Using the information contained within the four studies identified above, the internal costs of constructing and operating the BBNPP was developed, meeting the intent of NUREG 1555. The construction and operating cost values accounted for aspects of pertinent construction and operating practices and methods unique to nuclear generating facilities and were based on industry standards, as outlined in the literature cited above.

10.4.2.1 Monetary - Construction

The phrase commonly used to describe the monetary cost of constructing a nuclear plant is "overnight capital cost." The capital costs are those incurred during construction, when the actual outlays for equipment and construction and engineering are expended, in other words, the cost resulting if one were to pay for 100% of the plant "overnight". Overnight costs are:

- expressed as a constant dollar amount versus actual nominal dollars,
- expressed in $/kW, and
- for the nuclear industry, the overnight capital cost does not include inflation, financing, extraordinary site costs, licensing, transmission or the initial fuel load.

Overnight costs are exclusive of interest and include engineering, procurement, and construction costs, owner's costs, and contingencies.

The four studies identified in Section 10.4.2 estimate overnight capital costs that range from $1,100/kW to $2,5300/kW, with $1,500 to $2,000/kW being the most representative range. Many factors account for the range: the specific technology and assumptions about the number of like unit(s) built, allocation of first of a kind costs, site location and parity adjustments to allow comparison between countries, and allowances for contingencies. The estimates are not based on nuclear plant construction experience in this country and are more than 20 years old. Actual construction costs overseas have been less than most recent domestic construction, suggesting that the industry has learned from the domestic experience. There is an assumption that the overseas experience can be applied domestically, and the studies have found the overseas experience to be most applicable to estimating the cost of the new domestic nuclear plant construction.

The four studies identified in Section 10.4.2 tend to support $2,000/kW as a reasonable high end overnight capital cost estimate. The $2,5300 value presented above is based on construction in Japan (NEA, 2005). While no explanation is offered for this value, it is reasonable to suggest that contributing factors are the high cost of living in Japan (labor accounts for more than 20 percent of costs) and difficulties associated with construction on an island. For the purpose of the analysis in this Environmental Report (ER) and to avoid understating the cost, $2,000/kW value was chosen. According to Section 3.2, the U.S. Evolutionary Power Reactor (EPR) nuclear power-generating station for BBNPP will have a rated core thermal power of 4,590 megawatts thermal (MWt) and a rated net electrical output of ~~greater than or equal to~~ approximately 1,600 megawatts electric (MWe). The estimated total project capital cost for BBNPP is identified in Section 4.4.2.6.2.

10.4.2.2 Monetary - Operation

Operation costs are frequently expressed as the levelized cost of electricity, which is the price at the busbar needed to cover operating costs and annualized capital costs. Overnight capital costs account for a third of the levelized cost, and interest costs on the overnight costs account

for another 25% (UC, 2004). The four studies identified in Section 10.4.2 demonstrate a wide range of operation cost estimates. Levelized cost-of-electricity estimates range from $36 to $83/megawatt hour (MWh) ($0.036 to $0.083/kWh). Factors affecting the range include choices for discount rate, construction duration, plant life span, capacity factor, cost of debt and equity and split between debt and equity financing, depreciation time, tax rates, and premium for uncertainty. ~~-~~ According to the UC study, the projected cost associated with operating a new nuclear facility (similar to the size of the BBNPP) is in the range of $31 to $46/MWh ($0.031 to $0.046/kWh) (UC, 2004).

Based on information found in PPL's 2006 report entitled, "Economic Benefits of PPL Susquehanna Nuclear Power Plant" (PPL, 2006b), PPL Susquehanna's 2005 production cost was $0.0155/kWh, compared to $0.0489/kWh for the rest of the Commonwealth of Pennsylvania. This information may provide more localized production data to which BBNPP may be compared.

In addition to nuclear plant costs, the four studies provide coal -and gas fired generation costs for comparison. One study showed nuclear costs competitive with coal and gas (~~EIA, 2004~~NEA, 2005). The other studies showed nuclear costs exceeding those of coal and gas. One study concluded that new nuclear power is not economically competitive, but went on to suggest steps the government could take to improve nuclear economic viability (MIT, 2003). Since the study was issued, the government has undertaken the following steps to improve economic viability of nuclear energy:

- The U.S. Department of Energy (DOE) has provided financial support for plants testing the NRC licensing processes for early site permits and combined operating licenses.
- The U.S. government has endorsed nuclear energy as a viable carbon free generation option.

Estimates include decommissioning but, because of the effect of discounting a cost that would occur as much as 40 years in the future, decommissioning costs have relatively little effect on the levelized cost. In addition, the Energy Policy Act of 2005 instituted a production tax credit for the first advanced reactors brought on line in the U.S. (PL, 2005), which would tend to lower this estimate.

10.4.3 SUMMARY

Table 10.4-1 summarizes the benefits and costs associated with the proposed construction and operation of BBNPP, including information regarding select mitigation measures for potential impacts. Benefits-cost information for the three alternative sites to BBNPP, the Montour, ~~Sandy Bend, and Martins Creek~~ Humboldt, and Seedco sites, are also presented in Table 10.4-1. Costs that are environmental impacts are those anticipated after proposed mitigation measures are implemented. Section 10.5 addresses the environmental costs and cumulative impacts. In summary, there is a growing baseload demand and a growing shortfall in baseload supply in the ROI/primary market area. Energy alternatives were evaluated with nuclear power being the choice to meet the needed energy demands. Based on the site selection process, it was determined that the new nuclear facility should be located in Luzerne County, Pennsylvania. The BBNPP will result in a reduction in emissions with respect to comparably sized coal- or gas-fired alternative power-generating facilities. While the additional direct and indirect creation of jobs for the construction and operation of the new facility might place a temporary burden on

local services and infrastructures, the annual taxes and revenue generated by the new workers would contribute to the local economy and the productivity of the region.

In conclusion, the construction and operation of the proposed project is needed, and the benefits outweigh the economic, environmental, and social costs.

10.4.3 REFERENCES

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Table 10.4-1 Benefits and Costs of the Proposed Project Summarized

Benefit Category	Proposed Site BBNPP Site	Option 1 Montour Site	Option 2 ~~Sandy Bend Site~~Humboldt Site	Option 3 ~~Martins Creek~~ Seedco Site
Project Description	The BBNPP site is collocated with an existing nuclear power generating facility in Luzerne County, Pennsylvania.	The Montour site is a greenfield site located in Montour County, Pennsylvania, adjacent to the Montour coal-fired generating facility.	~~The Sandy Bend site is a brownfield site located in Mifflin County, Pennsylvania.~~The Humboldt site is a brownfield site that is located west of the City of Hazleton in Luzerne County, Pennsylvania	~~The Martins Creek site is a greenfield site located across the river in Warren County, New Jersey, from the Martins Creek natural gas-fired generating facility.~~The Seedco site is a brownfield site that is located east/southeast of the community of Ranshaw and the City of Shamokin in Northumberland County, Pennsylvania.
BENEFITS				
Electricity Generated and Generating Capacity	The EPR nuclear power generating station reactor for the BBNPP has a rated core thermal power of 4,590 MWt and a rated net electrical output of ~~greater than or equal to~~ approximately 1,600 MWe.	It is assumed that the electricity generated and generating capacity would be similar to that of the BBNPP.	It is assumed that the electricity generated and generating capacity would be similar to that of the BBNPP.	It is assumed that the electricity generated and generating capacity would be similar to that of the BBNPP.
Fuel Diversity	Nuclear provides option to natural gas. Does not have price volatility of natural gas, fuel availability issues limited.	Nuclear provides option to natural gas. Does not have price volatility of natural gas, fuel availability issues limited.	Nuclear provides option to natural gas. Does not have price volatility of natural gas, fuel availability issues limited.	Nuclear provides option to natural gas. Does not have price volatility of natural gas, fuel availability issues limited.
Licensing Certainty	Resolution of design criteria through certification; resolution of site, construction and operational issues in Combined Operating License Application (COLA); reliance on nuclear as generation.	Resolution of design criteria through certification; resolution of site, construction and operational issues in COLA; reliance on nuclear as generation.	Resolution of design criteria through certification; resolution of site, construction and operational issues in COLA; reliance on nuclear as generation.	Resolution of design criteria through certification; resolution of site, construction and operational issues in COLA; reliance on nuclear as generation.
Carbon Emissions (reduction)	Coal: (1,908,000 carbon dioxide equivalents [CO_2e]) -Natural Gas: (623,000 CO_2e) Nuclear: No carbon emissions.	Coal and Natural Gas: It is assumed that carbon emissions reduction would be similar to the BBNPP.	Coal and Natural Gas: It is assumed that carbon emissions reduction would be similar to the BBNPP.	Coal and Natural Gas: It is assumed that carbon emissions reduction would be similar to the BBNPP.

Table 10.4-1 Benefits and Costs of the Proposed Project Summarized

Benefit Category	Proposed Site BBNPP Site	Option 1 Montour Site	Option 2 ~~Sandy Bend Site~~Humboldt Site	Option 3 ~~Martins Creek~~ Seedco Site
		Nuclear: No carbon emissions.	Nuclear: No carbon emissions.	Nuclear: No carbon emissions.
Increased Customer Choice	Retail choice of 'clean' energy source in addition to menu of renewable sources.	Retail choice of 'clean' energy source in addition to menu of renewable sources.	Retail choice of 'clean' energy source in addition to menu of renewable sources.	Retail choice of 'clean' energy source in addition to menu of renewable sources.
Local Economy	Over 3,900 full-time equivalents will be added to the workforce for construction of the new facility (see Section 4.4.2). It is anticipated that a workforce of approximately 363 employees would be needed for operation (see Section 5.8.2). It was estimated that approximately 1,706 to 2,986 direct construction workers (and family members) would migrate into the region of influence (assuming 20 to 35 percent in-migration). The maximum potential in-migration, assuming all indirect workers migrate into the region of influence, would be 2,395 to 4,191 people (assuming 20 to 35 percent in-migration). This would represent a small percentage increase of 0.6 percent to 1.1 percent in the region of influence population of 378,034 people in 2006. Beneficial impacts associated with operation activities would be SMALL to LARGE due to the annual taxes and revenue generated by the new workers	A workforce similar to the size anticipated for the BBNPP is assumed. A similar range of in-migration was also assumed resulting in the same number of additional people migrating into the region of influence (between 1,706 and 2,986). Given that Montour County had a population of 17,817 people in 2007, the population increase due to in-migration of construction workers and their families would represent an increase of between 9.6 and 16.8 percent. Beneficial impacts associated with operation activities would be SMALL to LARGE due to the annual taxes and revenue generated by the new workers contributing to the local economy and the productivity of the region.	A workforce similar to the size anticipated for the BBNPP is assumed. A similar range of in-migration was also assumed resulting in the same number of additional people migrating into the region of influence (between 1,706 and 2,986). Given that Luzerne County had a population of 312,265 people in 2007, the population increase due to in-migration of construction workers and their families would represent an increase of between 0.5 and 1.0 percent. Beneficial impacts associated with operation activities would be SMALL to LARGE due to the annual taxes and revenue generated by the new workers contributing to the local economy and the productivity of the region.	A workforce similar to the size anticipated for the BBNPP is assumed. A similar range of in-migration was also assumed resulting in the same number of additional people migrating into the region of influence (between 1,706 and 2,986). Given that Northumberland County had a population of 91,003 people in 2007, the population increase due to in-migration of construction workers and their families would represent an increase of between 1.9 and 3.3 percent. Beneficial impacts associated with operation activities would be SMALL to LARGE due to the annual taxes and revenue generated by the new workers contributing to the local economy and the productivity of the region.

Table 10.4-1 Benefits and Costs of the Proposed Project Summarized

Benefit Category	Proposed Site BBNPP Site	Option 1 Montour Site	Option 2 ~~Sandy Bend Site~~Humboldt Site	Option 3 ~~Martins Creek~~ Seedco Site
	contributing to the local economy and the productivity of the region.~~Construction and operation workforce impacts are MODERATELY and SMALL respectively.~~			
Aesthetic Values	~~Selection of design and cooling tower technology allows for minimal esthetic impacts. Site contains existing nuclear power facility structures.~~ As stated in ER Section 5.8.2.6.2, the BBNPP would be constructed west of SSES Units 1 and 2, which have existing cooling towers and visible water vapor plumes. Thus, the plumes from the BBNPP would not introduce a new element to the visual landscape, and the additional visual impacts from BBNPP would be SMALL.	~~Selection of design and cooling tower technology allows for minimal esthetic impacts.~~The Montour site is adjacent to an existing coal-fired power plant with three stacks, two cooling towers, and associated plumes. The plumes from the proposed new unit at the Montour site would likely be visible at a considerable distance. However, given the close proximity to the existing coal-fired facility, aesthetic impacts would be SMALL.	~~Selection of design and cooling tower technology allows for minimal esthetic impacts.~~The introduction of large plumes from the cooling towers into the skies, where there are currently no plumes of this magnitude, has the potential to adversely affect the character and quality of views in the area surrounding the site. These plumes from the proposed new unit at the Humboldt site would likely be visible at a considerable distance. Aesthetic impacts would be MODERATE.	~~Selection of design and cooling tower technology allows for minimal esthetic impacts.~~The introduction of large plumes from the cooling towers into the skies, where there are currently no plumes of this magnitude, has the potential to adversely affect the character and quality of views in the area surrounding the site. These plumes from the proposed new unit at the Seedco site would likely be visible at a considerable distance, aesthetic impacts would be MODERATE.
Air Quality	Major beneficial impact in terms of avoidance of fossil-fuel power plant emissions.	Major beneficial impact in terms of avoidance of fossil-fuel power plant emissions.	Major beneficial impact in terms of avoidance of fossil-fuel power plant emissions.	Major beneficial impact in terms of avoidance of fossil-fuel power plant emissions.
Land Use	Land to be used for the new reactor unit and appurtenant structures is owned by PPL. The required land will need to be rezoned for development of the nuclear facility.	Land adjacent to the existing Montour coal-fired generating facility is owned by PPL and is of sufficient size for a new reactor unit and appurtenant structures. The required land will need to be rezoned for development of the nuclear facility.	Land will need to be acquired for the ~~Sandy Bend~~ Humboldt site. The required land ~~will~~ may need to be re-zoned for development of the nuclear facility.	~~Buffer land across the river from the Martins Creek natural-gas generating facility in New Jersey is owned by a PPL subsidiary and is of sufficient size for a new reactor unit and appurtenant structures.~~Land will need to be acquired for the Seedco site. The required land will need to be

Table 10.4-1 Benefits and Costs of the Proposed Project Summarized

Benefit Category	Proposed Site BBNPP Site	Option 1 Montour Site	Option 2 ~~Sandy Bend Site~~Humboldt Site	Option 3 ~~Martins Creek~~ Seedco Site
				rezoned for development of the nuclear facility.
State/Local Tax Payments during Construction and Operations	Construction will generate tax revenues from sources including income tax, retail sales tax on materials, supplies, and selected construction services; retail sales tax on expenditures by workers; and corporate income taxes paid by contractors. A net benefit within the region of influence would be the additional income from direct and indirect employment and increases in local and county tax revenues. It is estimated that Luzerne County and Columbia County would experience a $41.4-million and $43.8-million increase in annual wages from the direct workforce, respectively. During operation of the facility, local government tax revenues will accrue from property taxes and permitting and impact fees. Tax payments would occur annually over the life of the new reactor~~.~~ unit per year. Operations will result in annual expenditures of approximately $9 million on materials, equipment, and outside services. Overall SMALL to LARGE benefit to area from tax revenues (see Sections 4.4.2 and 5.8.2).	Construction will generate tax revenues from sources including income tax, retail sales tax on materials, supplies, and selected construction services; retail sales tax on expenditures by workers; and corporate income taxes paid by contractors. Employment and tax revenues would be similar to that noted for BBNPP. During operation of the facility, local government tax revenues will accrue from property taxes and permitting and impact fees. Tax payments would occur annually over the life of the new reactor unit ~~and are expected to be similar to the BBNPP~~. Annual expenditures during operation on material, equipment, and outside services are assumed to be similar to that noted for BBNPP. Overall SMALL to LARGE benefit to area from tax revenues.	Construction will generate tax revenues from sources including income tax, retail sales tax on materials, supplies, and selected construction services; retail sales tax on expenditures by workers; and corporate income taxes paid by contractors. Employment and tax revenues would be similar to that noted for BBNPP. During operation of the facility, local government tax revenues will accrue from property taxes and permitting and impact fees. Tax payments would occur annually over the life of the new reactor unit ~~and are expected to be similar to the BBNPP~~. Annual expenditures during operation on material, equipment, and outside services are assumed to be similar to that noted for BBNPP. Overall SMALL to LARGE benefit to area from tax revenues.	Construction will generate tax revenues from sources including income tax; retail sales tax on materials, supplies, and selected construction services; retail sales tax on expenditures by workers; and corporate income taxes paid by contractors. Employment and tax revenues would be similar to that noted for BBNPP. During operation of the facility, local government tax revenues will accrue from property taxes and permitting and impact fees. Tax payments would occur annually over the life of the new reactor unit ~~and are expected to be similar to the BBNPP~~. Annual expenditures during operation on material, equipment, and outside services are assumed to be similar to that noted for BBNPP. Overall SMALL to LARGE benefit to area from tax revenues.

Table 10.4-1 Benefits and Costs of the Proposed Project Summarized

Benefit Category	Proposed Site BBNPP Site	Option 1 Montour Site	Option 2 ~~Sandy Bend Site~~Humboldt Site	Option 3 ~~Martins Creek~~ Seedco Site
Effects on Regional Productivity	Anticipate an increase in regional productivity through the influx of construction and station operation workers. Workers will create additional new indirect (service-related) jobs in the region through the multiplier effect of direct employment. Construction workforce and their families will increase the population in the area. The expenditures of construction and facility operation workers for food, shelter, and services will create jobs, which will have a SMALL to LARGE ~~MODERATE~~ positive impact on the economy of the region. Job creation will reduce unemployment and create business opportunities.	Anticipate an increase in regional productivity through the influx of construction and station operation workers. Workers will create additional new indirect (service-related) jobs in the region through the multiplier effect of direct employment. Construction workforce and their families will increase the population in the area. The expenditures of construction and facility operation workers for food, shelter, and services will create jobs, which will have a SMALL to LARGE ~~MODERATE~~ positive impact on the economy of the region. Job creation will reduce unemployment and create business opportunities.	Anticipate an increase in regional productivity through the influx of construction and station operation workers. Workers will create additional new indirect (service-related) jobs in the region through the multiplier effect of direct employment. Construction workforce and their families will increase the population in the area. The expenditures of construction and facility operation workers for food, shelter, and services will create jobs, which will have a SMALL to LARGE ~~MODERATE~~ positive impact on the economy of the region. Job creation will reduce unemployment and create business opportunities.	Anticipate an increase in regional productivity through the influx of construction and station operation workers. Workers will create additional new indirect (service-related) jobs in the region through the multiplier effect of direct employment. Construction workforce and their families will increase the population in the area. The expenditures of construction and facility operation workers for food, shelter, and services will create jobs, which will have a SMALL to LARGE ~~MODERATE~~ positive impact on the economy of the region. Job creation will reduce unemployment and create business opportunities.
Technical and Other Non-Monetary Improvements (e.g., New Recreational Facilities and Improvements to Local Facilities)	Located adjacent to an existing nuclear facility (SSES). Anticipate that existing local and county police, fire, and medical facilities and/or personnel would be able to accommodate the influx of construction and facility operation workers. Anticipate that the existing water supply and the township wastewater treatment facilities can accommodate the added increase in population. Anticipate that the existing	Located adjacent to the existing Montour Coal Plant. Anticipate the need for additional local and county police, fire, and medical facilities and/or personnel to accommodate the influx of construction and facility operation workers. Anticipate the need for a site-specific wastewater treatment facility/system - either onsite or municipal system if available - to accommodate the added increase in population. Anticipate the need for additional	Anticipate the need for additional local and county police, fire, and medical facilities and/or personnel to accommodate the influx of construction and facility operation workers. Anticipate the need for a site-specific wastewater treatment facility/system - either onsite or municipal system if available - to accommodate the added increase in population. Anticipate the need for additional education and social services	Anticipate the need for additional local and county police, fire, and medical facilities and/or personnel to accommodate the influx of construction and facility operation workers. Anticipate the need for a site-specific wastewater treatment facility/system - either onsite or municipal system if available - to accommodate the added increase in population. Anticipate the need for additional education and social services

Table 10.4-1 Benefits and Costs of the Proposed Project Summarized

Benefit Category	Proposed Site BBNPP Site	Option 1 Montour Site	Option 2 ~~Sandy Bend Site~~Humboldt Site	Option 3 ~~Martins Creek~~ Seedco Site
	education and social services facilities can accommodate the increase in population. Construction and operation activities should not have long-term, adverse impacts to recreational use of the surrounding area. It is anticipated that neither technical developments nor recreational enhancements are anticipated at this time from the construction and operation of the proposed nuclear facility. In addition, minor road improvements would occur near the proposed nuclear facility, on an as needed basis, to support construction and operation activities.	education and social services facilities to accommodate the increase in population. Construction and operation activities should not have long-term, adverse impacts to recreational use of the surrounding area. It is anticipated that neither technical developments nor recreational enhancements are anticipated at this time from the construction and operation of the proposed nuclear facility. In addition, minor road improvements would occur near the proposed nuclear facility, on an as needed basis, to support construction and operation activities.	facilities to accommodate the increase in population. Construction and operation activities should not have long-term, adverse impacts to recreational use of the surrounding area. It is anticipated that neither technical developments nor recreational enhancements are anticipated at this time from the construction and operation of the proposed nuclear facility. In addition, minor road improvements would occur near the proposed nuclear facility, on an as needed basis, to support construction and operation activities.	facilities to accommodate the increase in population. Construction and operation activities should not have long-term, adverse impacts to recreational use of the surrounding area. It is anticipated that neither technical developments nor recreational enhancements are anticipated at this time from the construction and operation of the proposed nuclear facility. In addition, minor road improvements would occur near the proposed nuclear facility, on an as needed basis, to support construction and operation activities.
Environmental Enhancement	Reduction in carbon emissions with the use of nuclear power. ~~The BBNPP site has a smaller number of listed, threatened, or endangered species and critical habitat than the other sites.~~ No federal or state-listed threatened or endangered species or habitat has been identified on site. The need for transmission line upgrades is significantly less for the BBNPP site than the other sites.	Reduction in carbon emissions with the use of nuclear power.	Reduction in carbon emissions with the use of nuclear power.	Reduction in carbon emissions with the use of nuclear power.

Table 10.4-1 Benefits and Costs of the Proposed Project Summarized

Benefit Category	Proposed Site BBNPP Site	Option 1 Montour Site	Option 2 ~~Sandy Bend Site~~Humboldt Site	Option 3 ~~Martins Creek~~ Seedco Site
INTERNAL COSTS				
Construction Cost Note: Cost value is a roll-up of the Internal Cost values for constructing the facility, which include land, labor, materials, and equipment).	The proposed reactor at BBNPP has a rated core thermal power of 4,590 MWt and a rated net electrical output of ~~greater than or equal to~~ approximately 1,600 MWe. The estimated total project capital cost for BBNPP is provided in Part 9 of the COL Application.	It is anticipated that the installed reactor will be similar to the proposed reactor at the BBNPP. It is assumed that construction costs will be similar to the BBNPP site.	It is anticipated that the installed reactor will be similar to the proposed reactor at the BBNPP. It is assumed that construction costs will be similar to the BBNPP site.	It is anticipated that the installed reactor will be similar to the proposed reactor at the BBNPP. It is assumed that construction costs will be similar to the BBNPP site.
Transmission System	The BBNPP site would be co-located with the existing Susquehanna Steam Electric Station (SSES) Units 1 and 2. As such, transmission lines would be located in the immediate vicinity of the proposed site and be using existing transmission corridors. New transmission lines will connect to the existing Susquehanna switchyard. Two new 500-kV switchyards, along with two new 500-kV, 4,260-megavolt ampere (MVA) circuits on individual towers, would be constructed onsite. An	A new transmission line ROW would need to be constructed. A conceptual 500-kV transmission line route would extend south from the southern boundary of the Montour site for approximately 0.7 mi (1.1 km), where 15.5 mi (24.9 km) of existing 230-kV transmission ROW would be expanded, then travel southeast to reach the nearest 500-kV substation. ~~The Montour site would require a transmission system an upgrade. Approximately 30 mi (48.3 km) of transmission corridor would need to~~	A new transmission line ROW would need to be constructed. A conceptual 500-kV transmission line route would extend east from the eastern boundary of the Humboldt site for approximately 0.7 mi (1.1 km), where 13.6 mi (21.9 km) of existing 230-kV transmission ROW would be expanded, then travel north to reach an existing 500-kV substation. ~~New transmission lines and corridors would be necessary to connect the proposed facility at the Sandy Bend site to an existing transmission~~	A new transmission line ROW would need to be constructed. A conceptual 500-kV transmission line route would extend east-northeast from the eastern boundary of the Seedco site for approximately 9.0 mi (14.5 km), where 14.6 mi (23.5 km) of existing 230-kV transmission ROW would be expanded, then travel north-northwest to reach the closest 500-kV substation location. ~~Transmission system upgrades (circuits, towers, lines, corridors) would be needed to connect~~

Table 10.4-1 Benefits and Costs of the Proposed Project Summarized

Benefit Category	Proposed Site BBNPP Site	Option 1 Montour Site	Option 2 ~~Sandy Bend Site~~Humboldt Site	Option 3 ~~Martins Creek~~ Seedco Site
	expansion of the existing Susquehanna 500-kV switchyard would also be required. No new offsite corridors or widening of existing offsite corridors would be required. Therefore, transmission system upgrade costs would be minimal compared to the other sites. Because no new offsite transmission corridors will be required, ~~T~~transmission system environmental impacts from construction and operation would be SMALL.	~~be upgraded or approximately 13 mi (20.9 km) of transmission corridor would have to be constructed to access the 500 kilovolt (kV) transmission system at its closest approach to the Montour site.~~ ~~Impacts to transmission corridors during construction would be MODERATE due to the commitment of land and construction impacts associated with the transmission system upgrades on ecological resources.~~ Utilization of existing transmission corridor right-of-ways (ROWs) could present opportunities to minimize adverse impacts. ~~Impacts during operation, such as visual inspection, maintenance of lines, and reclearing of the ROW, would be SMALL.~~ Due to the construction and operation of new transmission corridors, construction- and operation-related transmission impacts are anticipated to be SMALL to MODERATE.	~~system. It is anticipated that approximately 3.5 mi (5.6 km) of new transmission system corridor would be needed.~~ ~~Transmission corridor impacts during construction would be SMALL to MODERATE due to the commitment of land and construction impacts associated with the transmission system upgrades on ecological resources.~~ Utilization of existing transmission corridor ROWs (if available) could present opportunities to minimize adverse impacts. ~~Impacts during operation, such as visual inspection, maintenance of lines, and reclearing of the ROW, would be SMALL.~~Due to the construction and operation of new transmission corridors, construction- and operation-related transmission impacts are anticipated to be SMALL to MODERATE.	~~Martins Creek site to the nearest 500-kV line, approximately 23 mi (37 km) away.~~ ~~Impacts to transmission corridors during construction would be MODERATE to LARGE due to the commitment of land and construction impacts associated with the transmission system upgrades on ecological resources.~~ Utilization of existing transmission corridor ROWs could present opportunities to minimize adverse impacts. ~~Impacts during operation, such as visual inspection, maintenance of lines, and reclearing of the ROW, would be SMALL.~~Due to the construction and operation of new transmission corridors, construction- and operation-related transmission impacts are anticipated to be SMALL to MODERATE.
Operating Cost Note: Cost value is a roll-up of the Internal Cost values for operating the facility which include labor, materials, and	Production cost is estimated to be [$0.0155/kWh.] (PPL, 2006b)	Costs would be similar to those at the BBNPP site.	Costs would be similar to those at the BBNPP site.	Costs would be similar to those at the BBNPP site.

Table 10.4-1 Benefits and Costs of the Proposed Project Summarized

Benefit Category	Proposed Site BBNPP Site	Option 1 Montour Site	Option 2 ~~Sandy Bend Site~~Humboldt Site	Option 3 ~~Martins Creek~~ Seedco Site
services).				
Land Use	The BBNPP is located on land already owned by PPL. Site is characterized primarily by farmland. As discussed in Section 4.1.1, construction activities will result in the permanent loss, through filling, of approximately 36 acres (14.6 hectares) of wetland habitat. Mitigation measures are described in Section 4.3.1.6. Siting of a nuclear facility at the BBNPP site would require a land use change. The topography of the BBNPP site is generally level with hills present in the northern portions of the site. There is existing rail access but no practical barge access to the site. Overall land use impacts from construction are anticipated to be MODERATE, primarily due to loss of wetlands, and would require mitigation. Land use impacts from operation are anticipated to be SMALL.	The Montour site is on land located in a rural and agricultural area of Montour County, Pennsylvania, and owned by PPL. A new ROW would need to be constructed to accommodate new transmission lines. The site area is adequate to support an EPR footprint, but is zoned for uses other than industrial. The topography is generally level on the southern portion, but the elevation rises in the northern portions of the site. There is existing rail access approximately 1.4 miles from the site, but no practical barge access to the site. ~~The surrounding land has been cleared for agricultural purposes.~~ ~~Siting of a nuclear facility at this site would require a land use change.~~ Overall land use impacts from construction and operation are anticipated to be SMALL.	~~The Sandy Bend site is a brownfield site located in Mifflin County, Pennsylvania. The surrounding land has been cleared for agricultural purposes.~~ ~~Siting of a nuclear facility at this site would require a land use change.~~ ~~Overall land use impacts from construction and operation are anticipated to be SMALL~~The Humboldt site is located west of the City of Hazleton in Luzerne County, Pennsylvania. Land uses surrounding the Humboldt site include undeveloped land to the north, the Humboldt Reservoir to the northeast, industrial park development to the south and east, and residential and private recreational development to the west. A new ROW would need to be constructed to accommodate new transmission lines. The site area is adequate to support an EPR footprint and is zoned for industrial use. The Humboldt site contains abandoned mine lands.	~~The Martins Creek site, which is owned by PPL, is a greenfield site located across the Delaware River from the Martins Creek natural-gas fired generating facility. The site consists of agricultural lands with some areas of undeveloped forest land.~~ ~~Siting of a nuclear facility at this site would require a land use change.~~ ~~Overall land use impacts from construction and operation are anticipated to be SMALL~~The Seedco site is located east/southeast of the community of Ranshaw and the City of Shamokin in Northumberland County, Pennsylvania. Land use in the area surrounding the Seedco site includes commercial development to the north, residential development to the northwest, and undeveloped lands to the east, south, and west. A new ROW would need to be constructed to accommodate new transmission lines. The site area is

Table 10.4-1 Benefits and Costs of the Proposed Project Summarized

Benefit Category	Proposed Site BBNPP Site	Option 1 Montour Site	Option 2 ~~Sandy Bend Site~~Humboldt Site	Option 3 ~~Martins Creek~~ Seedco Site
			The topography is generally level across the eastern portion, but rises in elevation throughout the north and northwestern portions. There is existing rail access, but no practical barge access, to the site. Based on potential environmental remediation on abandoned mined lands, the amount of relief in site topography, wetlands onsite, and proximity of adjacent residential and recreational land uses, overall land use impacts from construction and operation are expected to be MODERATE.	adequate to support an EPR footprint, but is zoned for other uses than industrial. There is approximately 300 ft (92.4 m) of topographic relief across the site. There is an existing rail line along the western boundary of the site, but no practical barge access to the site. Based on potential environmental remediation on abandoned mined lands, the amount of relief in site topography, wetlands onsite, and proximity of adjacent residential land uses, overall land use impacts from construction and operation are expected to be MODERATE.
Materials	Construction materials include: concrete, aggregate, rebar, conduit, cable, piping, building supplies, and tools. Operating materials include uranium fuel.	Construction materials include: concrete, aggregate, rebar, conduit, cable, piping, building supplies, and tools. Operating materials include uranium fuel.	Construction materials include: concrete, aggregate, rebar, conduit, cable, piping, building supplies, and tools. Operating materials include uranium fuel.	Construction materials include: concrete, aggregate, rebar, conduit, cable, piping, building supplies, and tools. Operating materials include uranium fuel.
Equipment	Typical construction equipment will include cranes, cement trucks, excavation equipment, dump truck, and graders. Equipment for the new facility would include the necessary components for the facility, such as the reactors, turbines, cooling systems, water processing/ treatment systems, and cooling towers.	Typical construction equipment will include cranes, cement trucks, excavation equipment, dump truck, and graders. Equipment for the new facility would include the necessary components for the facility, such as the reactors, turbines, cooling systems, water processing/ treatment systems, and cooling towers.	Typical construction equipment will include cranes, cement trucks, excavation equipment, dump truck, and graders. Equipment for the new facility would include the necessary components for the facility, such as the reactors, turbines, cooling systems, water processing/ treatment systems, and cooling towers.	Typical construction equipment will include cranes, cement trucks, excavation equipment, dump truck, and graders. Equipment for the new facility would include the necessary components for the facility, such as the reactors, turbines, cooling systems, water processing/ treatment systems, and cooling towers.

Table 10.4-1 Benefits and Costs of the Proposed Project Summarized

Benefit Category	Proposed Site BBNPP Site	Option 1 Montour Site	Option 2 ~~Sandy Bend Site~~Humboldt Site	Option 3 ~~Martins Creek~~ Seedco Site
Services	Support services and supplies would be needed during construction. Security, maintenance, trash removal, and/or landscaping services may be needed during operation of the facility.	Support services and supplies would be needed during construction. Security, maintenance, trash removal, and/or landscaping services may be needed during operation of the facility.	Support services and supplies would be needed during construction. Security, maintenance, trash removal, and/or landscaping services may be needed during operation of the facility.	Support services and supplies would be needed during construction. Security, maintenance, trash removal, and/or landscaping services may be needed during operation of the facility.
Water Use	Makeup water for the BBNPP would be drawn from the North Branch Susquehanna River. Given the short distance from the site to the river, impacts associated with construction of the makeup water pipelines are anticipated to be temporary in nature. As stated in Section 5.2.1.2, the average water demand from the Susquehanna River for operation of BBNPP is estimated at 25,721~~4~~9 gpm (97,3~~5~~84 Lpm). (Ref. 5.1-4) As stated in Section 4.2.1.3, the average construction water usage is estimated at 96 gpm (363 Lpm). The Susquehanna River will supply adequate surface water for plant use. The water availability in the Susquehanna River at 7Q10 would exceed the total water usage at the BBNPP Site by more than 10 times. Water use impacts associated with construction activities would be SMALL to MODERATE, while impacts associated with operations	It is estimated that ~~consumptive~~ water use for a nuclear facility at the Montour site would be similar to that which is proposed for the BBNPP site. The West Branch of the Susquehanna River is the main source of water for the Montour site. The water availability in the West Branch Susquehanna River at the lowest 7-day average flow in a ten year period (i.e., 7Q10) exceeds the total water usage at the site by approximately 10 times. To obtain the water from the West Branch of the Susquehanna River, new water intake and discharge pipelines would need to be constructed for a total of approximately 18.3 mi (29.8 km). Based on the temporary nature of the construction-related impacts and implementation of BMPs during construction, the overall construction-related water use impacts would be SMALL. Based on the implementation of operational controls and monitoring	It is estimated that ~~consumptive~~ water use for a nuclear facility at the ~~Sandy Bend~~ Humboldt site would be similar to that which is proposed for the BBNPP site. The main branch of the Susquehanna River is the main source of water for the Humboldt site. The water availability in the Susquehanna River at 7Q10 would exceed the total water usage at the Humboldt Industrial Park by approximately 10 times. To obtain the water from the Susquehanna River, new water intake and discharge pipelines would need to be constructed for a total of approximately 23.5 mi (37.8 km). Based on the temporary nature of the construction-related impacts and implementation of BMPs during construction, the overall construction-related water use impacts would be SMALL. Based on the implementation of operational controls and monitoring to meet permit limits, overall water use impacts from operation	It is estimated that ~~consumptive~~ water use for a nuclear facility at the ~~Martins Creek~~Seedco site would be similar to that which is proposed for the BBNPP site. The Susquehanna River is the main source of water for the Seedco site. The water availability in the Susquehanna River at 7Q10 exceeds the total water usage at the site by approximately 28 times. To obtain the water from the Susquehanna River, new water intake and discharge pipelines would need to be constructed for a total of approximately 21 mi (34 km). Based on the temporary nature of the construction-related impacts and implementation of BMPs during construction, the overall construction-related water use impacts would be SMALL. Based on the implementation of operational controls and monitoring to meet permit limits, overall water use impacts from operation

Table 10.4-1 Benefits and Costs of the Proposed Project Summarized

Benefit Category	Proposed Site BBNPP Site	Option 1 Montour Site	Option 2 ~~Sandy Bend Site~~Humboldt Site	Option 3 ~~Martins Creek~~ Seedco Site
	would be SMALL.	to meet permit limits, overall water use impacts from operation activities would be SMALL. ~~The Montour site would require routing makeup and blowdown pipelines approximately 14 miles to the Susquehanna River.~~ ~~Water use impacts associated with construction and operations are anticipated to be SMALL.~~	activities would be SMALL. ~~The Sandy Bend site would require routing makeup and blowdown pipelines approximately 2 miles to the river.~~ ~~Water use impacts associated with construction and operations are anticipated to be SMALL.~~	activities would be SMALL. ~~The primary water source is the Delaware River.~~ ~~Construction-related water impacts are anticipated to be SMALL. Operations-related water use impacts are anticipated to be SMALL during periods of normal to high flow due to the relatively small percentage of flow that would be consumed. However, under periods of extreme low flow, the operations related water use impacts are anticipated to be MODERATE due to the consumptive water use being approximately 13% of the flow.~~
EXTERNAL COSTS				
Air Quality	~~The power facility must meet applicable federal, state, and local air quality permitting regulations.~~ The BBNPP site is located in Luzerne County and is designated as in attainment for all pollutants as regulated by the USEPA. Any air emissions that would occur as a result of the operation of the BBNPP should be low enough that they would not cause or contribute to a significant change in local or regional air quality levels. However, the BBNPP site is located in a four-county maintenance area for ozone, and therefore an applicability analysis of emissions	~~The power facility must meet applicable federal, state, and local air quality permitting regulations.~~ The Montour site is located in Montour County and is designated as an attainment area for all pollutants regulated by the USEPA. Any air emissions that would occur as a result of the operation of the proposed new unit at the Montour site would be low enough that they should not cause or contribute to a significant change in local or regional air quality levels. There are no PSD Class I areas in Pennsylvania, and there are no Class I areas within 100 mi (161	~~The power facility must meet applicable federal, state, and local air quality permitting regulations.~~ The Humboldt site is located in Luzerne County and is designated as an attainment area for all pollutants regulated by the USEPA. Any air emissions that would occur as a result of the operation of the proposed new unit at the Humboldt site would be low enough that they should not cause or contribute to a significant change in local or regional air quality levels. However, the Humboldt site is located in a four-county maintenance area for ozone, and therefore an	~~The power facility must meet applicable federal, state, and local air quality permitting regulations.~~ The Seedco site is located in Northumberland County and is designated as an attainment area for all pollutants regulated by the USEPA. Any air emissions that would occur as a result of the operation of the proposed new unit at the Seedco site would be low enough that they should not cause or contribute to a significant change in local or regional air quality levels. There are no PSD Class I areas in Pennsylvania, and there are no Class I areas within 100 mi (161

Table 10.4-1 Benefits and Costs of the Proposed Project Summarized

Benefit Category	Proposed Site BBNPP Site	Option 1 Montour Site	Option 2 ~~Sandy Bend Site~~Humboldt Site	Option 3 ~~Martins Creek~~ Seedco Site
	of ozone and its precursors is required to determine whether the federal Clean Air Conformity Rule would be triggered by BBNPP construction. There are no Prevention of Significant Deterioration (PSD) Class I areas in Pennsylvania, and there are no Class I areas within 100 mi (161 km) of the site. Air quality impacts from construction and operation are anticipated to be SMALL.	km) of the site. Air quality impacts from construction and operation are anticipated to be SMALL.	applicability analysis of emissions of ozone and its precursors is required to determine whether the federal Clean Air Conformity Rule would be triggered by the plant's construction. There are no PSD Class I areas in Pennsylvania, and there are no Class I areas within 100 mi (161 km) of the site. Air quality impacts from construction and operation are anticipated to be SMALL.	km) of the site. ~~It is anticipated that there would be a small increase in regional and local air emissions as a result of increased vehicular traffic associated with workforce employed for facility operations and periodic refueling activities.~~ Air quality impacts from construction and operation are anticipated to be SMALL.
Terrestrial Biology	Terrestrial species that are listed as threatened or endangered by U.S. Fish and Wildlife Service (USFWS) and the Commonwealth of Pennsylvania and have the potential to occur within Luzerne County are presented in Section 2.4.1. ~~No rare, threatened, or endangered species are known to occur in the immediate vicinity of the site.~~ ~~Wetlands that may be impacted upon by construction of the proposed facility are discussed in Section 4.3.~~ Sixteen species of terrestrial fauna were identified as potentially "important" at the BBNPP site, yet none have been observed at or in the immediate area of the BBNPP. No state-threatened species have been documented on the BBNPP site. No important rare reptiles or	~~Terrestrial species that are listed as threatened or endangered by USFWS and the Commonwealth of Pennsylvania and have the potential to occur within Montour County are presented in Section 9.3.2. No rare, threatened, or endangered species are known to occur in the immediate vicinity of the site.~~ ~~Wetlands impacts from construction of the proposed facility are discussed in Section 9.3.~~ ~~Terrestrial impacts from construction are anticipated to be MODERATE, while terrestrial impacts from operations are anticipated to be SMALL.~~ Table 9.3-1 provides a list of federally and state-listed threatened and endangered terrestrial species known to occur	~~Terrestrial species that are listed as threatened or endangered by USFWS and the Commonwealth of Pennsylvania and have the potential to occur within Mifflin County are presented in Section 9.3.2. No rare, threatened, or endangered species are known to occur in the immediate vicinity of the site.~~ ~~Wetlands that may be impacted by construction of the proposed facility are discussed in Section 9.3.~~ ~~Terrestrial impacts from construction are anticipated to SMALL to MODERATE, while terrestrial impacts from operations are anticipated to be SMALL.~~ Table 9.3-3 provides a list of federally and state-listed threatened and endangered terrestrial species that may occur in	~~Terrestrial species that are listed as threatened or endangered by USFWS and the State of New Jersey and have the potential to occur within Warren County are presented in Section 9.3.2. There are several State and federally listed protected terrestrial species that have the potential to occur in Warren County.~~ ~~Wetlands that may be impacted by construction of the proposed facility are discussed in Section 9.3.~~ ~~Terrestrial impacts from construction are anticipated to SMALL to MODERATE, while terrestrial impacts from operations are anticipated to be SMALL.~~ Table 9.3-5 provides a list of state-protected terrestrial species that may occur in Northumberland County, Pennsylvania. There are

Table 10.4-1 Benefits and Costs of the Proposed Project Summarized

Benefit Category	Proposed Site BBNPP Site	Option 1 Montour Site	Option 2 ~~Sandy Bend Site~~Humboldt Site	Option 3 ~~Martins Creek~~ Seedco Site
	amphibians have been documented to occur at the BBNPP site. Commercially or recreationally important species are known to occur on the BBNPP site, yet the impacts of construction would likely be minimal given the abundance of these species in Pennsylvania. Terrestrial ecology impacts at the BBNPP site from operation activities, including impacts from salt drift, vapor plumes, icing, precipitation modifications, noise, and avian collisions with cooling towers, and associated mitigation measures, are discussed in ER Section 5.3.3.2 and ER Section 5.6.1. Terrestrial impacts from construction and operations are anticipated to be SMALL.	in Montour County, Pennsylvania. Construction-related impacts on terrestrial protected species and recreationally and commercially important terrestrial wildlife species from construction at the site would be SMALL. Impacts on protected species from construction of the water pipeline and new/expanded transmission corridors are anticipated to be MODERATE. To lessen the impacts, wetland impacts would be avoided, minimized, and/or mitigated; threatened and endangered species considered and protected; and BMPs implemented to minimize the potential for impacts to watercourses. Impacts on ecologically important species/habitat from facility construction or installation of pipelines or powerlines to serve the proposed new unit would be SMALL. It is anticipated that terrestrial ecology impacts from operations would be similar to those described for the BBNPP site in ER Section 5.3.3. Therefore, impacts on terrestrial ecology from operations would be SMALL.	Luzerne County, Pennsylvania. The potential impacts on protected plant species from construction at the site would be MODERATE. Impacts on protected bird, mammal, and reptiles would be SMALL. Construction-related impacts on terrestrial protected species and recreationally and commercially important terrestrial wildlife species from construction at the site would be SMALL. Impacts on protected species from construction of the water pipeline and new/expanded transmission corridors are anticipated to be MODERATE. To lessen the impacts, wetland impacts would be avoided, minimized, and/or mitigated; threatened and endangered species considered and protected; and BMPs implemented to minimize the potential for impacts to watercourses. Impacts on ecologically important species/habitat from facility construction or installation of pipelines or powerlines to serve the proposed new unit would be SMALL. It is anticipated that terrestrial ecology impacts from operations would be similar to those described for the BBNPP site in ER Section 5.3.3. Therefore, impacts on	no federally protected species that are known to occur in the county, thus no impacts on federally protected species would be expected. Impacts on protected plant, mammalian, and reptile species would be SMALL. Construction-related impacts on protected animal species at the Seedco site would be SMALL. Impacts on protected species from construction of the water pipeline and new/expanded transmission corridors are anticipated to be MODERATE. To lessen the impacts, wetland impacts would be avoided, minimized, and/or mitigated; threatened and endangered species considered and protected; and BMPs implemented to minimize the potential for impacts to watercourses. Impacts on ecologically important species from facility construction or installation of pipelines or powerlines to serve the proposed new unit would be SMALL. It is anticipated that terrestrial ecology impacts from operations would be similar to those described for the BBNPP site in ER Section 5.3.3. Therefore, impacts on terrestrial ecology from operations

Table 10.4-1 Benefits and Costs of the Proposed Project Summarized

Benefit Category	Proposed Site BBNPP Site	Option 1 Montour Site	Option 2 ~~Sandy Bend Site~~Humboldt Site	Option 3 ~~Martins Creek~~ Seedco Site
			terrestrial ecology from operations would be SMALL.	would be SMALL.
Aquatic Biology	No aquatic species that are listed as threatened or endangered by USFWS and the Commonwealth of Pennsylvania and have been collected at the site as described in Section 2.4.2. The construction footprint in the Susquehanna River would be limited to construction of the CWS Makeup Water Intake Structure and discharge structure. Construction-related impacts on recreational fish species would be minimal. No loss of important mussel habitat would occur as a result of construction of the intake/discharge structures. No incremental effect on aquatic resources beyond what currently	~~Aquatic species that are listed as threatened or endangered by USFWS and the Commonwealth of Pennsylvania and have the potential to occur in Montour County are presented in Section 9.3.2.~~ ~~Proposed facilities at the site will include cooling towers that would reduce the amount of cooling water withdrawal required for plant operation. Through the use of cooling towers with an appropriate intake design, it is anticipated that potential adverse impacts from entrainment or impingement of aquatic organism would be minor~~	~~Aquatic species that are listed as threatened or endangered by USFWS and the Commonwealth of Pennsylvania and have the potential to occur in Mifflin County are presented in Section 9.3.2.~~ ~~Proposed facilities at the site will include cooling towers that would reduce the amount of cooling water withdrawal required for plant operation. Through the use of cooling towers with an appropriate intake design, it is anticipated that potential adverse impacts from entrainment or impingement of aquatic organism would be minor and would not significantly disrupt~~	~~Aquatic species that are listed as threatened or endangered by USFWS and the State of New Jersey and have the potential to occur in Warren County are presented in Section 9.3.2. There is one federally listed threatened or endangered aquatic invertebrate species in Warren County. While the probability of the glochidia becoming entrained in the cooling water intake system is very low due to the relatively large volume of water in the Delaware River, there is a possibility of impact due to known populations existing in Warren County.~~

Table 10.4-1 Benefits and Costs of the Proposed Project Summarized

Benefit Category	Proposed Site BBNPP Site	Option 1 Montour Site	Option 2 ~~Sandy Bend Site~~Humboldt Site	Option 3 ~~Martins Creek~~ Seedco Site
	occurs within the transmission corridor is expected for the construction of BBNPP. Aquatic impacts attributable to the operation of the CWS Makeup Water Intake Structure are impingement and entrainment. ER Section 5.3.1.2 provides information regarding impingement and entrainment studies at the site and SSES. The effects of the BBNPP discharge on aquatic ecology are anticipated to be similar to the SSES discharge. As noted in ER Section 5.3.2.2, no substantial detrimental ecological impacts resulting from operation of the SSES discharge have been documented in 24 years of monitoring. ~~Proposed facilities at the site will include cooling towers that would reduce the amount of cooling water withdrawal required for plant operation. Through the use of cooling towers with an appropriate intake design, it is anticipated that potential adverse impacts from entrainment or impingement of aquatic organism would be minor and would not significantly disrupt existing populations.~~ ~~Operation under the National Pollutant Discharge Elimination~~	~~and would not significantly disrupt existing populations.~~ ~~Operation under the NPDES permit should result in the maintenance of a balanced, indigenous population of fish, shellfish, and other aquatic organisms in the vicinity of the discharge structure.~~ ~~Aquatic ecology impacts from construction are anticipated to be MODERATE based on commitment of land and construction of pipeline and transmission system corridors. Aquatic ecology impacts from operations are anticipated to be SMALL.~~ Although there are streams on the Montour site that will be impacted by construction, no wetlands occur on the Montour site (see Table 9.3-12). The adverse aquatic ecology impacts associated with construction of the CWS Makeup Water Intake Structure are anticipated to be SMALL. Due to construction of potential new transmission line and water pipeline corridors, and new access roadways that will impact wetlands and streams offsite (see Table 9.3-12), offsite construction activities would have a MODERATE impact on aquatic ecology. Table 9.3-1 provides a list of	~~existing populations.~~ ~~Operation under the NPDES permit should result in the maintenance of a balanced, indigenous population of fish, shellfish, and other aquatic organisms in the vicinity of the discharge structure.~~ ~~Aquatic ecology impacts from construction are anticipated to be SMALL to MODERATE based on expansion of the transmission system corridor. Aquatic impacts from operations are anticipated to be SMALL.~~ There are wetlands and streams on the Humboldt site that will be impacted from construction (Table 9.3-12). Adverse aquatic ecology impacts associated with construction of the CWS Makeup Water Intake Structure are anticipated to be SMALL. Due to construction of potential new transmission line and water pipeline corridors that will impact wetlands and streams offsite (see Table 9.3-12), offsite construction activities would have a MODERATE impact on aquatic ecology. There are no federally protected aquatic species known to occur in Luzerne County, Pennsylvania (Table 9.3-3). Table 9.3-3 identifies three state-protected aquatic	~~Proposed facilities at the site will include cooling towers that would reduce the amount of cooling water withdrawal required for plant operation. Through the use of cooling towers with an appropriate intake design, it is anticipated that potential adverse impacts from entrainment or impingement of aquatic organism would be minor and would not significantly disrupt existing populations.~~ There are wetlands and streams on the Seedco site that will be impacted from construction (Table 9.3-12). Adverse aquatic ecology impacts associated with construction of the CWS Makeup Water Intake Structure are anticipated to be SMALL. Due to construction of potential new transmission line and water pipeline corridors and new access roadways and a railroad spur that will impact wetlands and streams offsite (see Table 9.3-12), offsite construction activities would have a MODERATE impact on aquatic ecology. There are no federally protected aquatic species known to occur in Northumberland County, Pennsylvania. Table 9.3-5 identifies two state-protected aquatic species

Table 10.4-1 Benefits and Costs of the Proposed Project Summarized

Benefit Category	Proposed Site BBNPP Site	Option 1 Montour Site	Option 2 ~~Sandy Bend Site~~Humboldt Site	Option 3 ~~Martins Creek~~ Seedco Site
	~~System (NPDES) permit should result in the maintenance of a balanced, indigenous population of fish, shellfish, and other aquatic organisms in the vicinity of the discharge structure.~~ Aquatic ecology impacts from construction and operations are anticipated to be SMALL.	federally and state-listed threatened and endangered aquatic species located within Montour County, Pennsylvania. No federally or state-listed threatened or endangered species are located onsite. No impacts on protected aquatic species would result from construction at the site. Impacts on federally or state-protected aquatic species, as well as recreationally important fish species or ecologically important aquatic species, would be SMALL. It is anticipated that aquatic ecology impacts from operation of the proposed new unit at the Montour site would be similar to those described for the BBNPP site in ER Section 5.3.3. Therefore, impacts on aquatic ecology from operations would be SMALL.	species known to occur in Luzerne County. Impacts on federally or state-protected aquatic species would be SMALL. Impacts on recreationally important fish species or ecologically important aquatic species would be MODERATE. It is anticipated that aquatic ecology impacts from operation of the proposed new unit at the site would be similar to those described for the BBNPP site in ER Section 5.3.3. Therefore, impacts on aquatic ecology from operations would be SMALL.	known to occur in Northumberland County. Impacts on federally and state-protected aquatic species would be SMALL. Impacts on recreationally important fish species or ecologically important aquatic species would be MODERATE. It is anticipated that aquatic ecology impacts from operation of the proposed new unit at the Seedco site would be similar to those described for the BBNPP site in ER Section 5.3.3. Therefore, impacts on aquatic ecology from the operation of the proposed new unit at the Seedco site would be SMALL.

Table 10.4-1 Benefits and Costs of the Proposed Project Summarized

Benefit Category	Proposed Site BBNPP Site	Option 1 Montour Site	Option 2 ~~Sandy Bend Site~~Humboldt Site	Option 3 ~~Martins Creek~~ Seedco Site
~~Aquatic Biology (continued)~~				~~Operation under the NPDES permit should result in the maintenance of a balanced, indigenous population of fish, shellfish, and other aquatic organisms in the vicinity of the discharge structure.~~ ~~Aquatic ecology impacts from construction are anticipated to be SMALL to MODERATE based on loss of habitat and wetlands associated with expansion of the transmission system. Aquatic impacts from operations are considered to be SMALL to MODERATE due to the presence and potential entrainment of a federally listed endangered species.~~
Socioeconomic	Socioeconomic impacts associated with the construction and operation of BBNPP ~~is~~ are discussed in Section 5.8. Employment projections indicate a readily available workforce or employment during the construction and operation phase of the project. Most construction workers would come from within region surrounding the site. Should a larger-than-expected number of construction workers come from outside the region, there could be a noticeable increase in population, but it would not be excessive.	Socioeconomic impacts associated with the construction and operation of a nuclear facility at the Montour site ~~is~~ are discussed in Section 9.3. The estimated population in Montour County in 2007 was 17,817 people. The Montour County median household income in 2007 was $46,116. Socioeconomic adverse and beneficial impacts associated with construction activities would be SMALL to MODERATE due to the percent increase of population into the area and its resulting potential impact on housing, public services,	Socioeconomic impacts associated with the construction and operation of a nuclear facility at the ~~Sandy Bend~~ Humboldt site ~~is~~ are discussed in Section 9.3. The estimated population in Luzerne County in 2007 was 312,265 people. The Luzerne County median household income in 2007 was $43,229. Socioeconomic adverse and beneficial impacts associated with construction activities would be SMALL to MODERATE due to the percent increase of population into the area and its resulting potential	Socioeconomic impacts associated with the construction and operation of a nuclear facility at the ~~Martins Creek~~ Seedco site ~~is~~ are discussed in Section 9.3. The estimated population in Northumberland County in 2007 was 91,003 people. The Northumberland County median household income in 2007 was $37,282. Socioeconomic adverse and beneficial impacts associated with construction activities would be SMALL to MODERATE due to the percent increase of population into

Table 10.4-1 Benefits and Costs of the Proposed Project Summarized

Benefit Category	Proposed Site BBNPP Site	Option 1 Montour Site	Option 2 ~~Sandy Bend Site~~Humboldt Site	Option 3 ~~Martins Creek~~ Seedco Site
	The estimated population of the region of influence, which included Columbia and Luzerne counties, in 2006 was 378,034 people. Population within a 50-mi (80-km) radius of the BBNPP site in 2000 was 1,781,893 people. Columbia County's median household income in 2004 was approximately $37,871. Luzerne County's median household income in 2004 was approximately $36,968. Socioeconomic adverse and beneficial impacts associated with construction activities would be SMALL to MODERATE due to the percent increase of population into the area and its resulting potential impact on housing, public services, and tax revenue. Adverse impacts associated with operation activities would be SMALL. ~~Socioeconomic impacts (adverse and beneficial) from construction activities are expected to be SMALL to MODERATE. Beneficial impacts from operations activities are expected to be SMALL to LARGE.~~	and tax revenue. Adverse impacts associated with operation activities would be SMALL. ~~Employment projections within the area indicate a general upward trend in the availability of various construction jobs An increase of available jobs indicates additional competition in acquiring a workforce for the construction of the proposed facility.~~ ~~It is assumed that many of the direct and indirect jobs created by the proposed facility would require a largely migrating workforce.~~ ~~The impact of the proposed facility on the population and demographics of Montour County is expected to be SMALL.~~	impact on housing and public services, and tax revenue. Adverse impacts associated with operation activities would be MODERATE due to the impacts on the character and quality of views in the area. ~~Employment projections within the area indicate a general upward trend in the availability of various construction jobs An increase of available jobs indicates additional competition in acquiring a workforce for the construction of the proposed facility.~~ ~~It is assumed that many of the direct and indirect jobs created by the proposed facility would require a largely migrating workforce.~~ ~~The impact of the proposed facility on the population and demographics of Mifflin County is expected to be SMALL.~~	the area and its resulting potential impact on housing and public services, and tax revenue. Adverse impacts associated with operation activities would be MODERATE due to the impacts on the character and quality of views in the area. ~~It is expected that most construction workers would come from within region surrounding the site. Should a larger-than-expected number of construction workers come from outside the region, there could be a noticeable increase in population, but it would not be excessive.~~ ~~The overall population level is anticipated to be sufficiently large that the impact on area employment from construction and operation of the new unit would be low. It is expected that the impact on housing and community services would be negligible.~~ ~~The impact of the proposed facility on the population and demographics of Warren County is expected to be SMALL.~~

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Benefit Category	Proposed Site BBNPP Site	Option 1 Montour Site	Option 2 ~~Sandy Bend Site~~Humboldt Site	Option 3 ~~Martins Creek~~ Seedco Site
Housing	~~As identified in Section 4.4.2.4, there are adequate housing units available to address the influx of both temporary and permanent workforce required to support a nuclear power generating facility.~~ The increase in housing demand in Luzerne County would be less than the existing availability of housing units within the 50-mi (80-km) radius of the BBNPP site. The impact on housing would be SMALL to MODERATE.	~~There are adequate housing units available to address the influx of both temporary and permanent workforce required to support a nuclear power generating facility.~~ The increase in housing demand in Montour County would be less than the existing availability of housing units within the 50-mi (80 km) radius. The impact on housing would be SMALL to MODERATE.	~~There are adequate housing units available to address the influx of both temporary and permanent workforce required to support a nuclear power generating facility.~~ The increase in housing demand in Luzerne County would be less than the existing availability of housing units within the 50-mi (80-km) radius. The impact on housing would be SMALL to MODERATE.	~~There are adequate housing units available to address the influx of both temporary and permanent workforce required to support a nuclear power generating facility.~~ The increase in housing demand in Northumberland County would be less than the existing availability of housing units within the 50-mi (80-km) radius. The impact on housing would be SMALL to MODERATE.
Local Infrastructure	Local infrastructure surrounding the BBNPP site is discussed in Sections 2.1 and 2.2. The BBNPP site is located adjacent to U.S. Route 11. There is an existing freight rail line at the BBNPP site, and a rail spur runs up the eastern border of the site. Impacts associated with construction of the access road and rail spur are anticipated to be temporary in nature. ~~Transportation routes near the site are limited to state and county roads, and include major highways in Luzerne County (near the BBNPP site), Pennsylvania.~~ Emergency evacuation of the area is possible. The site is adjacent to the existing SSES Units 1 and 2 and brings the advantage of	Local infrastructure surrounding the Montour site is discussed in Section 9.3. The Montour site has access from SR 54 and SR 254. There is an existing Norfolk Southern rail line and spur located approximately 1.4 mi (2.2 km) to the southwest of the site. Impacts associated with construction of the access road and rail spur are anticipated to be temporary in nature. There is existing infrastructure from the Montour Coal Power Plant that could be used to support the proposed new unit at the Montour site. Emergency evacuation of the area is possible. An emergency plan is already in place (for the Montour Coal Plant) that could easily be adapted to include the	Local infrastructure surrounding the ~~Sandy Bend~~ Humboldt site is discussed in Section 9.3. The Humboldt site is located adjacent to Pennsylvania State Highway 924 and I-81. There is an existing rail line at the site, which runs along the eastern edge of the site. An emergency evacuation plan would need to be developed for the proposed new unit at the site. There would be short-term traffic impacts on State Highway 924 and I-81 during construction and limited long-term traffic impacts from operation activities. Implementing appropriate mitigation measures would result in SMALL to MODERATE impacts on transportation during construction activities, and a SMALL impact	Local infrastructure surrounding the ~~Martins Creek~~ Seedco site is discussed in Section 9.3. The Seedco site is located northeast of Pennsylvania State Highway 901 and south of State Highway 61. There is an existing rail line at the site, which runs along the western edge of the site. Impacts associated with construction of the access road and rail spur are anticipated to be temporary in nature. An emergency evacuation plan would need to be developed for the proposed new unit at the site. There would be short-term traffic impacts on State Highways 901 and 61 during construction and limited long-term traffic impacts during operation activities. Implementing appropriate

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Benefit Category	Proposed Site BBNPP Site	Option 1 Montour Site	Option 2 ~~Sandy Bend Site~~Humboldt Site	Option 3 ~~Martins Creek~~ Seedco Site
	already having an emergency plan that could be used to facilitate the development of a plan for the new site~~easily be adapted to include the new site~~. There is also existing infrastructure from the SSES Units 1 and 2 that could be used to support the BBNPP. Increased traffic at beginning and end of shifts may increase traffic on highways to and from plant. There would be short-term traffic impacts on U.S. Route 11 and roads surrounding the site during construction, and limited long-term traffic impacts during operation activities. Little impact on availability of services is anticipated. ~~Overall impacts to local infrastructure would be SMALL.~~ Implementing the appropriate mitigation measures would result in SMALL to MODERATE impacts on transportation during construction activities, and a SMALL impact during operation of the BBNPP.	proposed new unit. There would be short-term traffic impacts on SR 54 and SR 254, and roads surrounding the site during construction and limited long-term traffic impacts during operation activities. Implementing appropriate mitigation measures would result in SMALL to MODERATE impacts on transportation during construction activities, and a SMALL impact during operations. ~~Transportation routes near the site are limited to state and county roads. The proposed site would require the upgrade/construction of new roads to access the site. There is existing infrastructure for the Montour Coal Power Plant that could be used to support the proposed facility.~~ ~~Emergency evacuation of the area is possible. An emergency plan is already in place (for the Montour Coal Plant) that could easily be adapted to include the new site.~~ ~~Increased traffic at beginning and end of shifts may increase traffic on highways to and from plant. Little impact on availability of services is anticipated. Overall impacts to local infrastructure would be SMALL.~~	during operations. ~~Infrastructure necessary to support a large industrial facility is currently not in place.~~ ~~Transportation routes near the site are limited to federal, state and county roads. The site is accessed from Sandy Bend Road, a local road which would most likely need to be improved to accommodate construction and operation activities. The site also has access to an active rail line adjacent to the site.~~ ~~Emergency evacuation of the area is possible. However, the site would require an emergency plan.~~ ~~Increased traffic at beginning and end of shifts may increase traffic on highways to and from plant. Overall impacts to local infrastructure would be SMALL.~~	mitigation measures would result in SMALL to MODERATE impacts on transportation during construction activities, and a SMALL impact during operations. ~~Transportation routes near the site are limited to county and local roads.~~ ~~Emergency evacuation of the area is possible. The site is across the Delaware River from the existing Martins Creek natural gas-fired generating facility and brings the advantage of already having an emergency plan that could easily be adapted to include the new site.~~ ~~Increased traffic at beginning and end of shifts will significantly increase traffic on county and local roads to and from plant. Overall impacts to local infrastructure would be MODERATE.~~

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Benefit Category	Proposed Site BBNPP Site	Option 1 Montour Site	Option 2 ~~Sandy Bend Site~~Humboldt Site	Option 3 ~~Martins Creek~~ Seedco Site
Radiological Heath	Radiological exposure below limits to workers and public. SMALL	Radiological exposure below limits to workers and public. SMALL	Radiological exposure below limits to workers and public. SMALL	Radiological exposure below limits to workers and public. SMALL
Loss of Resources	Loss of resources is discussed in Sections 10.1, 10.2, and 10.3. It is expected that losses will be mitigated to minimize the impact of the loss. SMALL	Loss of resources is discussed in Sections 10.1, 10.2, and 10.3. It is expected that losses will be mitigated to minimize the impact of the loss. SMALL	Loss of resources is discussed in Sections 10.1, 10.2, and 10.3. It is expected that losses will be mitigated to minimize the impact of the loss. SMALL	Loss of resources is discussed in Sections 10.1, 10.2, and 10.3. It is expected that losses will be mitigated to minimize the impact of the loss. SMALL
Measures and Controls to Reduce Environmental Impact	Costs associated with mitigation will be SMALL, since the nuclear unit would be built adjacent to an existing nuclear site. The existing nuclear plant's mitigation and environmental monitoring programs may be expanded to account for the proposed new unit, thereby potentially reducing mitigation costs.	Costs associated with mitigation will be MODERATE, since the nuclear unit would be built on an undeveloped site. Mitigation and environmental monitoring programs will need to be implemented to account for the new unit.	Costs associated with mitigation will be MODERATE, since the nuclear unit would be built on an undeveloped site. Mitigation and environmental monitoring programs will need to be implemented to account for the new unit.	Costs associated with mitigation will be MODERATE, since the nuclear unit would be built on an undeveloped site. Mitigation and environmental monitoring programs will need to be implemented to account for the new unit.