ENVIRONMENTAL REPORT

CHAPTER 9

ALTERNATIVES TO THE PROPOSED ACTION

9.0 ALTERNATIVES TO THE PROPOSED ACTION

This chapter assesses alternatives to the proposed siting and construction of a new nuclear power plant at the Bell Bend Nuclear Power Plant (BBNPP) site.

Chapter 9 describes the alternatives to construction and operation of a new nuclear unit with closed cycle cooling adjacent to the Susquehanna Steam Electric Station (SSES) Units 1 and 2 location, and alternative plant and transmission systems. The descriptions provide sufficient detail to facilitate evaluation of the impacts of the alternative generation options or plant and transmission systems relative to those of the proposed action. The chapter is divided into four sections:

- ″No-Action" Alternative
- Energy Alternatives
- Alternative Sites
- Alternative Plant and Transmission Systems

9.1 NO-ACTION ALTERNATIVE

The "No-Action" alternative refers to a scenario where a new nuclear power plant, as described in Chapter 2, is not constructed and no other generating station, either nuclear or non nuclear, is constructed and operated.

The most significant effect of the No-Action alternative would be loss of the potential 1,600 MWe additional generating capacity that BBNPP would provide, which could lead to a reduced ability of existing power suppliers to maintain reserve margins and supply lower cost power to customers. Chapter 8 describes a 1.5% annual increase in electricity demand in the eastern part of the PJM Interconnection, LLC (PJM) "classic" region for the merchant BBNPP, over the next 10 years. (PJM, 2008a) Under the No-Action alternative, this increased need for power would need to be met by means that involve no new generating capacity.

Additionally, over the next 10 years, the expected annual increase in the weather normalized average peak demand for electricity in the region of interest (ROI)/primary market area will be approximately 1.6%. As noted in Section 8.2.2, PJM has identified over 9,400 megawatts (MW) of new generation for commercial operation dates of 2006 to 2012, with most of the new generation units proposed to be baseload coal-fired units located in the western part of the PJM area. The BBNPP would provide much needed baseload power (i.e., the quantity of generation that exists continuously during a given period) for the ROI/primary market area that is expected to have average annual peak forecast grow between 1.2% (winter) and 1.6% (summer) per year over the next 10 years (PJM, 2008a).

Under the No-Action alternative, PPL Bell Bend, LLC (PPL), would not be able to satisfy corporate climate change policy objectives that include reducing greenhouse gas emissions while maintaining a strong economy, reducing dependence on foreign energy sources, and providing reliable electricity supply and infrastructure (PPL, 2008).

Although Pennsylvania has not, at this time, established mandatory programs to regulate carbon dioxide and other greenhouse gases, it is observing, though not participating, in the Regional Greenhouse Gas Initiative (RGGI), a cap and trade program among nine northeastern states. As of November 2007, three other states within the ROI/primary market area (New Jersey, Delaware, and Maryland) are members of RGGI (MDE, 2008).

The New Jersey Department of Environmental Protection (NJDEP) proposed regulations in July 2008 to establish a carbon dioxide (CO_2) cap-and-trade program for fossil-fuel-fired electric generators as part of its participation in the RGGI (NJDEP, 2008). The proposed New Jersey rule provides for up to 99% of New Jersey's CO_2 allowances to be sold via auction rather than allocated for free. Certain cogeneration units that qualify as "dispatch agreement facilities" or that meet certain thermal efficiency standards will be eligible to receive allowances for free or at a reduced cost. In addition, the proposed rule allows for up to one percent of New Jersey's annual CO_2 allowances to be set aside and retired to account for the voluntary purchase of qualified renewable energy, such as wind and solar. The proposed rule also exempts electric generating units that sell less than 10% of their electric output to the grid.

In 2008, the state of Delaware became the tenth state to pass legislation ratifying its participation in RGGI. The state's RGGI legislation caps emissions at 2009 levels and reduces them to 10% below 2009 levels by 2019 (DSS, 2008). Under the legislation, Delaware will auction its share of emissions allowances and use the proceeds to fund a variety of emission reduction, conservation, and low income financial assistance programs.

The Maryland RGGI Rule, Code of Maryland Regulations (COMAR) 26.09, was enacted in 2007 and closely follows the RGGI Model Rule with some reorganization. As part of the RGGI program, Maryland is proposing to auction 100% of the CO_2 budgeted allowances annually allocated to its Consumer Energy Efficiency Account, a strategic energy fund with proceeds to go into the MDE Clean Air Fund (MDE, 2008).

Although a non-RGGI state, Virginia enacted the Virginia Energy Plan in 2007. The Plan aims to increase the state's energy independence, conservation, and efficiency. The primary goals of the Plan are to reduce the rate of growth in energy use by 40%, reduce greenhouse gas emissions 30% by 2025, and increase in-state energy production by 20%. The Plan also recommends consumer energy education, strategic economic development, alternative energy research, and the creation of a Climate Change Commission to assess the level of Virginia's carbon emissions, related consequences, and potential further action. The Plan is to be updated every 5 years. (COV, 2007)

PPL Corporation has conducted an inventory of its carbon dioxide emissions and is continuing to evaluate various options for reducing, avoiding, off setting, or sequestering its carbon dioxide emissions. PPL Corporation believes that the regulation of greenhouse gas emissions may have a material impact on its capital expenditures and operations, but the costs are not now determinable.

As noted in Chapter 8, electric utilities forecast demand to increase over the next 10 years by 19% (141,000 MW) in the U.S. and 13% (9,500 MW) in Canada, but project committed resources to increase by only 6% (57,000 MW) in the United States and by 9% (9,000 MW) in Canada. The following points suggest the continuing benefits of and the need for a new merchant baseload generating facility in the ROI/primary market area: the region's need to diversify sources of energy, the potential to reduce the average cost of electricity to consumers, and the current national policy to reduce dependence on fossil fuels. As discussed in Chapter 8, the BBNPP will help meet the growing demand for new capacity and reduce carbon emissions in the ROI/primary market area.

The No-Action alternative is not optimal from the standpoint of the cost of operation or the cost of supplied power. Generating capability within this ROI/primary market area could become increasingly dependent on existing fossil fuel generation. If current trends continue, it is expected that older steam units in the east will be replaced by units burning natural gas (PJM, 2008b). The North American Energy Reliability Council (NERC) states:

> *Available capacity margins are projected to decline over the 2006-2015 period.*

Available capacity margins are projected to drop below minimum regional target levels in Electric Reliability Council of Texas (ERCOT), Midwest Reliability Organization (MRO), New England, ReliabilityFirst Corporation (RFC), and the Rocky Mountain and Canada areas of Western Electricity Coordinating Council (WECC) in the next 2 to 3 years, with other portions of the northeastern, southwestern, and western U.S. reaching minimum levels later in the 10-year period. (PPUC, 2007)

Without additional nuclear capacity, the ROI/primary market area would not recognize the role that diversity of generation fuels has in satisfying the overall reliability needs of the PJM Regional Transmission Organization (RTO) power system, as discussed in Section 8.1. For example, the development and installation of many gas-fired plants and recent shortages in gas supply and pipeline capability in some areas of the RTO have highlighted this issue. If PPL took No-Action to meet growth demands, the ability to supply low cost, reliable power to its customers and to the RTO would be impaired. In addition, PPL would not be able to support national goals, as established in the Energy Policy Act (EPACT) of 2005, to advance the use of nuclear energy.

In addition to the benefits described in Section 10.4, additional benefits of the construction and operation of the BBNNP include economic and tax impacts to the surrounding region that are described in Section 4.4.2, Section 4.4.3, Section 5.8.2.3, and Section 5.8.2.4. Under the No-Action alternative, none of the benefits of the proposed action as described in this Environmental Report (ER) would be realized.

Under the No-Action alternative, the predicted construction- and operation-related impacts from the project would not occur at the site. Those impacts would result primarily from the construction of the facility and would include land use, ecological, socioeconomic, and water related impacts, as summarized in Table 4.6-1. The potential adverse impacts identified from the operation of BBNPP are anticipated to be SMALL for all categories evaluated and are summarized in Table 5.10-1. The benefits of implementing the No-Action alternative would include avoiding the construction and operation impacts, as described in the sections referenced above.

As discussed in Chapter 8, because of transmission constraints with import of electricity from nearby states, purchasing power from other utilities or power generators is not considered economically practicable. Demand-side management is one alternative; however, even using optimistic projections, demand-side management will not meet future demands.

Implementation of the No-Action alternative could result in the future need for other generating sources, including continued reliance on carbon intensive fuels, such as coal and natural gas. Therefore, the predicted impacts, as well as other unidentified impacts, could occur in other areas.

9.1.1 References

COV, 2007. The Virginia Energy Plan, Commonwealth of Virginia, Department of Mines, Minerals, and Energy.

DSS, 2008. An Act to Amend Title 7 of the Delaware Code Relating to a Regional Greenhouse Gas Initiative and CO_2 Emission Trading Program, Senate Bill Number 263, Delaware State Senate, 144th General Assembly.

MDE, 2008. Technical Support Document for Proposed COMAR 26.09 CO_2 Budget Trading Program, Maryland Department of Environment, January 30, 2008 (revised March 19, 2008).

NJDEP, 2008. Notice of Rule Proposal/Proposed Revision to the State Implementation Plan(SIP)/Hearing Carbon Dioxide (CO_2) Budget Trading Program, Proposed Rules at N.J.A. 7:27C-1 through 10 and Proposed Amendments at N.J.A.C 7:27A-3.2 and 3.10, Air Quality Management, Environmental Regulation Public Notice, ATTN: Docket No. 07-08-06/662.

PJM, 2008a. PJM Load Forecasting Report, PJM Interconnection, LLC, January 2008 (revised May 2008).

PJM, 2008b. 2007 State of the Market Report, Volume 1: Introduction, Market Monitoring Unit, PJM Interconnection, LLC, March 11, 2008.

PPUC, 2007. Electric Power Outlook for Pennsylvania 2006-2011, Pennsylvania Public Utilities Commission, August 2007.

9.2 ENERGY ALTERNATIVES

This section discusses the potential environmental impacts associated with electricity generating sources other than a new nuclear unit at the BBNPP site. These alternatives include: purchasing electric power from other sources to replace power that would have been generated by a new unit at the BBNPP site, a combination of new generating capacity and conservation measures, and other generation alternatives that were deemed not to be competitive alternatives to the proposed facility.

Alternatives that do not require new generating capacity were considered, including energy conservation and Demand-Side Management (DSM). 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 reasonable combination of these alternatives, were also analyzed.

Alternatives that do not require new generating capacity are discussed in Section 9.2.1, while alternatives that do require new generating capacity are discussed in Section 9.2.2. Some of the alternatives discussed in Section 9.2.2 were eliminated from further consideration based on their availability in the region, overall feasibility, and environmental consequences. Section 9.2.3, describes the remaining alternatives in further detail relative to specific criteria such as environmental impacts, reliability, and economic costs.

9.2.1 Alternatives Not Requiring New Generating Capacity

The alternative of electric power generating capacity through the combination of purchased power and the reactivation or extended service life of power generating facilities within the primary market area is not feasible due to the insufficient capacity of power available for purchase from other local utilities or power generators, or inability to transport available power to the ROI/primary market area during periods of grid congestion. Also, the lack of inventory of deactivated power generating facilities or the possibility of extending the service life of a facility scheduled for deactivation in the future is also not feasible (PPL Susquehanna, LLC, 2006). A description of the power system, factors associated with the power demand and supply, and an assessment of the need for power is provided in Chapter 8.

As noted in Section 8.2.2, although the expected growth rates vary in the individual utilities' geographic zones, many of the highest projected rates of annual growth are in the eastern part of the PJM classic market area. To meet this load, the PJM regional transmission extension plan (RTEP) shows a need for reliance on western generation sources over an already congested transmission system or additional local generation resources to both ensure reliable service to customers and to obtain economical, available electricity supplies. (PJM, 2007)

The electricity needs of the eastern part of the PJM classic market area are supplied by local generation and significant energy transfers from the western portion of the PJM region. A significant portion of these transfers flows through transmission systems of northern West Virginia, northern Virginia, Maryland, eastern Ohio, and central southwestern Pennsylvania. This eastern part of the PJM classic market area's dependence on energy transfers from the western portion of the PJM region has been growing steadily over the past decade (PJM, 2007). This dependence is a result of limitations in the west-to-east transmission of energy across the Allegheny Mountains and the growing demand for baseload power at load centers along the east coast. As noted in Section 8.3, PJM was among the first to seek early designation of two transmission corridors designed to address congestion problems, which have been included in a 2007 DOE study on transmission congestion issues (PJM, 2006). PJM's two proposed corridors are the Allegheny Mountain Corridor, extending from the West Virginia panhandle region southeastward and serving population in Baltimore and Washington areas, and the Delaware River Corridor, extending from West Virginia region eastward and serving population centers around Philadelphia, New Jersey, and Delaware. Congestion costs resulting from constraints in the Allegheny Mountain Corridor totaled $747 million in 2005, with another $464 million on the Delaware River Corridor that year.

This section describes the assessment of the economic and technical feasibility of supplying the demand for energy without constructing new generating capacity. Specific alternatives include:

- Initiating conservation measures (including implementing DSM actions)
- Reactivating or extending the service life of existing plants within the power system
- Purchasing power from other utilities or power generators
- A combination of these elements that would be equivalent to the output of the project and therefore eliminate its need.

9.2.1.1 Initiating Conservation Measures

Under the Energy Policy Act of 2005 (PL, 2005) a rebate program was established for homeowners and small business owners who install energy-efficient systems in their buildings. The rebate was set at $3,000, or 25% of the expenses, whichever was less. The Act authorized $150 million in rebates for 2006 and up to $250 million in 2010. This new legislation was enacted in the hope that homeowners and small business owners would become more aware of energy-efficient technologies, lessening energy usage in the future.

Historically, state regulatory bodies have required utilities to institute programs designed to reduce demand for electricity. DSM has shown great potential in reducing peak-load consumption (maximum power requirement of a system at a given time). According to the Department of Energy/Energy Information Administration (DOE/EIA), in 2006, peak load usage was reduced by 27,240 MWe through DSM strategies. This reduction is 6% greater than that of the 25,710 MWe reduction in 2005 (EIA, 2007a). However, DSM costs increased by 6.8% over the same period (EIA, 2007b). Although DSM has shown great potential in reducing peak load usage, it does not satisfy the baseload need of the BBNPP. Additional information regarding energy efficiency and substitutions is provided in Section 8.2.2, and the assessment of need for power is discussed in more detail in Section 8.4.

9.2.1.1.1 Conservation Programs

As noted in Section 8.0 and Section 9.1, parts of Delaware, New Jersey, Maryland, Virginia, and Pennsylvania are included as the ROI/primary market area for the BBNPP. Conservation programs are generally comprehensive and complementary and focus on providing technical and financial assistance to homeowners, businesses, schools, and government organizations.

In 2007, the Governor of the State of Delaware signed "An Act to Amend Title 29 of the Delaware Code to Create a Sustainable Energy Utility in the State of Delaware" (DSS, 2007). The act created the Delaware State Energy Utility (SEU) program that will use competitive markets and leverage private financing to deliver cost-effective end-use energy services to residential, commercial, industrial, and transportation markets. The energy efficiency targets in the act state that by December 31, 2015, the SEU shall have achieved 30% reduction in annual energy usage for SEU participants, with a target of one-third of the participating savings occurring for residential clients, based on January 1, 2006, baseline levels.

New Jersey's Clean Energy Program™, administered through the New Jersey Office of Clean Energy, is a signature initiative of the New Jersey Board of Public Utilities (NJBPU), which provides education, information, and financial incentives for renewable energy systems and energy efficiency measures (NJBPU, 2008). New Jersey's Clean Energy Program is a statewide program that targets approximately $180 million each year toward technologies that save electricity and natural gas and increase the amount of electricity generated from clean, renewable resources. The Program establishes a set of objectives and measures to track progress in reducing energy use and increasing the use of renewable energy in New Jersey. The Program promotes increased energy efficiency and the use of clean, renewable sources of energy including solar, wind, geothermal, and sustainable biomass. Each year, the program provides an average of $145 million dollars in financial incentives, programs, and services to residential customers, businesses, schools, and municipalities that install energy efficient and renewable energy technologies, including solar PV systems.

Additionally, the State of New Jersey developed a draft Energy Master Plan to plan for adequate, reliable energy supply of electricity that keeps up with the growth in demand. The five major goals of the draft Plan are: (1) maximize energy conservation and energy efficiency by reducing energy consumption at least 20% by 2020; (2) reduce peak electricity demand by 5,700 MW by 2020; (3) meet 22.5% of the state's electricity needs from renewable sources; (4) develop new low carbon emitting, efficient power plants to help close the gap between the supply and demand of electricity; and (5) invest in innovative clean energy technologies and businesses to stimulate the industry's growth in New Jersey (NJOG, 2008).

In 1991, the Maryland General Assembly (MGA) enacted an energy conservation measure that is codified as Section 7-211 of the Public Utility Companies (PUC) Article (MGA, 1991). This provision requires each gas and electric company to develop and implement programs to encourage energy conservation. In response to this mandate and continuing with preexisting initiatives under its existing authority, the Maryland Public Service Commission (MDPSC) directed each affected utility to develop a comprehensive conservation plan. The MDPSC further directed each utility to engage in a collaborative effort with staff, the Office of People's Counsel (OPC), and other interested parties to develop its conservation plan. The result of these actions was that each utility implemented conservation and energy efficiency programs. (MDPSC, 2007)

The MDPSC requires Maryland electric utilities to implement DSM as a means to conserve energy and to take DSM energy savings into account in long-range planning. Recent legislation passage positions the State of Maryland as one of the leaders in energy efficiency and climate policy. On the energy efficiency side, the state recently launched the EmPOWER Maryland Initiative, which establishes a state goal of achieving a 15% reduction in per capita electricity use and peak demand by the end of 2015. This requires the state's utilities to implement energy efficiency programs and tasks the MDPSC with tracking progress toward that goal. This energy efficiency initiative, unlike energy conservation, which is based on changing behaviors and lifestyles, is technology-based.

As noted in Section 9.1, Virginia enacted the Virginia Energy Plan in 2007. The Plan aims to increase the state's energy independence, conservation, and efficiency. The primary goals of the Plan are to reduce the rate of growth in energy use by 40%, reduce greenhouse gas emissions 30% by 2025, and increase in-state energy production by 20%. To achieve these goals, the Plan sets fuel-specific goals to reduce electricity use by 10% by 2022, to reduce natural gas consumption by more than 7%, to reduce non-transportation petroleum use by 10%, and to reduce transportation energy use by 5% (COV, 2007).

Pennsylvania has implemented the Alternative Energy Portfolio Standards (AEPS) Act that includes provisions for market-based DSM measures to reduce electricity demand within the commonwealth. Prior to implementing the AEPS Act, Pennsylvania had developed, through individual settlements with the commonwealth's major distribution companies, a comprehensive program to promote and advance DSM in the retail electric market. The Pennsylvania Sustainable Energy Board (PSEB) worked in partnership with regional sustainable energy boards, other Commonwealth agencies, electric utilities, business organizations, and environmental organizations to develop and implement "tools" to save energy. Five settlement agreements were established as separate and independent sustainable energy funds to promote: (1) the development and use of renewable energy and clean energy technologies, (2) energy conservation and energy efficiency, (3) renewable energy business initiatives, and (4) projects which improve the environment in the companies' service territories, related to the transmission and distribution facilities. PPL Electric Utilities Corporation (PPL EU) DSM offerings under this program included energy efficiency programs, education programs, renewable energy projects, and clean energy projects (PSEB, 2004). It is expected that projected energy efficiencies would be anticipated by the market.

PPL EU is an industry leader in establishing programs to help customers save energy, promote energy efficiency, and understand how they can reduce their electricity use and cost. PPL EU has offered customer electric use DSM and financial assistance programs for a quarter of a century, and PPL EU plans to continue to increase the number and financial support for these programs. In the past, PPL EU offered large industrial customers a DSM program that allowed them to curtail their electric load during heavy system peak use. The companies were financially rewarded with a lower price per kilowatt hour (kWh) for allowing PPL EU this control over their demand. PPL EU also has had a pilot DSM program for residential customers for the last 6 years. That program is focused on on-peak and off-peak time of use rates in trying to get customers to reduce demand and their cost during these peak energy use times on weekdays. As the energy landscape is changing, PPL EU is developing more programs and tolls to help customers understand how they use energy, and learn what they can do to save energy and money on their bills (PPL Susquehanna, LLC, 2008).

The following provides additional information on these and other customer energy savings programs:

- Customer Daily Electricity Use: In 2004, PPL EU completed installation of automated meters for all its customers, making it one of the first electric utilities in the country to install advanced electric meters that can be read automatically by the company, saving the energy previously required from manual reading operations. PPL EU can use the capability of these advanced electric meters to provide customers with their monthly and daily energy usage and show customers trends in their monthly electricity use on their bills. By 2009, customers will be able to see their hourly electricity use. All this information will enable customers to evaluate the effectiveness of their energy efficiency actions, and make even more informed decisions about their electricity use (PPL Susquehanna, LLC, 2008).

- Expansion of Existing Pilot Program: Since 2002, PPL EU has operated a residential customer pilot program for time of use electricity pricing during the summer months. Approximately 300 residential customers currently participate in the program. PPL EU is expanding the program in 2008. The expanded program will provide about 600 participating customers an opportunity to lower their bills by conserving energy during "on peak" hours, when the cost of wholesale electric generation supply is greatest. The participants in the expanded pilot program will be able to track their hourly electric use using the company's Energy Analyzer. In addition, the company is planning a year round time of use pilot program that could begin in late 2008 (PPL Susquehanna, LLC, 2008).

- Energy Analyzer Website: In June 2007, PPL EU launched a new website with an online Energy Analyzer tool that helps customers understand and manage their electricity use, and identify actions they can take to use energy wisely. The Energy Analyzer had more than 165,000 individual users in its first 9 months.

  The website includes an Energy Learning Center where a customer can calculate the energy use of various appliances and learn about potential savings by switching to more energy efficient appliances. The energy library offers the customer detailed information about everything from compact fluorescent lights to attic insulation. The website also has a bill analyzer tool that allows customers to take a closer look at why one bill was higher than another and understand how much weather or changes in the home may have affected the bill (PPL Susquehanna, LLC, 2008).

- Compact Fluorescent Light Bulb Initiative: In fall 2007, PPL EU delivered more than 150,000 energy efficient compact fluorescent light bulbs (CFLs) to customers who completed profiles on the Energy Analyzer to find ways they could save energy in their homes and businesses. Those light bulbs could save customers more than $8 million and 77 million kWh of electricity before they burn out. PPL EU also delivered special CFL recycling containers to more than 160 municipalities as part of an Earth Day initiative to encourage safe disposal of these bulbs (PPL Susquehanna, LLC, 2008).

- Onsite Energy Generation: In addition to helping customers reduce energy demand from PPL supplied electricity, PPL EU has developed and installed a significant number and variety of on site customer energy projects to help them control their electric demand. These include onsite natural gas, biogas and solar energy customer installations. PPL EU plans to invest more than $100 million over the next 5 years in renewable energy projects. One of PPL EU's 2007 customer renewable energy projects was selected as a "Project of the Year" by the U.S. Environmental Protection Agency (USEPA). (PPL Susquehanna, LLC, 2008)

- ENERGY STAR: PPL EU is a partner in the federal government's ENERGY STAR® program to promote energy efficiency and the wise use of electricity. With the help of ENERGY STAR, Americans saved an estimated $14 billion on their utility bills in 2006 (PPL Susquehanna, LLC, 2008).

- Customer Energy Education: Each issue of PPL EU's Connect newsletter, which accompanies PPL EU's 1.4 million customer bills each month, includes a focus on energy saving tips. PPL EU has also begun a new Speakers Bureau, delivering presentations on energy efficiency to community groups throughout PPL EU's service area (PPL Susquehanna, LLC, 2008).

As a practical matter, it would be impossible to increase the energy savings identified above by an additional 1,600 MWe to replace the BBNPP generating capability. For these reasons, PPL does not consider energy conservation to represent a reasonable alternative to the BBNPP.

9.2.1.2 Reactivating or Extending Service Life of Existing Plants

Retired fossil fuel power generating facilities and fossil fuel power generating facilities slated for retirement may not be economically viable, particularly in meeting today's restrictions on air contaminant emissions. Because of increasingly stringent environmental restrictions, delaying retirement or reactivating power generating facilities in order to compensate for the closure of a large baseloaded facility would require major construction to upgrade or replace facility components. There are a number of planned retirements in the PJM service area. These known retirements are listed in Table 8.3-8, including PPL Corporation's two, Martins Creek coal units in September 2007 (totaling 280 MWe). None of these retired power generating facilities would be able to supply the necessary 1,600 MWe of baseload capacity and, in accordance with the Federal Energy Regulatory Commission (FERC) order, PJM cannot compel the owners of units proposed for retirement to remain in service. Such retirements may take effect upon 90 days prior notice. Therefore, reactivating or extending the service life of existing baseload plants is not a feasible alternative to the BBNPP.

9.2.1.3 Purchasing Power from Other Utilities or Power Generators

In PJM, market participants wishing to buy and sell energy have multiple options. Market participants decide whether to meet their energy needs through self-supply, bilateral purchases from generation owners or market intermediaries, through the day-ahead market or the real-time balancing (that is, spot) market. Energy purchases can be made over any timeframe from instantaneous real-time balancing market purchases to long-term, multi-year bilateral contracts. Purchases may be made from generation located within or outside the PJM RTO region. Market participants also decide whether and how to sell the output of their generation assets. Generation owners can sell their output within the PJM RTO region or outside the region and can use generation to meet their own loads, to sell into the spot market or to sell bilaterally. Generation owners can sell their output over any timeframe from the real-time spot market to multi-year bilateral arrangements. Market participants can use increment and decrement bids in the day-ahead market to hedge positions or to arbitrage expected price differences between markets (PJM, 2008b). In addition, each RTO has a commitment to control its generation in a manner so as not to burden the interconnected systems. Failure to provide adequate control can result in deviations in frequency and inadvertent power flow, stability issues, or transmission constraints.

The policy of PJM is to maintain, at all times, the integrity of the PJM RTO transmission systems and the Eastern Interconnection, and to give maximum reasonable assistance to adjacent systems when a disturbance that is external to the PJM RTO region occurs. Power system disturbances are most likely to occur as the result of loss of generating equipment, transmission facilities, or as the result of unexpected load changes. These disturbances may be of, or develop into, a magnitude sufficient to affect the reliable operation of the PJM RTO region and/or the Eastern Interconnection. These events demand timely, decisive action to prevent further propagation of the disturbance. At these times, PJM must either purchase energy from outside the PJM RTO region, as needed, or sell energy to other RTOs as requested during disturbance condition. When the purchasing of energy is needed, PJM uses its best efforts to acquire the lowest priced energy available at the time. (PJM, 2008c)

Under the purchased power alternative, therefore, environmental impacts would still occur, but they would originate from a baseload power generating facility located elsewhere in the region.

Because of existing constraints on west-to-east power transfers within PJM, the purchased power alternative would likely necessitate additional high voltage (that is, 345 or 500 kV) transmission lines to route power from the remote locations in the PJM region to the intended primary market area. PPL anticipates that most of the transmission lines could be routed along existing rights-of-way. In such cases, the environmental impacts of transmission line construction would be moderate to large. Otherwise, impacts would be large for new line construction. Since baseload generating capacity available for purchase in western PJM is typically fossil-fired, the environmental impacts of emissions due to operation of this fossil-fired capacity for purchased power to replace the BBNPP would be large. Purchasing power from other utilities or power generators has been identified as inconsistent with the objectives of the BBNPP; therefore, it is not described in more detail.

Because of transmission constraints with import of electricity from nearby areas, purchasing power from other utilities or power generators is not considered economically practicable.

9.2.2 Alternatives that Require New Generating Capacity

Although many methods are available for generating electricity and many combinations or mixes can be assimilated to meet system needs, such expansive consideration would be too unwieldy to reasonably examine in depth given the purposes of this alternatives analysis. The alternative energy sources considered are as follows:

- Wind
- Geothermal
- Hydropower
- Solar power
  - Concentrating solar power systems
  - Photovoltaic (PV) cells
- Wood waste
- Municipal solid waste
- Energy crops
- Petroleum liquids (oil)
- Fuel cells
- Coal
- Natural gas
- Integrated gasification combined cycle (IGCC)

Based on the installed capacity of 1,600 MWe that BBNPP would produce, not all of the above-listed alternative sources are competitive or viable. Each of the alternatives is discussed in more detail in later sections, with an emphasis on coal, solar, natural gas, and wind energy. As a renewable resource, solar and wind energies have gained increasing popularity over the years, in part because of concern over greenhouse gas emissions. Air emissions from solar and wind facilities are much smaller than fossil fuel air emissions. Although the use of coal and natural gas has undergone a slight decrease in popularity, they remain two of the most widely used fuels for producing electricity.

This section identifies alternatives that PPL has determined are not viable and the basis for this determination. This Combined License (COL) Application is premised on the installation of a facility that would serve as a merchant baseload resource and that any feasible alternative would need to be able to generate equivalent baseload power. In performing this evaluation, PPL has utilized information from the NRC Generic Environmental Impact Statement (GEIS) for License Renewal of Nuclear Plants (NRC, 1996).

The GEIS is useful for the analysis of alternative sources because NRC has determined that the technologies of these alternatives will enable the agency to consider the relative environmental consequences of an action given the environmental consequences of other activities that also meet the purpose of the proposed action. To generate the set of reasonable alternatives that are considered in the GEIS, common generation technologies were included and various state energy plans were consulted to identify the alternative generation sources typically being considered by state authorities across the country.

From this review, a reasonable set of alternatives to be examined was identified. These alternatives included wind energy, PV cells, solar thermal energy, hydroelectricity, geothermal energy, incineration of wood waste and municipal solid waste, energy crops, coal, natural gas, oil, and delayed retirement of existing non nuclear plants. These alternatives were considered pursuant to the statutory responsibilities imposed under the National Environmental Policy Act of 1969 (NEPA) (NEPA, 1982).

Although the GEIS is provided for license renewal, the alternatives analysis in the GEIS can be compared to the proposed action to determine if the alternative represents a reasonable alternative to the proposed action.

Each of the alternatives is discussed in the subsequent sections relative to the following criteria:

- The alternative energy conversion technology is developed, proven, and available in the relevant region within the life of the COL.
- The alternative energy source provides baseload generating capacity equivalent to the capacity needed and to the same level as the proposed nuclear plant.
- The alternative energy source does not create more environmental impacts than a nuclear plant would, and the costs of an alternative energy source do not make it economically impractical.

Each of the potential alternative technologies considered in this analysis are consistent with national policy goals for energy use and are not prohibited by federal, state, or local regulations. Based on one or more of these criteria described above, several of the alternative energy sources were considered technically or economically infeasible after a preliminary review and were not considered further. Alternatives considered to be technically and economically feasible are described in greater detail in Section 9.2.3.

9.2.2.1 Wind

In general, areas identified by the National Renewable Energy Laboratory (NREL) as wind resource Class 4 and above are regarded as potentially economical for wind energy production with current technology. Class 4 wind resources are defined as having mean wind speeds between 15.7 and 16.8 mph (25.3 to 27.0 kph) at 50 m elevation. (AWEA, 2008)

As a result of advances in technology and the current level of financial incentive support, a number of additional areas with slightly lower wind resources (Class 3+) may also be suitable for large-scale wind development. These would, however, operate at an even lower annual capacity factor and output than used by NREL for Class 4 sites.

Wind turbines must be sufficiently spaced to maximize capture of the available wind energy. If the turbines are too close together, one turbine can impact the efficiency of another turbine. A 2 MWe turbine requires approximately 0.25 ac (0.1 ha) of dedicated land for placement of the wind turbine, leaving landowners with the ability to utilize the remaining acreage for some other uses that do not impact the turbine, such as agricultural use. (AE, 2008)

Even if there was enough land area to develop wind turbines, the majority of land area throughout the primary market area is characterized as a Class 1 site with scattered areas of Class 2 and Class 3 sites; therefore, it would not be practicable to construct a wind power generating facility at the site or within the primary market area/ROI (Energy Efficiency and Renewable Energy [EERE], 2003).

Although wind technology is considered mature, technological advances may make wind a more economic choice than other renewable sources for developers (CEC, 2003). Technological improvements in wind turbines have helped reduce capital and operating costs. In 2000, wind power was produced at a cost between $0.03 and $0.06/kWh, depending on wind speeds. By 2020, wind power production costs are projected to decrease to between $0.03 and $0.04/kWh (ELPC, 2001). The following contains information about the viability of the wind resource.

- In 1995, the EIA estimated the cost of building a 115 kV line to be $130,000 per mile, excluding rights-of-way costs (EIA, 2003b). Besides construction, operating, and maintenance costs for wind farms, there are also costs for connection to the transmission grid. In 1993, the cost of constructing a new substation for a 115 kV transmission line was estimated at $1.08 million, and the cost of connection for a 115 kV transmission line with a substation was estimated to be $360,000. The farther a wind energy development project is from transmission lines, the higher the cost of connection to the transmission and distribution system. The distance from transmission lines at which a wind developer can profitably build depends on the cost of the specific project. (EIA, 1995)

- A wind project would have to be located where the project would produce economical generation, and that location may be far removed from the nearest possible connection to the transmission system. A location far removed from the power transmission grid might not be economical, as new transmission lines would be required to connect the wind farm to the distribution system. Existing transmission infrastructure may need to be upgraded to handle the additional supply. Soil conditions and the terrain must be suitable for the construction of the towers' foundations. Finally, the choice of a location may be limited by land use regulations and the ability to obtain the required permits from local, regional, and national authorities.

- Additional considerations on the integration of wind capacity into the electric utility system are the limitations of wind energy generation. Wind power generating facilities must be located at sites with specific characteristics to maximize the amount of wind energy captured and electricity generated (ELPC, 2001). Additionally, for transmission purposes, wind generation is not considered "dispatchable," meaning the generator can control output to match load and economic requirements. Because the resource is intermittent (or not available all of the time), wind by itself, even with an attached storage system to store energy captured at any time for later use, is not considered a firm source of baseload capacity. The inability of wind alone to be a dispatchable, baseload producer of electricity is inconsistent with the objectives for the BBNPP; however, wind can be used in combination with other resources. This is discussed further in Section 9.2.3.3.

In addition to the land requirements posed by large facilities, wind power generating facilities have the following potential environmental impacts:

- Some people consider large scale commercial wind farms to be an aesthetic problem. Local residents near the wind farms may lose what they consider their pristine scenic viewshed of the area.

- High speed wind turbine blades can be noisy.

- Wind power generating facilities can expect to have higher bird fatality rates than those expected if the facility were not there.

Although Wind Powering America indicates that Pennsylvania has wind resources consistent with utility-scale production in a few areas of the state, near Lake Erie and on ridge crests in the southwestern part of the state, and southwest and southeast of Altoona, they are classified as fair winds (Class 3) at a maximum (EERE, 2008a).

Wind Powering America indicates that Delaware has wind resources consistent with utility-scale production. The good to excellent wind resource is located along the coasts of Delaware Bay and the Atlantic Ocean, especially from Cape Henlopen to the Maryland border. In addition, small wind turbines may have applications in some areas (EERE, 2008b).

Wind Powering America indicates that the highest resources areas in New Jersey are found along the Atlantic Ocean and Delaware Bay coastal areas, and on the ridges of western and northwestern New Jersey. In addition, small wind turbines may have applications in some areas (EERE, 2008c).

Wind Powering America indicates that Maryland has wind resources consistent with utility-scale production. Several areas are estimated to have good to excellent wind resources. These are the barrier islands along the Atlantic coast, the southeastern shore of Chesapeake Bay, and ridge crests in the western part of the state, west of Cumberland. In addition, small wind turbines may have applications in some areas (EERE, 2008d).

Wind Powering America indicates that Virginia has wind resources consistent with utility-scale production. Several areas of the state are estimated to have good to excellent wind resource. In addition, small wind turbines may have applications in some areas (EERE, 2008e).

Many renewable resources, like wind, are intermittent. Storing energy from renewable resources allows supply to match demand. For example, a storage system attached to a renewable resource, such as a wind turbine, could store energy captured at any time, and then utilize that energy during higher-priced midday usage. (NREL, 2006)

With the inability of wind energy to generate baseload power; the lack of available Class 3 and Class 4 sites; the cost factors in construction, operation, and transmission connections; and the environmental impacts associated with development, a wind power generating facility alone is not a feasible alternative to the BBNPP and, therefore, is not carried forward for further analysis.

9.2.2.2 Geothermal

As illustrated by Figure 8.4 in the GEIS (NRC, 1996), geothermal plants might be located in the western continental U.S., Alaska, and Hawaii, where hydrothermal reservoirs are prevalent; however, suitable geothermal resources do not exist in the ROI/primary market area. (NRC, 1996)

Based on the hottest known geothermal regions of the U.S., the ROI/primary market area is not a candidate for geothermal energy and could not produce the proposed 1,600 MWe of baseload energy (GEO, 2000). Delaware and Maryland have vast low-temperature resources suitable for geothermal heat pumps. However, neither state has sufficient resources to use other geothermal technologies (EERE, 2008b) (EERE, 2008d). Pennsylvania, New Jersey, and Virginia have low to moderate temperature resources that can be tapped for direct heat or for geothermal heat pumps (EERE, 2008a) (EERE, 2008c) (EERE, 2008e) but they are not adequate for the baseload power requirements. Therefore, a geothermal energy source is not adequate in the ROI/primary market area, and a geothermal power generating facility is not a feasible alternative. As a result, this energy source is not carried forward for further analysis.

9.2.2.3 Hydropower

The GEIS (NRC, 1996) estimates land use of 1,600 mi^2 (4,144 km^2) per 1,000 MWe generated by hydropower. Based on this estimate, hydropower would require flooding more than 2,600 mi^2 (6,734 km^2) to produce a baseload capacity of 1,600 MWe, resulting in a large impact on land use.

Environmental considerations associated with hydropower dams include alteration of aquatic habitats above and below the dam, which would affect existing aquatic species, and the constraint the dam puts on migrating fish species in the area. Another consideration is the potential displacement of communities by flooding the new reservoir, or local communities' loss of use of the current river system for recreational activities.

Pennsylvania has 104 hydropower sites with the potential for 2,217.3 MWe of electricity. Sixty-seven of the sites have been developed with an impoundment or diversion structure, but are currently without power generation capability. These have a potential for 309.8 MWe of electricity. Thirty-two of the sites are undeveloped (no impoundment or diversion structure and no power generation capability) with a potential for 1,700.6 MWe of electricity. Five of the sites have been developed with power generation capability and have the potential for 206.9 MWe of additional capacity. In order to produce the 1,600 MWe of baseload capacity required by the BBNPP, numerous hydropower generating facilities would need to be developed and in operation (INEEL, 1997). Virginia has a total of 88 hydropower facilities with the potential for generating 1,250 MWe (INEEL, 1997a). Pennsylvania, Delaware, New Jersey, and Maryland have low hydropower resource as a percentage of the state’s electricity generation (EERE, 2008a; EERE, 2008b; EERE, 2008c; EERE, 2008d). Virginia has moderate hydropower resource as a percentage of the state's electricity generation (EERE, 2008e).

Because hydropower is not a feasible alternative due to substantial land use requirements, this energy source is not carried forward for further analysis.

9.2.2.4 Solar Power

Solar energy depends on the availability and strength of sunlight (strength is measured as kWh/m^2), and solar power is considered an intermittent source of energy. Solar facilities would have equivalent or greater environmental impacts than a new nuclear facility at the BBNPP site. Such facilities would also have higher costs than a new nuclear facility.

The construction of solar power-generating facilities has substantial impacts on natural resources (such as wildlife habitat, land use, and aesthetics). As stated in the GEIS, land requirements are high: 35,000 ac (14,000 ha) per 1,000 MWe for PV cells and approximately 14,000 ac (6,000 ha) per 1,000 MWe for solar thermal systems (NRC, 1996). This would require a footprint of approximately 56,000 ac (22,700 ha) for PV cells and 22,400 ac (9,100 ha) for solar thermal systems to produce a 1,600 MWe baseload capacity. Both of these alternatives would increase environmental impacts by constructing on a much larger footprint area.

In the ROI, two types of collectors for solar resources were considered: concentrating collectors and flat-plate collectors. Concentrating collectors are mounted to a tracker, which allows them to face the sun at all times of the day. In the ROI/primary market area, approximately 3,000 to 3,500 watt hours per square meter per day ($W(hr)/m^2/day$) can be collected using concentrating collectors (EERE, 2008f). Flat-plate collectors are usually fixed in a tilted position to best capture direct rays from the sun and also to collect reflected light from clouds or off the ground. In the ROI/primary market area, approximately 4,000 to 4,500 $W(hr)/m^2/day$ can be collected using flat-plate collectors (EERE, 2008f). For flat-plate collectors, Pennsylvania has a useful resource across the state. For concentrating collectors, Pennsylvania resource is relatively poor (EERE, 2008a). For flat-plate collectors, Delaware has a useful resource throughout the state. For concentrating collectors, Delaware has a marginal resource (EERE, 2008b). For flat-plate collectors, New Jersey has a useful resource; southern New Jersey has the best resource. For concentrating collectors, New Jersey has a marginal resource (EERE, 2008c). For flat-plate collectors, Maryland has a good, useful solar resource throughout the state. For concentrating collectors, Maryland has a marginal resource (EERE, 2008d). For flat-plate collectors, Virginia has good, useful solar resource throughout most of the state. For concentrating collectors, Virginia could pursue some types of technologies in the south central region of the state (EERE, 2008e). The footprint needed to produce a 1,600 MWe baseload capacity is much too large to construct at the proposed plant site.

Environmental impacts of solar power systems can vary based on the technology used and the site-specific conditions.

- Land use and aesthetics are the primary environmental impacts of solar power.
- Land requirements for each of the individual solar energy technologies are large, compared to the land used by a new nuclear plant.
- Depending on the solar technology used, there may be thermal discharge impacts. These impacts are anticipated to be small. During operation, PV and solar thermal technologies produce no air pollution, little or no noise, and require no transportable fuels.
- PV technology creates environmental impacts related to manufacture and disposal. Chemicals used in the manufacture of PV cells include cadmium and lead. Potential

human health risks also arise from the manufacture and deployment of PV systems because there is a risk of exposure to heavy metals such as selenium and cadmium during use and disposal (CEC, 2004). There is some concern that landfills could leach cadmium, mercury, and lead into the environment in the long term.

- Generally, PV cells are sealed and the risk of release is considered slight; however, the long-term impact of these chemicals in the environment is unknown. Another environmental consideration with solar technologies is the lead-acid batteries that are used with some systems. The impact of these lead batteries is lessening; however, as batteries become more recyclable, batteries of improved quality are produced and better quality solar systems that enhance battery lifetimes are created. (REW, 2001)

Based on the large facility footprint needed to produce a 1,600 MWe baseload capacity, as well as the early stage of development of the technology, solar power systems are not considered competitive to the proposed project and are not carried forward for further analysis.

9.2.2.4.1 Concentrating Solar Power Systems

Concentrating solar plants produce electric power by converting solar energy into high temperature heat using various mirror configurations. The heat is then channeled through a conventional generator, via an intermediate medium (i.e., water or salt). Concentrating solar plants consist of two parts: one that collects the solar energy and converts it to heat, and another that converts heat energy to electricity.

Concentrating solar power systems can be sized for "village" power (10 kWe) or grid connected applications (up to 100 MWe). Some systems use thermal energy storage (TES), setting aside heat transfer fluid in its hot phase during cloudy periods or at night. These attributes, along with solar-to-electric conversion efficiencies, make concentrating solar power an attractive renewable energy option in the southwest part of the U.S. and other Sunbelt regions worldwide (EERE, 2006b). Others can be combined with natural gas. This type of combination is discussed in Section 9.2.3.3.

There are three kinds of concentrating solar power systems-troughs, dish/engines, and power towers - classified by how they collect solar energy (EERE, 2006b).

Concentrating solar power technologies utilize many of the same technologies and equipment used by conventional power plants, simply substituting the concentrated power of the sun for the combustion of fossil fuels to provide the energy for conversion into electricity. This "evolutionary" aspect - as distinguished from "revolutionary" or "disruptive" - allows for easy integration into the transmission grid. It also makes concentrating solar power technologies the most cost-effective solar option for the production of large-scale electricity generation (10 MWe and above).

In 2005, concentrating solar power systems had a benchmark cost of \$0.12 to \$0.14/kWh with a target cost of \$0.035 to \$0.06/kWh by 2025 (EERE, 2006a). However, concentrating solar power generating facilities are still in the demonstration phase of development, are not currently competitive with nuclear based technologies, and are not carried forward for further analysis.

9.2.2.4.2 "Flat-Plate" Photovoltaic Cells

The second common method for capturing the sun's energy is through the use of PV cells. A typical PV or solar cell might be a square that measures about 10 cm (4 in) on a side. A cell can produce about 1 watt of power-more than enough to power a watch, but not enough to run a radio.

When more power is needed, some 40 PV cells can be connected to form a "module." A typical module is powerful enough to light a small light bulb. For larger power needs, about 10 such modules are mounted in PV arrays, which can measure up to several meters on a side. The amount of electricity generated by an array increases as more modules are added.

"Flat-plate" PV arrays can be mounted at a fixed angle facing south, or they can be mounted on a tracking device that follows the sun, allowing them to capture more sunlight over the course of a day. Ten to 20 PV arrays can provide enough power for a household; for large electric utility or industrial applications, hundreds of arrays can be interconnected to form a single, large PV system (NREL, 2007). The land requirement for this technology is approximately 14 hectares (35 acres) per MWe (NRC, 1996). In order to produce the 1,600 MWe baseload capacity as BBNPP 22,660 hectares (55,993 acres) would be required for construction of the photovoltaic modules.

Some PV cells are designed to operate with concentrated sunlight, and a lens is used to focus the sunlight onto the cells. This approach has both advantages and disadvantages compared with flat-plate PV arrays. Economics of this design turn on the use of as little of the expensive semi-conducting PV material as possible, while collecting as much sunlight as possible. The lenses cannot use diffuse sunlight, but must be pointed directly at the sun and moved to provide optimum efficiency. Therefore, the use of concentrating collectors is limited to the west and southwest areas of the U.S.

Currently, PV solar power is not competitive with other methods of producing electricity for the open wholesale electricity market. When calculating the cost of solar systems, the totality of the system must be examined. There is the price per watt of the solar cell, price per watt of the module (whole panel), and the price per watt of the entire system. It is important to remember that all systems are unique in their quality and size, making it difficult to make broad generalizations about price. The average price for modules (dollars per peak watt) increased 9%, from $3.42 in 2001 to $3.74 in 2002. For cells, the average price decreased 14%, from $2.46 in 2001 to $2.12 in 2002 (EIA, 2003a). The module price, however, does not include the design costs, land, support structure, batteries, an inverter, wiring, and lights/appliances.

Costs of PV cells in the future may decrease with improvements in technology and increased production. By 2020, costs of grid-connected PV systems could drop to $2,275 per kWe and to $0.15 to $0.20 per kWh by 2020 (ELPC, 2001). These costs would still be substantially in excess of the costs of power from a new nuclear plant. Therefore, PV cells are non competitive with a new nuclear plant at the BBNPP site and are not carried forward for further analysis.

9.2.2.5 Wood Waste and Other Biomass

The use of wood waste and other biomass to generate electricity is largely limited to states with significant wood resources, such as California, Maine, Georgia, Minnesota, Oregon, Washington, and Michigan. Electric power is generated in these states by the pulp, paper, and paperboard industries, which consume wood and wood waste for energy, benefiting from the use of waste materials that could otherwise represent a disposal problem. However, the largest wood waste power plants are 40 to 50 MWe in size. This would not meet the proposed 1,600 MWe baseload capacity.

Nearly all of the wood-energy-using electricity generation facilities in the U.S. use steam turbine conversion technology. The technology is relatively simple to operate and it can accept a wide variety of biomass fuels; however, at the scale appropriate for biomass, the technology is expensive and inefficient. Therefore, the technology is relegated to applications where there is a readily available supply of low, zero, or negative cost delivered feedstock.

As indicated in the GEIS, construction of a wood-fired plant would have an environmental impact that would be similar to that for a coal-fired plant. Like coal-fired plants, wood waste plants require large areas for fuel storage, processing, and waste (i.e., ash) disposal. Additionally, the operation of wood-fired plants creates environmental impacts, including impacts on the aquatic environment and air (NRC, 1996).

The availability of biomass resources in Pennsylvania are as follows in thousand metric tons/year (thousand tons/year): Crop residues: 735 (810); switchgrass on CRP lands: 610 (672); forest residues: 1,523 (1,679); methane from landfills: 582 (642); methane from manure management: 21 (23); primary mill: 1,231 (1,358); secondary mill: 115 (127); urban wood: 1,123 (1,238); and methane from domestic wastewater: 18 (20). This totals approximately 5,959 thousand metric tons/year (6,569 thousand tons/year)) total biomass availability in the Commonwealth of Pennsylvania (NREL, 2005).

Studies indicate that Delaware has good biomass resource potential. According to a technical report (NREL, 2005), the availability of biomass resources in Delaware are as follows in thousand metric tons/year (thousand tons/year): Crop residues: 222 (245); switchgrass on CRP lands: 20 (22); forest residues: 47 (51); methane from landfills: 53 (58); methane from manure management: 0.5 (0.5); primary mill: 0.05 (0.05); secondary mill: 7 (8); urban wood: 77 (85); and methane from domestic wastewater: 0.9 (1). This totals approximately 427 thousand metric tons/year [471 thousand tons/year]) total biomass availability in the State of Delaware (NREL, 2005).

Data in the NREL report shows the availability of biomass resources in New Jersey are as follows in thousand metric tons/year (thousand tons/year): Crop residues: 83 (91); switchgrass on CRP lands: 10 (11); forest residues: 26 (29); methane from landfills: 451 (497); methane from manure management: 0.3 (0.3); primary mill: 15 (17); secondary mill: 811 (894); urban wood: 566 (624); and methane from domestic wastewater: 13 (14). This totals approximately 1,975 thousand metric tons/year (2,177 thousand tons/year)) total biomass availability in the State of New Jersey (NREL, 2005).

The availability of biomass resources in Maryland are as follows in thousand metric tons/year (thousand tons/year): Crop residues: 530 (584); switchgrass on CRP lands: 246 (271); forest residues: 239 (263); methane from landfills: 185 (204); methane from manure management: 5.4 (6); primary mill: 125 (138); secondary mill: 30 (33); urban wood: 566 (624); and methane from domestic wastewater: 8.2 (9). This totals approximately 1,933 thousand metric tons/year (2,131 thousand tons/year)) total biomass availability in the State of Maryland (NREL, 2005).

According to a technical report (NREL, 2005), the availability of biomass resources in Virginia are as follows in thousand metric tons/year (thousand tons/year): Crop residues: 455 (502); switchgrass on CRP lands: 269 (297); forest residues: 2,180 (2,403); methane from landfills: 249 (275); methane from manure management: 21 (23); primary mill: 1,948 (2,147); secondary mill: 56 (62); urban wood: 738 (813); and methane from domestic wastewater: 11 (12). This totals approximately 5,928 thousand metric tons/year (6,535 thousand tons/year)) total biomass availability in the Commonwealth of Virginia (NREL, 2005).

Biomass fuel can be used to co-fire with a coal-powered generating facility, decreasing cost from \$0.023 to \$0.021 per kWh. This is only cost effective if biomass fuels are obtained at prices equal to or less than coal prices. In today's direct-fired biomass power plants, generation costs are about \$0.09 per kWh (EERE, 2007), which is significantly higher than the costs associated with a nuclear power plant (\$0.031 to \$0.046 per kWh) (DOE, 2002). Because of the environmental impacts and costs of a biomass-fired plant, biomass is non-competitive within the ROI with a new nuclear unit and this energy source is not carried forward for further analysis.

9.2.2.6 Municipal Solid Waste

The initial capital costs for municipal solid waste (MSW) plants are greater than for comparable steam turbine technology at wood-waste facilities (NRC, 1996). This is because of the need for specialized waste separation and handling equipment.

The decision to burn MSW to generate energy is usually driven by the need for an alternative to landfills, rather than by energy considerations. The use of landfills as a waste disposal option is likely to increase in the near term; however, it is unlikely that many landfills will begin converting waste to energy because of the numerous obstacles and factors that may limit the growth in MSW power generation. Chief among them are environmental regulations and public opposition to siting MSW facilities.

Estimates suggest that the overall level of construction impacts from a waste-fired plant should be approximately the same as those for a coal-fired plant. Additionally, waste-fired plants have the same or greater operational impacts (including impacts on the aquatic environment, air, and waste disposal) (NRC, 1996). Some of these impacts would be moderate, but still larger than the proposed action.

As an MSW reduction method, incineration can be implemented, generating energy and reducing the amount of waste by up to 90% in volume and 75% in weight (USEPA, 2006b).

As of March 2008, generation of other renewable electricity, which includes MSW, accounted for the following percentages of total generation in the ROI: 1.2% in Pennsylvania, 1.6% in Delaware, 1.3% in Maryland, and 1.6% in New Jersey (EIA, 2008c).

The U.S. has about 89 operational MSW-fired power generation plants, generating approximately 2,500 MWe, or about 0.3% of total national power generation. However, economic factors have limited new construction. This comes to approximately 28 MWe per MSW-fired power generation plant, and would not meet the proposed 1,600 MWe baseload capacity. Burning MSW produces nitrogen oxides and sulfur dioxide as well as trace amounts of toxic pollutants, such as mercury compounds and dioxins. MSW power plants, much like fossil fuel power plants, require land for equipment and fuel storage. The non-hazardous ash residue from the burning of MSW is typically deposited in landfills (USEPA, 2006a).

The cost of power for MSW fired power generation plants would be partially offset by savings in waste disposal fees. However, MSW fired power generation remains significantly more costly than nuclear power, even when disposal fee savings are included into the cost of power. A study performed for a proposed MSW fired power facility in 2002 found that cost of power varied from \$0.096 to \$0.119 per kWh in the case with low MSW disposal fees, and from \$0.037 to \$0.055 per KWh in the case with high MSW disposal fees (APT, 2004). These costs, accounting for the disposal fees, are significantly higher than the costs associated with a nuclear power plant (\$0.031 to \$0.046 per kWh) (DOE, 2002). Therefore, MSW is non-competitive with a new nuclear unit at the BBNPP site because the energy source cannot provide the baseload electricity needs compared to a new nuclear unit and this energy source is not carried forward for further analysis.

9.2.2.7 Energy Crops

In addition to wood and MSW fuels, there are several other concepts for fueling electric generators, including burning energy crops, converting crops to a liquid fuel such as ethanol (ethanol is primarily used as a gasoline additive), and gasifying energy crops (including wood waste). None of these technologies has progressed to the point of being competitive on a large scale or of being reliable enough to replace a baseload plant capacity of 1,600 MWe.

Estimates suggest that the overall level of construction impacts from a crop-fired plant should be approximately the same as those for a wood-fired plant. Additionally, crop-fired plants would have similar operational impacts (including impacts on the aquatic environment and air) (NRC, 1996). In addition, these systems have large impacts on land use because of the acreage needed to grow the energy crops.

Ethanol is perhaps the best known energy crop. It is estimated that 3.0 mi^2 (7.69 km^2) of corn are needed to produce 1 million gallons of ethanol and in 2002, Pennsylvania produced approximately 2,073 mi^2 (5,369 km^2) of corn. Currently in Pennsylvania, more corn is used for grain products than any other purpose. Pennsylvania produces more than 50% of the corn grown in the ROI. If ethanol were to be proposed as an energy crop, Pennsylvania would have to supplement its corn production from nearby states (USDA, 2004). Surrounding states within the ROI also use corn for grain products and do not have the resources to supplement ethanol based fuel facilities.

The energy cost per KWh for energy crops is estimated to be similar to, or higher than, other biomass energy sources (EIA, 2004). A DOE forecast concluded that the use of biomass for power generation is not projected to increase substantially in the next ten years because of the cost of biomass relative to the costs of other fuels and the higher capital costs relative to those for coal- or natural-gas-fired capacity (EIA, 2002). Therefore, energy crops are non-competitive with a new nuclear unit at the BBNPP site and this energy source is not carried forward for further analysis.

9.2.2.8 Petroleum Liquids (Oil)

From 2002 to 2005, petroleum costs almost doubled, increasing by 92.8%, and the period from 2004 to 2005 alone produced an average petroleum increase of 50.1% (EIA, 2006). Between January 2006 and January 2008, petroleum costs tripled, increasing by approximately 195 percent (EIA, 2007c) (EIA, 2008b). In spite of the increase in the cost of petroleum, Pennsylvania experienced an increase in production of electricity by power generating facilities fueled by oil. However, from 2005 to 2006, net generation of electricity from petroleum liquids dropped by about 84% in Maryland (EIA, 2007d). As of March 2008, generation of petroleum fired electricity accounted for only a small percentage of total generation in the ROI: 0.4% in Pennsylvania, 3.5% in Delaware, 0.4% in Maryland, and 0.8% in New Jersey. Between January 2007 and January 2008, net generation from petroleum liquids increased by 82% (EIA, 2008a). In the GEIS, NRC staff estimated that construction of a 1,000 MWe oil power generating facility would require approximately 120 ac (50 ha) of land (NRC, 1996).

Operation of oil-fired plants would have environmental impacts (including impacts on the aquatic environment and air) that would be similar to those from a coal-fired plant. Oil fired plants also have one of the largest carbon footprints of all the electricity generation systems analyzed. Conventional oil-fired plants result in emissions of greater than 650 grams of CO_2 equivalent/kilowatt-hour (gCO_2eq/kWh). This is approximately 130 times higher than the carbon footprint of a nuclear power generation facility (approximately 5 gCO_2eq/kWh). Future developments such as carbon capture and storage and co-firing with biomass have the potential to reduce the carbon footprint of oil-fired electricity generation (POST, 2006).

Apart from fuel price, the economics of oil fired power generation are similar to those for natural gas fired power generation. Distillate oil can be used to run gas turbines in a combined cycle system; however, the cost of distillate oil usually makes this type of combined cycle system a less competitive alternative when natural gas is available. Oil fired power generation experienced a significant decline in the early 1970s. Increases in world oil prices have forced utilities to use less expensive fuels; however, oil fired generation is still an important source of power in certain regions of the U.S. (NRC, 1996).

On these bases, an oil-fired generation plant is non-competitive with a new nuclear unit at the BBNPP site and this energy source is not carried forward for further analysis.

9.2.2.9 Fuel Cells

Phosphoric acid fuel cells are the most mature fuel cell technology, but they are only in the initial stages of commercialization. During the past three decades, significant efforts have been made to develop more practical and affordable fuel cell designs for stationary power applications, but progress has been slow. Today, the most widely marketed fuel cells cost about $4,500 per kWh of installed capacity.

By contrast, a diesel generator costs $800 to $1,500 per kWh of installed capacity, and a natural gas turbine may cost even less. DOE has launched an initiative - the Solid State Energy Conversion Alliance - to bring about dramatic reductions in fuel cell cost. The DOE's goal is to cut costs to as low as $400 per kWh of installed capacity by the end of this decade, which would make fuel cells competitive for virtually every type of power application. (DOE, 2006)

As market acceptance and manufacturing capacity increase, natural-gas-fueled fuel-cell plants in the 50 to 100 MWe range are projected to become available. This will not meet the proposed 1,600 MW(e) baseload capacity. At the present time, fuel cells are not economically or technologically competitive with other alternatives for baseload electricity generation and the fuel cell alternative is non-competitive with a new nuclear unit at the BBNPP site. As a result, this energy source is not carried forward for further analysis.

9.2.2.10 Coal

Coal-fired steam electric plants provide the majority of electric generating capacity in the U.S., accounting for about 52% of the electric utility industry's total generation, including co-generation, in 2000 (EIA, 2001). Conventional coal-fired plants generally include two or more generating units and have total capacities ranging from 100 MWe to more than 2,000 MWe. Coal is likely to continue to be a reliable energy source well into the future, assuming environmental constraints do not cause the gradual substitution of other fuels (EIA, 1993).

The U.S. has abundant low-cost coal reserves, and the price of coal for electric generation is likely to increase at a relatively slow rate. Even with recent environmental legislation, new coal capacity is expected to be an affordable technology for reliable, near-term development and for potential use as a replacement technology for nuclear power plants (NRC, 1996).

The environmental impacts of constructing a typical coal-fired steam plant are well known because coal is the most prevalent type of central generating technology in the U.S. The impacts of constructing a 1,000 MWe coal plant at a greenfield site can be substantial, particularly if it is sited in a rural area with considerable natural habitat. An estimated 1,050 acres (425 ha) or 1.64 mi^2 (4.25 km^2) would be needed at the BBNPP for a new 1,600 MWe coal-fired facility, including power block, coal storage, and waste management, resulting in the loss of the same amount of natural habitat and/or agricultural land for the plant site alone, excluding land required for mining and other fuel cycle impacts (NRC, 2008).

As of March 2008, generation of coal-fired electricity accounted for the following percentages of total generation in the ROI: 57.2% in Pennsylvania, 76.5% in Delaware, 62.1% in Maryland, and 17.1% in New Jersey (EIA, 2008c). An existing coal-fueled power plant usually averages about $0.023/kWh. However, co-firing with inexpensive biomass fuel can decrease the cost to $0.021/kWh. This is only cost effective if biomass fuels are obtained at prices equal to or less than coal prices (EERE, 2007).

The operating impacts of new coal plants would be substantial for several resources. Concerns over adverse human health effects from coal combustion have led to important federal legislation in recent years, such as the Clean Air Act and Amendments (CAAA). Although new technology has improved emissions quality from coal-fired facilities, health concerns remain. Air quality would be degraded by the release of additional carbon dioxide, regulated pollutants, and radionuclides.

Carbon dioxide has been identified as a leading cause of global warming. Sulfur dioxide and oxides of nitrogen have been identified with acid rain. Substantial solid waste, especially fly ash and scrubber sludge, would be produced and would require constant management. Losses to aquatic biota would occur through impingement and entrainment and discharge of cooling water to natural water bodies. However, the positive socioeconomic benefits can be considerable for surrounding communities in the form of several hundred new jobs, substantial tax revenues, and plant spending.

Based on the well-known technology, fuel availability, and generally understood environmental impacts associated with constructing and operating a coal gas-fired power generation plant, it is considered a competitive alternative and is therefore discussed further in Section 9.2.3.

9.2.2.11 Natural Gas

As of March 2008, generation of natural gas-fired electricity accounted for the following percentages of total generation in the ROI: 7.0% in Pennsylvania, 8.3% in Delaware, 2.2% in Maryland, and 32.9% in New Jersey (EIA, 2008c).

Most of the environmental impacts of constructing natural gas-fired plants are similar to those of other large central generating stations. Land-use requirements for gas-fired plants are small, at 0.17 mi^2 (0.45 km^2) for a 1,000 MWe plant, so land-dependent ecological, aesthetic, erosion, and cultural impacts should be small. Siting at a greenfield location would require new transmission lines and increased land-related impacts, whereas collocating the gas-fired plant with an existing nuclear plant would help reduce land-related impacts. Also, gas-fired plants, particularly combined cycle and gas turbine facilities, take much less time to construct than other plants (NRC, 1996).

Additionally, land use requirements for the BBNPP site would be approximately 160 ac (65 ha) or 0.25 mi^2 (0.65 km^2) for a new 1,600 MWe gas-fired plant to be located at the BBNPP site. Another 12 ac (4.9 ha) or 0.02 mi^2 (0.05 km^2) would be required to build a pipeline to connect to an existing pipeline corridor (NRC, 2008).

Based on the well-known technology, fuel availability, and generally understood environmental impacts associated with constructing and operating a natural gas-fired power generation plant, it is considered a competitive alternative and is therefore discussed further in Section 9.2.3.

9.2.2.12 Integrated Gasification Combined Cycle (IGCC)

Integrated Gasification Combined Cycle (IGCC) is an emerging, advanced technology for generating electricity with coal that combines modern coal gasification technology with both gas turbine and steam turbine power generation. The technology is substantially cleaner than conventional pulverized coal plants because major pollutants can be removed from the gas stream prior to combustion.

The IGCC alternative generates substantially less solid waste than the pulverized coal-fired alternative. The largest solid waste stream produced by IGCC installations is slag, a black, glassy, sand-like material that is potentially a marketable byproduct. Slag production is a function of ash content. The other large-volume byproduct produced by IGCC plants is sulfur, which is extracted during the gasification process and can be marketed rather than placed in a landfill. IGCC units do not produce ash or scrubber wastes.

At present, IGCC technology has insufficient operating experience for widespread expansion into commercial-scale, utility applications. Each major component of IGCC has been broadly utilized in industrial and power generation applications. But the integration of coal gasification with a combined cycle power block to produce commercial electricity as a primary output is relatively new and has been demonstrated at only a handful of facilities around the world, including five in the U.S. Experience has been gained with the chemical processes of gasification, coal properties and their impact on IGCC design, efficiency, economics, etc.

However, system reliability is still relatively lower than conventional pulverized coal-fired power plants. There are problems with the integration between gasification and power production, as well. For example, if there is a problem with gas cleaning, uncleaned gas can cause various damages to the gas turbine. (PU, 2005)

Overall, IGCC plants are estimated to be about 15% to 20% more expensive than comparably sized pulverized coal plants, due in part to the coal gasifier and other specialized equipment. Recent estimates indicate that overall capital costs for coal-fired IGCC power plants range from $1,400 to $1,800/kilowatt (kW) (EIA, 2005). The production cost of the electricity from a coal-based IGCC power plant is estimated to be about $0.033 to $0.045/kWh. The projected cost associated with operating a new nuclear facility similar to BBNPP is in the range of $0.031 to $0.046/kWh.

In 2004, the DOE commissioned Booz Allen Hamilton to conduct a study on the various ways to increase IGCC's market penetration potential in the future. The study considered only coal as the feedstock. Booz Allen Hamilton concluded that it is feasible for IGCC to assume a more prominent role in energy production only after extensive research is conducted to lower the production costs. Additionally, Booz Allen Hamilton depicted three challenges that IGCC must overcome before becoming a prominent source of energy, including: overcoming the financial burden relative to competing technologies, mitigating siting risks, and managing uncertainty. Booz Allen Hamilton lays out a series of recommendations for the DOE to take to begin to overcome these challenges. Many of these recommendations include conducting further studies and research tests (BAH, 2004).

Because IGCC technology currently requires further research to achieve an acceptable level of reliability, an IGCC facility is not a competitive alternative to BBNPP and is not carried forward for further analysis.

9.2.3 Assessment of Reasonable Alternative Energy Sources and Systems

For the viable alternative energy source options identified in Section 9.2.2, the issues associated with these options were characterized based on the significance of impacts, with the impacts characterized as being either SMALL, MODERATE, or LARGE. This characterization is consistent with the criteria that NRC established in 10 CFR 51, Appendix B, Table B-1, Footnote 3, as follows:

- SMALL - Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts, the Commission has concluded that those impacts that do not exceed permissible levels in the Commission's regulations are considered small.
- MODERATE - Environmental effects are sufficient to alter noticeably, but not to destabilize, any important attribute of the resource.
- LARGE - Environmental effects are clearly noticeable and are sufficient to destabilize any important attributes of the resource (NRC, 2001).

Table 9.2-1 provides a comparison of the alternatives regarding environmental categories.

9.2.3.1 Coal-Fire Generation

The environmental impacts from coal-fired generation alternatives were evaluated in the GEIS (NRC, 1996), draft GEIS for license renewal (NRC, 2008), and SSES Units 1 and 2 License Renewal Application (NRC, 2006). It was concluded that construction impacts for coal-fired generation could be substantial, in part because of the large land area required (for the plant site alone; 1,050 ac (425 ha) or 1.64 mi^2 (4.25 km^2) would be needed at the BBNPP for a new 1,600 MWe coal-fired facility, including power block, coal storage, and waste management (NRC, 2008), which would be in addition to the land resource required for mining and other fuel cycle impacts. These construction impacts would be decreased to some degree by siting a new coal-fired plant where an existing nuclear plant is located.

9.2.3.1.1 Air Quality

The air quality impacts of coal-fired generation are considerably different from those of nuclear power. A coal-fired plant would emit sulfur dioxide (SO2, as SOx surrogate), oxides of nitrogen (NOx), particulate matter (PM), and carbon monoxide (CO), all of which are regulated pollutants. Air quality impacts from fugitive dust, water quality impacts from acidic runoff, and aesthetic and cultural resources impacts are all potential adverse consequences of coal mining.

Air emissions were estimated for a coal-fired generation facility based on the emission factors contained in USEPA document, AP-42 (USEPA, 1995). The emissions from this facility are based on a power generation capacity of 1,600 MWe. The coal-fired generation facility assumes the use of bituminous coal-fired in a circulating fluidized bed combustor (FBC). The sulfur content of the coal was assumed to be 2% by weight. Emissions control included the use of lime in the combustor unit, a wet scrubber system to control acid gas emissions, selective catalytic reduction to minimize NOx emissions and a baghouse to control PM. Table 9.2-2 summarizes the air emissions produced by a 1,600 MWe coal-fired facility.

Operating impacts of a new coal plant include concerns over adverse human health effects, such as increased cancer and emphysema. Air quality would be impacted by the release of CO_2, regulated pollutants, and radionuclides. CO_2 has been identified as a leading cause of global warming, and SO_2 and oxides of nitrogen have been identified with acid rain. Substantial solid waste, especially fly ash and scrubber sludge, would be also be produced and would require constant management. Losses of aquatic biota due to cooling water withdrawals and discharges would also occur.

As described in Section 9.1, Pennsylvania has not, at this time, established mandatory programs to regulate carbon dioxide and other greenhouse gases and is observing, though not participating in, the RGGI. As of November 2007, three other states within the ROI/primary market area (New Jersey, Delaware, and Maryland) are members of RGGI (MDE, 2008). A description of the RGGI and implementation within the ROI/primary market area is provided in Section 9.1.

Coal burning power systems have the largest carbon footprint of all the electricity generation systems analyzed. Conventional coal systems result in emissions of greater than 1,000 grams of CO_2 equivalent/kilowatt-hour (gCO_2eq/kWh). This is approximately 200 times higher than the carbon footprint of a nuclear power generation facility (approximately 5 gCO_2eq/kWh). Lower emissions can be achieved using new gasification plants (less than 800 gCO_2eq/kWh), but this is still an emerging technology and not as widespread as proven combustion technologies. Future developments such as carbon capture and storage (CCS) and co-firing with biomass have the potential to reduce the carbon footprint of coal-fired electricity generation. (POST, 2006)

The NRC indicates that air emission impacts from fossil fuel generation are greater than nuclear power generating facility air emission impacts (NRC, 1996) (NRC, 2006) (NRC, 2008). The NRC notes that human health effects from coal combustion are also greater based on the health effects from air emissions (NRC, 2008). Based on the emissions generated by a coal-fired facility, air impacts would be MODERATE.

9.2.3.1.2 Waste Management

Substantial solid waste, especially fly ash and scrubber sludge, would be produced during plant operation and would require constant management (NRC, 2008). Approximately 360 ac (145.7 ha) would be required over a 40-year period of a coal-fired facility at the BBNPP for waste disposal. (NRC, 2008)

With proper placement of the facility, coupled with current waste management and monitoring practices, waste disposal would not destabilize any resources. There would also need to be an estimated 34.4 mi^2 (89 km^2) for mining the coal and disposing of the waste to support a coal plant during its operational life (NRC, 1996).

As a result of the above mentioned factors, waste management impacts would be MODERATE. Impacts from construction wastes, such as debris from land clearing and solid wastes would be SMALL.

9.2.3.1.3 Economic Comparison

DOE has estimated the cost of generating electricity from a coal facility to be approximately \$0.049 per kWh. The projected cost associated with operating a new nuclear facility similar to the BBNPP is in the range of \$0.031 to \$0.046 per kWh (DOE, 2002) (DOE, 2004).

Although coal-fired generation is considered a competitive alternative to nuclear power generation, coal-fired generation is not considered to be environmentally preferable to the proposed action. Therefore, as allowed in NUREG-1555, ESRP 9.2.3 (NRC, 2007), additional cost data, e.g., decommissioning costs, and fuel cost estimates, are not provided for alternatives that are not deemed to be environmentally preferable to the proposed action.

9.2.3.1.4 Other Impacts

Construction of the power block and coal storage area would disturb approximately 690 ac (279 ha) or 1.1 mi^2 (2.8 km^2) of land and associated terrestrial habitat and 360 ac (146 ha) or 0.6 mi^2 (1.5 km^2) for waste management (NRC, 2008). As a result, land use impacts would be MODERATE during construction and operation.

Impacts to aquatic resources and surface water quality would be minimized but could be characterized as SMALL due to the coal power generating facility's use of a new cooling water system. Losses to aquatic biota would occur through impingement and entrainment and discharge of cooling water to natural water bodies. Impacts from construction activities to surficial groundwater would be localized and SMALL (Section 4.2.2.3). The groundwater would be expected to recover during operations mode, therefore, impact to groundwater would be SMALL (Section 5.2.2.2). Impacts to surface water bodies would be MODERATE during construction primarily due to loss of wetlands and wetland buffers. Although coal pile runoff could affect surface water quality, impacts to water resources and quality would be SMALL due to the coal power generating facility's use of a new cooling water system. (NRC, 2008)

The BBNPP site is already aesthetically altered by the presence of the existing SSES Units 1 and 2 structures. The power plant buildings would be up to 200 ft (61 m) tall and may be visible in the daylight hours and the exhaust stacks would be up to 600 ft (183 m) tall. Current SSES cooling towers are approximately 540 ft (165 m) tall. The visual impact of the towers could be mitigated through landscaping and light paint color. The aesthetic impact, therefore, would be SMALL during operation (NRC, 2008). Noise impacts during operation would be SMALL to MODERATE (NRC, 2006). Construction activities would not be visible to the public because of highways bordered by vegetation; therefore, impacts would be SMALL to MODERATE (NRC, 2008).

The BBNPP site development would use terrestrial forest, wetland habitat, and land previously disturbed by agriculture near SSES. Permanent and/or temporary impacts to wetlands and/or streams would occur within the project footprint during construction. BMPs would be used to minimize wetlands impacts and wetland construction on PPL-owned or other property would mitigate loss of wetland habitat. Because wetland habitat loss would require mitigation, ecological resource impacts would be MODERATE. Terrestrial habitat loss during construction would be small in comparative acreage to the region but may be locally significant. No impact to important aquatic species would occur. Impacts from construction activity to terrestrial habitat and the totality of the aquatic ecosystems would be limited and temporary; therefore, impacts during construction would be SMALL. Recovery of some species during operations is anticipated and impacts would be SMALL. (Ecology III, Inc., 2007b) (NRC, 2008)

No known state or federal rare, threatened, or endangered plant species have been observed on the BBNPP site. Ten threatened and endangered species and species of special concern are known to have distribution in the area. Four important habitats, including wetlands will be impacted. (PDCNR, 2008a) (PDCNR, 2008b) (PPL Susquehanna, LLC, 2006) (Ecology III, Inc., 1995) (Ecology III, Inc., 2007a). Impact to wetlands and wetland buffer would require mitigation. Impacts would be MODERATE.

Although archaeological, cultural, and historical sites were identified as a result of the Phase I and Phase II cultural resource investigations conducted, it is likely that there will be SMALL impacts to these resources from construction and operation (Sections 4.1.3, 5.1.3).

Construction employment impacts would be MODERATE (NRC, 2008), socioeconomic benefits from several hundred mining and construction and operation jobs as well as additional tax revenues would be associated with the coal mining (NRC, 1996). As a result, socioeconomic impacts would be MODERATE and beneficial.

As a result of increased safety technologies, accident impacts would be SMALL. Mining safety is not considered within this impact category.

As previously described, as a result of increased air emissions and public health risks, such as cancer and emphysema associated with those emissions, human health impacts during operation would be MODERATE and SMALL during construction due to best management practices to curb fugitive dust emissions.(NRC, 2008)

Demographic characteristics of the area surrounding the BBNPP demonstrate that there are no significant numbers of minority or low-income populations represented in the vicinity; therefore, the environmental justice impact would be SMALL.(Sections 4.4.3.1, 5.8.3.1)

9.2.3.1.5 Summary

The impacts for the operation of the coal-fired alternative would be SMALL, SMALL to MODERATE, and MODERATE. Water use and quality, terrestrial and aquatic ecology including wetlands, threatened and endangered species, cultural and historic resources, safety, and environmental justice impacts would be SMALL. Impacts to aesthetics would be SMALL to MODERATE and impacts to land use, air quality, waste management, human health, and socioeconomics would be MODERATE. Based of these impacts, the coal power generating facility would not be environmentally preferable to the BBNPP.

9.2.3.2 Natural Gas Generation

Most environmental impacts related to constructing natural gas-fired plants should be approximately the same for steam, gas-turbine, and combined-cycle plants. These impacts, in turn, generally will be similar to those of other large central generating stations. The environmental impacts of operating gas-fired plants are generally less than those of other fossil fuel technologies of equal capacity.

The environmental impacts from natural gas generation alternatives were evaluated in the GEIS (NRC, 1996), draft GEIS for license renewal (NRC, 2008), and SSES Units 1 and 2 License Renewal Application (NRC, 2006).

As identified in Table 9.2-1, construction impacts from this alternative would be SMALL to MODERATE. SMALL impacts would be anticipated for the impact categories of air quality, water use and quality, land use, terrestrial and aquatic ecology, waste management, human health, historic and cultural resources, enviromental justice, aesthetics, and safety. MODERATE impacts during construction would be anticipated in the categoies of socioeconomics, and threatened and endangered resources due to impacts to wetlands.

Impacts from operations would be SMALL to MODERATE overall. Impacts would be SMALL for air quality, water use and quality, ecology, waste management, socioeconomics, historic and cultural resources, environmental justice, aesthetics, and accidents. MODERATE impacts are anticipated for human health. Adverse off-site environmental impacts from natural gas wellfields were not included within the impact comparisons.

9.2.3.2.1 Air Quality

Natural gas is a relatively clean-burning fossil fuel. Also, because the heat recovery steam generator does not receive supplemental fuel, the combined-cycle operation is highly efficient (56% vs. 33% for the coal-fired alternative). Therefore, the gas-fired alternative would release similar types of emissions, but in lesser quantities than the coal-fired alternative. Control technology for gas-fired turbines focuses on the reduction of NOx emissions.

Human health effects are not as large as from coal-fired generation, and based on decreased air quality impacts are determined to be SMALL. Natural gas technologies produce fewer pollutants than other fossil technologies, and SO_2, a contributor to acid rain, is not emitted at all (NRC, 1996). Air emissions were estimated for a natural gas-fired generation facility based on the emission factors contained in USEPA document, AP-42 (USEPA, 1995). Emissions from the facility were based on a power generation capacity of 1,600 MWe.

Current gas powered electricity generation has a carbon footprint around half that of coal (approximately 500 gCO_2eq/kWh), because gas has a lower carbon content than coal. This is approximately 100 times higher than the carbon footprint of a nuclear power generation facility (approximately 5 gCO_2eq/kWh). Like coal-fired plants, gas plants could co-fire biomass to reduce carbon emissions in the future (POST, 2006).

The natural gas-fired generation facility assumes the use of a combined cycle gas turbine generator (GTG). Water injection is used to control nitrogen oxides emissions. Table 9.2-2 summarizes the air emissions produced by a 1,600 MWe natural gas-fired facility. Based on the emissions generated from a natural gas-fired facility, air impacts would be MODERATE.

9.2.3.2.2 Waste Management

Construction wastes (land clearing and solid wastes) would be minimal and would be subject to regulatory control. Therefore, the impact of construction waste management would be SMALL (NRC, 2008).

Gas-fired generation would result in almost no waste generation, producing minor (if any) impacts. Approximately 1,500 cubic ft of spent selective catalytic reduction (SCR) catalyst would be generated per year for a 2,400 MWe plant and would be less for a 1,600 MWe plant. This waste would be shipped offsite for disposal. As a result, waste management impacts would be SMALL.

9.2.3.2.3 Economic Comparison

DOE has estimated the cost of generating electricity from a gas-fired facility to be $0.047 per kWh. The projected cost associated with operating a new nuclear facility similar to BBNPP is in the range of $0.031 to $0.046 per kWh (DOE, 2002) (DOE, 2004).

Although natural gas-fired generation is considered a competitive alternative to nuclear power generation, natural gas-fired generation is not considered to be environmentally preferable to the proposed action, as described in the following section. Therefore, as allowed in NUREG-1555, ESRP 9.2.3 (NRC, 2007), additional cost data, e.g., decommissioning costs, and fuel cost estimates, are not provided for alternatives that are not deemed to be environmentally preferable to the proposed action.

9.2.3.2.4 Other Impacts

Construction of a 1,600 MWe natural gas power generating facility could affect approximately 160 ac (65 ha) or 0.25 mi^2 (0.65 km^2) would be required for the facility and 12 ac (4.9 ha) or 0.02 mi^2 (0.05 km^2) for a pipeline that would be needed to connect to an existing line (PPL Susquehanna, LLC, 2006). Acreage does not include the gas well field (NRC, 2008). As a result, land use impacts would be SMALL during construction and operation of this type of facility.

According to the GEIS, consumptive water use is about the same for natural gas power generating facilities as for alternate power generating facilities. Water consumption is likely to be less for gas turbine power generating facilities (NRC, 1996). Potential impacts to aquatic biota through impingement and entrainment and increased water temperatures in receiving water bodies and water quality would be minimized but could be characterized as SMALL due to the natural gas power generating facility's use of a new cooling water system, dependent upon the cooling system's design. Impacts from construction activities to surficial groundwater would be localized and SMALL (Section 4.2.2.3). The groundwater would be expected to recover during operation; therefore, impacts to groundwater would be SMALL (Section 5.2.2.2). Impacts to surface water bodies are MODERATE during construction primarily due to loss of wetlands and wetland buffers. (NRC, 2008)

The BBNPP site is already aesthetically altered by the presence of the existing SSES Units 1 and 2 structures, and the gas-fired plant structures are smaller that the existing SSES structures. Gas-fired units would be about 100 ft tall, while the exhaust stacks would be at least 174 ft (53 m) tall as opposed to the current units' height of 540 ft (165 m) tall. A new Turbine Building and exhaust stacks would need to be constructed. Noise would be detectable offsite, but it is likely that the level would not be any greater than the existing plant noise; a closed cycle cooling alternative could also introduce plumes. As a result, aesthetic impacts would be SMALL. (NRC, 2006) (NRC, 2008)

The BBNPP site would use a previously disturbed area near the SSES Units 1 and 2. Although permanent and/or temporary impacts during construction to wetlands and/or streams within the project footprint may occur, mitigation could be used to minimize impacts (NRC, 2006). Ecological resource impacts would, therefore, be SMALL. Terrestrial habitat loss during construction is small in comparative acreage to the region but may be locally significant. No impact to important aquatic species would occur. Impacts from construction activity to terrestrial habitat and aquatic ecosystems would be limited and temporary; therefore, impacts during construction would be SMALL. Recovery of some species during operation is anticipated and impacts would be SMALL. (Ecology, III, Inc., 2007b) (NRC, 2008)

No known state or federal rare, threatened, or endangered plant species have been observed on the BBNPP site. Ten threatened and endangered species and species of special concern are known to have distribution in the area. Four important habitats, including wetlands will be impacted (PDCNR, 2008a) (PDCNR, 2008b) (PPL Susquehanna, LLC, 2006) (Ecology III, Inc.,1995) (Ecology III, Inc., 2007a). Impact to wetlands and wetland buffer would require mitigation. Impacts would be MODERATE.

Although archaeological, cultural, and historical sites were identified as a result of the Phase I and Phase II cultural resource investigations conducted, it is likely that there will be SMALL impacts to these resources from construction and operation (Sections 4.1.3, 5.1.3).

Construction employment impacts would be MODERATE (NRC, 2008). Socioeconomic benefits from approximately 88 construction and operations jobs, as well as additional tax revenues, would be associated with this alternative (PPL Susquehanna, LLC, 2006). As a result, socioeconomic impacts would be SMALL.

Due to increased safety technologies, accident impacts would be SMALL.

As previously mentioned because of increased air emissions and public health risks, human health impacts would be MODERATE (PPL Susquehanna, LLC, 2006) and SMALL during construction due to best management practices to curb fugitive dust emissions (NRC, 2008).

Demographic characteristics of the area surrounding the BBNPP demonstrate that there are no significant numbers of minority or low-income populations represented in the vicinity; therefore, the environmental justice impact would be SMALL (Sections 4.4.3.1, 5.8.3.1).

9.2.3.2.5 Summary

The majority of operations impacts for the natural gas-fired generator would be SMALL: land use, ecology, water use and quality, waste management, historic and cultural resources, environmental justice, aesthetics, socioeconomics, and safety. Categories with MODERATE impacts include air quality, human health and threatened and endangered resources due to impacts to wetlands. Because of these impacts, the natural gas power generating facility would not be environmentally preferable to the BBNPP.

9.2.3.3 Combination of Alternatives

BBNPP will have a baseload capacity of approximately 1,600 MWe. Any alternative or combination of alternatives would be required to generate the same baseload capacity.

Because of the intermittent nature of the resources and the lack of cost-effective technologies, wind and solar energies are not sufficient on their own to generate the equivalent baseload capacity or output of BBNPP, as discussed in Section 9.2.2.1 and Section 9.2.2.4. As noted in Section 9.2.3.1 and Section 9.2.3.2, fossil fuel fired technology generates baseload capacity, but the associated environmental impacts are greater than for a nuclear facility.

A combination of alternatives may be possible, but should be sufficiently complete, competitive, and viable to provide NRC with appropriate comparisons to the proposed nuclear plant.

9.2.3.3.1 Determination of Alternatives

Many possible combinations of alternative power generation sources could be used to satisfy the baseload capacity requirements of the BBNPP facility. Some of these combinations include renewable sources, such as wind and solar, although wind and solar do not, by themselves, provide a reasonable alternative energy source to the baseload power to be produced by the BBNPP facility. In combination with fossil fuel fired power generation; however, wind and solar may be a reasonable alternative to nuclear energy produced by the BBNPP facility.

As described in Section 8.3 and throughout Section 9.2.3, the ROI/primary market area utilizes a diversity of fuel sources for baseload power generation, including the alternatives identified in this section as a combination alternative to the baseload power to be provided by the BBNPP. A generation portfolio of diverse fuel sources reduces the risk to system reliability from the availability of individual fuels, the transportation of individual fuels, and the impact of fuel price variations and consequent generation loading patterns.

The BBNPP will operate as a baseload, merchant independent power producer. The power produced will be sold on the wholesale market without specific consideration to supplying a traditional service area or satisfying a reserve margin objective. The ability to generate baseload power in a consistent, predictable manner meets the business objectives for the BBNPP. Therefore, when examining combinations of alternatives, the ability to consistently generate baseload power must be a determining factor when analyzing the suitability of the combination. This section reviews the ability of the combination alternative to have the capacity to generate baseload power equivalent to BBNPP.

When examining a combination of alternatives that would meet business objectives similar to that for the BBNPP, any combination that includes a renewable power source (either all or part of the capacity of the BBNPP) must be combined with a fossil-fueled facility equivalent to the generating capacity of the BBNPP. This combination would allow the fossil-fueled portion of the combination alternative to produce the needed power if the renewable resource is unavailable and to be displaced when the renewable resource is available.

For example, if the renewable portion is provided by some amount of wind generation and that resource became available, then the output of the fossil fueled generation portion of the combination alternative could be lowered to offset the increased generation from the renewable portion. This facility, or facilities, would satisfy business objectives of the BBNPP facility in that it would be capable of providing the requisite baseload power regardless of the availability of the renewable power source.

Coal and natural gas power generating facilities have been determined to have environmental impacts that are equivalent to or greater than the impacts of the BBNPP. Based on the comparative impacts of these two technologies, as shown in Table 9.2-1 (USEPA, 1995), it can be concluded that a natural gas power generating facility would have less of an environmental impact than a comparably sized coal power generating facility. In addition, the operating characteristics of natural gas power generation are more amenable to the kind of load changes that may result from inclusion of renewable generation, such that the baseload generation output of 1,600 MWe is maintained.

"Clean Coal" power plant technology could decrease the air pollution impacts associated with burning coal for power. Demonstration projects show that clean coal programs reduce NOx, SOx, and particulate emissions; however, the environmental impacts from burning coal using these technologies, if proven, will still be greater than the impacts from natural gas (NETL, 2001). Therefore, for the purpose of examining the impacts from a combination of alternatives to the BBNPP, a natural gas power baseload generating facility equivalent to the BBNPP was used in the environmental analysis of combination alternatives.

The analysis accounts for the reduction in environmental impacts from a gas-fired facility when generation from the facility is displaced by the renewable resource. Additionally, the impact associated with the combined-cycle natural gas-fired unit is based on the gas fired generation impact assumptions discussed in Section 9.2.3.2. Additionally, the renewable portion of the combination alternative would be any combination of renewable technologies that could produce power equal to or less than the BBNPP when such resources were available.

This combination of renewable energy and natural gas fired generation represents a potentially viable mix of non nuclear alternative energy sources. Many types of alternatives can be used to supplement wind energy, notably solar power. PV cells are another source of solar power that would complement wind power by using the sun during the day to produce energy while wind turbines use windy and stormy conditions to generate power. Wind and solar facilities in combination with fossil fuel facilities (coal, petroleum) could also be used to generate baseload power.

However, wind and solar facilities in combination with fossil fuel facilities would have equivalent or greater environmental impacts relative to a new nuclear facility at the BBNPP site. Similarly, wind and solar facilities in combination with fossil fuel facilities would have costs higher than a new nuclear facility at the BBNPP site. Therefore, wind and solar facilities in combination with fossil fuel facilities are non-competitive with a new nuclear unit at the BBNPP site.

9.2.3.3.2 Environmental Impacts

The environmental impacts associated with a gas fired power generation facility sized to produce power equivalent to the BBNPP have already been described in previous sections. Depending on the level of potential renewable output included in the combination alternative, the level of impact of the gas-fired portion would be comparably lower during periods that the renewable resource is available. If the renewable portion of the combination alternative were not enough to displace all of the power produced by the natural gas power generation, then there would be some level of impact associated with the natural gas power generating facility. Alternately, if the renewable portion of the combination alternative were enough to fully displace the output of the natural gas portion, then when the renewable resource is available, the output of the natural gas power generating facility could be removed, thereby eliminating its operational impacts.

The environmental impacts associated with solar and wind power generating facilities are discussed in Section 9.2.2.1 and Section 9.2.2.4. Whereas the natural gas plant and solar arrays could potentially be built on the BBNPP site, the level of wind, as previously discussed, is not sufficient for this technology. The wind facility, therefore, would need to be located offsite but within the ROI. If this technology combination were deemed to be feasible, then potential locations within the ROI could be evaluated. In comparing the environmental impacts of the combinations, existing information was used for the previously determined gas-fired generation in conjunction with available data for solar and wind technologies. Because a location within the ROI has not been selected, information regarding many of the impact categories could not be determined. Categories of impacts which would be SMALL include waste management and accidents, and categories of impacts which would be MODERATE include air quality, water use and quality, socioeconomics, human health, and environmental justice. Categories with SMALL to LARGE impacts include land use, ecology, historic and cultural resources, and threatened and endangered resources. It should be noted, however, that the natural gas power generating facility alone has larger impacts than the BBNPP. The greater the potential output of the renewable portion of the combination alternative, the closer the impacts would approach the level of impacts associated with the BBNPP.

The combination of wind and/or solar power generating facilities with a natural gas power generating facility would have environmental impacts equal to or greater than the BBNPP.

When the renewable resource is not available, the environmental impacts would be greater than the BBNPP. Therefore, the most favorable combination of energy alternatives is not environmentally preferable to the BBNPP.

9.2.3.3.3 Economic Comparison

As noted earlier, the combination alternative must generate power equivalent to the capacity of the BBNPP. DOE has estimated the cost of generating electricity from a gas-fired facility ($0.047 per kWh) (DOE, 2002). The cost for a natural gas-fired facility in combination with a renewable facility would increase, because the facility would not be operating at full availability when it is displaced by the renewable resource. In 2000, wind power was produced at a cost between $0.03/kWh and $0.06/kWh, depending on wind speeds (ELPC, 2001). By 2020, production costs are projected to be between $0.03/kWh and $0.04/kWh. In 2005, concentrating solar power systems had a benchmark cost of $0.12/kWh to $0.14/kWh with a target cost of $0.035/kWh to $0.06/kWh by 2025 (EERE, 2006a).

As a result, the capital costs and fixed operating costs of the natural gas facility would be spread across fewer kWh from the gas facility, thereby increasing its cost per kWh. The projected cost associated with operating a new nuclear facility similar to the BBNPP is in the range of $0.031 to $0.046 per kWh (DOE, 2002) (DOE, 2004). The projected costs associated with forms of generation other than from a nuclear unit would be higher. Therefore, the cost associated with the operation of the combination alternative would be non-competitive with the BBNPP.

9.2.3.3.4 Summary

Because the combination alternative is not considered to be a competitive alternative to nuclear power generation, this combination is not considered to be environmentally preferable to the proposed action as described in the following section. Therefore, as allowed in NUREG-1555, ESRP 9.2.3 (NRC, 2007), additional cost data, e.g., decommissioning costs, and fuel cost estimates, are not provided for alternatives that are not deemed to be environmentally preferable to the proposed action.

Wind and/or solar power generating facilities in combination with a natural gas power generating facility could be used to generate baseload power and would serve the purpose of the BBNPP. This combination, however, would have equivalent or greater environmental impacts than a nuclear power generating facility at the BBNPP site, and land requirements would be substantially larger. Therefore, wind and/or solar facilities in combination with a natural gas power generating facility are not an environmentally preferable alternative to the BBNPP.

9.2.3.4 Conclusion

PPL has determined that neither a power generating facility fueled by coal, nor one fueled by natural gas, nor a combination of alternatives, including wind and/or solar power generating facilities, would provide an appreciable reduction in overall environmental impacts relative to the BBNPP. Furthermore, each of these types of alternatives, with the possible exception of the combination alternative, would entail a significantly greater environmental impact on air quality than would a nuclear power generating facility. To achieve a SMALL air quality impact in the combination alternative by using larger amounts of wind or solar generation, a MODERATE to LARGE impact on land use would result. Therefore, PPL concludes that neither a power generating facility fueled by coal, nor one fueled by natural gas, nor a combination of alternatives, would be environmentally preferable to a nuclear power generating facility at the

BBNPP site. Furthermore, these alternatives would have higher economic costs, and therefore, would also not be economically preferable to a nuclear power generating facility.

9.2.4 References

AE, 2008. Energy Basics, Renewable Energy, Wind Power, Information Center for Biological Diversity (CBD), Fact Sheet on Altamont Pass Bird Kills, Alliant Energy, 2008, Website: http://www.alliantenergygeothermal.com/stellent2/groups/public/documents/pub/phtv_eb_re_000315.hcsp, Date accessed: March 13, 2008.

APT, 2004. Investigation into Municipal Solid Waste Gasification for Power Generation, Alameda Power and Telecom, May 2004, Website: http://www.alamedapt.com/newsroom/reports/gasification.pdf, Date accessed: June 12, 2007.

AWEA, 2008. Wind Energy FAQ - Basic Principles of Wind Resource Evaluation, American Wind Energy Association, Website: http://www.awea.org/faq/basicwr.html, Date accessed: April 7, 2008.

BAH, 2004. Coal-Based Integrated Coal Gasification Combined Cycle: Market Penetration Recommendations and Strategies, Produced by Booz Allen Hamilton for the Department of Energy, National Energy Technology Laboratory, and the Gasification Technologies Council, September 2004.

CEC, 2003. Renewable Resources Development Report, California Energy Commision, Publication Number 500 03 080F, November 2003.

CEC, 2004. Potential Health and Environmental Impacts Associated with the Manufacture and Use of Photovoltaic Cells (November 2003), California Energy Commission, Publication Number P500 04 053, August 2004.

COV, 2007. The Virginia Energy Plan, Commonwealth of Virginia, Department of Mines, Minerals, and Energy.

DSS, 2007. An Act to Amend Title 29 of the Delaware Code to Create a Sustainable Energy Utility in the State of Delaware, Senate Substitute Number 1 for Senate Bill Number 18, Delaware State Senate, 144th General Assembly.

DOE, 2002. Business Case for New Nuclear Power Plants, U.S. Department of Energy, Office of Nuclear Energy, Science and Technology, July 2002, Website: http://www.ne.doe.gov/home/bc/ExecOverviewNERAC100102.pdf.

DOE, 2004. The Economic Future of Nuclear Power, U.S. Department of Energy, Office of Nuclear Energy, August 2004, Website: http://www.nei.org/filefolder/univchicago_economic_study_8-04.pdf.

DOE, 2006. Future Fuel Cells R&D, U.S. Department of Energy, Office of Science and Technology, Website: http://www.fossil.energy.gov/programs/powersystems/fuelcells/, Date accessed: May 18, 2007.

Ecology III, Inc., 1995. Environmental Studies in the Vicinity of the Susquehanna Steam Electric Station: 1994 Annual Report, Ecology III, Inc, June, 1995.

Ecology III, Inc., 2007a. Threatened and Endangered Species Assessment for UniStar Project Leo, Ecology III, Inc, June 2007.

Ecology III, Inc., 2007b. Wetland Evaluation for UniStar Project Leo, Ecology III, Inc, June 2007.

EERE, 2003. Pennsylvania - 50m Wind Resource Map, U.S. Department of Energy, Energy Efficiency and Renewable Energy, January 12, 2003.

EERE, 2006a. Solar Technologies Program - Multi Year Program Plan 2007 2011, January 2006, U.S. Department of Energy, Energy Efficiency and Renewable Energy, Website: http://www1.eere.energy.gov/solar/pdfs/set_myp_2007-2011_proof_1.pdf, Date accessed: March 14, 2008.

EERE, 2006b. Concentrating Solar Power, U.S. Department of Energy, Energy Efficiency and Renewable Energy, 2006, Website: http://www1.eere.energy.gov/solar/csp.html, Date accessed: May 31, 2007.

EERE, 2007. State Energy Alternatives, U.S. Department of Energy, Energy Efficiency and Renewable Energy, Website: http://www.eere.energy.gov/states/alternatives/biomass.cfm, Date accessed: May 18, 2007.

EERE, 2008a. Alternative Energy Resources in Pennsylvania, U.S. Department of Energy, Energy Efficiency and Renewable Energy, Website: http://www.eere.energy.gov/states/alternatives/resources_pa.cfm, Date accessed: February 21, 2008.

EERE, 2008b. Alternative Energy Resources in Delaware, U.S. Department of Energy, Energy Efficiency and Renewable Energy, Website: http://www.eere.energy.gov/states/alternatives/resources_de.cfm, Date accessed: February 21, 2008.

EERE, 2008c. Alternative Energy Resources in New Jersey, U.S. Department of Energy, Energy Efficiency and Renewable Energy, Website: http://www.eere.energy.gov/states/alternatives/resources_nj.cfm, Date accessed: February 21, 2008.

EERE, 2008d. Alternative Energy Resources in Maryland, U.S. Department of Energy, Energy Efficiency and Renewable Energy, Website: http://www.eere.energy.gov/states/alternatives/resources_md.cfm, Date accessed: February 21, 2008.

EERE, 2008e. Alternative Energy Resources in Virginia, U.S. Department of Energy, Energy Efficiency and Renewable Energy, Website: http://www.eere.energy.gov/states/alternatives/resources_va.cfm, Date accessed: February 21,2008.

EERE, 2008f. Biomass Energy, U.S. Department of Energy, Energy Efficiency and Renewable Energy, Website: http:/ / www.eere.energy.gov/ states/ alternatives/biomass.cfm, Date accessed: March 17, 2008.

EIA, 1993. Renewable Resources in the U.S. Electricity Supply, Energy Information Administration, DOE/EIA 0561(92), February 1993.

EIA, 1995. Renewable Energy Annual 1995, Energy Information Administration, DOE/EIA 0603(95), December 1995.

EIA, 2001. Annual Energy Outlook 2002 with Projections to 2020, Energy Information Administration, DOE/EIA 0383(2002), December 2001.

EIA, 2002. Biomass for Electricity Generation, U.S. Department of Energy, Energy Information Administration, Website: http://www.eia.doe.gov/oiaf/analysispaper/biomass/index.html, Date accessed: June 12, 2007.

EIA, 2003a. Renewable Energy Annual 2002 with Preliminary Data for 2002, Energy Information Administration, DOE/EIA 0603(2002), November 2003.

EIA, 2003b. Table FE2, Typical Costs and Capacity of New Transmission Lines (1995 Dollars), Energy Information Administration, Website: http://www.eia.doe.gov/cneaf/pubs_html/feat_trans_capacity/table2.html.

EIA, 2004. Biomass for Electricity Generation, U.S. Department of Energy, Energy Information Administration, April 2004, Energy Information Administration, Website: http://www.epa.gov/cleanrgy/pdf/haq_apr20.pdf, Date accessed: June 12, 2007.

EIA, 2005. Annual Energy Outlook, 2005: With Projections to 2025, Energy Information Administration, USDOE/EIA-0383(2005), February 2005, Website: http://www.econstats.com/EIA/AE02004.PDF, Date accessed: June 3, 2007.

EIA, 2006. Electric Power Annual 2005, Energy Information Administration, DOE/EIA-0348(2005), November 2006, Website: http://www.eia.doe.gov/cneaf/electricity/epa/epa.pdf, Date accessed: May 19, 2007.

EIA, 2007a. Demand Side Management Actual Peak Load Reductions by Program Category, Energy Information Administration, October 22, 2007.

EIA, 2007b. Demand Side Management Program Direct and Indirect Costs, Energy Information Administration, October 22, 2007.

EIA, 2007c. Electric Power Annual: Figure ES 4. Fuel Costs for the Electricity Generation, Energy Information Administration, October 22, 2007.

EIA, 2007d. Net Generation from Petroleum Liquids by State by Sector, Year-to-Date through December 2006 and 2005, Energy Information Administration.

EIA, 2008a. Table 1.8.B. Net Generation from Petroleum Liquids, Year to date through January 2008 and 2007, Energy Information Administration, Website: http://www.eia.doe.gov/cneaf/electricity/epm/table1_8_b.html, Date accessed: March 17, 2008.

EIA, 2008b. Table 4.11.A. Average Cost of Petroleum Liquids Delivered for Electricity Generation by State, January 2008 and 2007, Energy Information Administration, Website: http://www.eia.doe.gov/cneaf/electricity/epm/table4_11_b.html,

EIA, 2008c. Official Energy Statistics for the U.S. Government, Energy Information Administration, Website: http://tonto.eia.doe.gov/state/state_energy_profiles.cfm?sid=US, Date accessed: August 12, 2008.

ELPC, 2001. Repowering the Midwest: The Clean Energy Development Plan for the Heartland, Environmental Law and Policy Center, 2001.

GEO, 2000. Hottest Known Geothermal Regions, Geothermal Education Office, Website: http://geothermal.marin.org/GEOpresentation/sld015.htm, Date accessed: March 17, 2008.

INEEL, 1997. U.S. Hydropower Resource Assessment for Pennsylvania, Idaho National Engineering and Environmental Laboratory, DOE/ID 10430(PA), December 1997.

INEEL, 1997a. "U.S. Hydropower Resource Assesment for Virginia," DOE/ID-10430(VA). December 1997.

MDE, 2008. Technical Support Document for Proposed COMAR 26.09 CO_2 Budget Trading Program, Maryland Department of Environment, January 30, 2008 (revised March 19, 2008).

MGA, 1991. Section 7-211 of the Public Utility Companies Articles, Maryland General Assembly, Annapolis, Maryland.

MDPSC, 2007. Electric Supply Adequacy Report of 2007, Maryland Public Service Commission, January 2007.

NEPA, 1982. The National Environmental Policy Act of 1969, as amended, Publication L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, as amended by Publication L. 94-52, July 3, 1975, Publication L. 94-83, August 9, 1975, and Publication L. 97-258, Section 4(b), September 13, 1982.

NETL, 2001. Environmental Benefits of Clean Coal Technologies, National Energy Technology Laboratories, U.S. Department of Energy, Topical Report 18, April 2001.

NJOG, 2008. Draft New Jersey Energy Master Plan, April 2008, New Jersey Office of the Governor, Website: http://www.nj.gov/emp/home/docs/pdf/draftemp.pdf, Date accessed: 2008.

NJBPU, 2008. New Jersey's Clean Energy Program™, 2006 Annual Report, New Jersey Clean Energy Program, Your Power to Save, NJBPU, Office of Clean Energy.

NRC, 1996. Generic Environmental Impact Statement for License Renewal of Nuclear Plants, NUREG 1437, Volumes 1 and 2, May 1996.

NRC, 2001. Title 10 of the Code of Federal Regulations, Appendix B to Subpart A Environmental Effect of Renewing the Operating License of a Nuclear Power Plant, Appendix B, 2001.

NRC, 2006. Applicant's Environmental Report -Operating License Renewal Stage: Susquehanna Steam Electric Station, PPL Susquehanna, LLC Unit 1, Docket No. 50 387, License No. NPF 014, Unit 2, Docket No. 50 388, License No. NPF 022, September 2006.

NRC, 2007. Standard Review Plans for Environmental Reviews for Nuclear Power Plants (NUREG 1555), Draft Revision 1, July 2007.

NRC, 2008. Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 35, Regarding Susquehanna Steam Electric Station Units 1 and 2, NUREG-1437, Supplement 35, Draft Report for Comment, April 2008.

NREL, 2005. A Geographic Perspective on the Current Biomass Resource Availability in the United States, Technical Report NREL/TP-560-39181, U.S. Department of Energy, National Renewable Energy Laboratory, December 2005.

NREL, 2006. "Energy Storage Basics," Website: http://www.nrel.gov/learning/eds_energy_storage.html, Date accessed: March 17, 2008.

NREL, 2007. Photovoltaics, U.S. Department of Energy, National Renewable Energy Laboratory, Website: http://www.nrel.gov/learning/re_photovoltaics.html, Date accessed: April 3, 2007.

PDCNR, 2008a. Pennsylvania Department of Conservation and Natural Resources, "Endangered and Threatened Species of Pennsylvania, Index.", Website: http://www.dcnr.State.pa.us/wrcf/pubindex.aspx, Date accessed: April 2, 2008.

PDCNR, 2008b. Letter from Rebecca H. Bowen (Pennsylvania Department of Conservation and Natural Resources) to George Wrobel (CEG GNA Engineering), Re: Environmental Review of Bell Bend Nuclear Power Plant Site, Berwick, Luzerne County, Pennsylvania, Dated: March 24, 2008.

PJM, 2006. PJM Inside Lines, PJM Interconnection, LLC, July 31, 2006.

PJM, 2007. Manual 14B: PJM Regional Planning Process, PJM Interconnection, LLC.

PJM, 2008b. 2007 State of the Market Report, Volume II, Section 4 - Interchange Transactions, PJM Interconnection, LLC, April 24, 2008.

PJM, 2008c. Emergency Operations, PJM Manual 13, Prepared by Systems Operation Division, Revision: 34, PJM Interconnection, LLC, June 13, 2008.

PL, 2005. Energy Policy Act of 2005, Public Law 109-58, 119 STAT. 596, August 2005, Website: http://frwebgate.access.gpo.gov/cgibin/getdoc.cgi?dbname=109_cong_public_laws&docid=f:publ058.109, Date accessed: May 19, 2007.

POST, 2006. "Carbon Footprint of Electricity Generation," Postnote, Number 268, October 2006.

PPL Susquehanna, LLC, 2006. License Renewal Application - Susquehanna Steam Electric Station Units 1 and 2, PPL Susquehanna, LLC, September 2006.

PPL Susquehanna, LLC, 2008. ”PPL Customer Demand Side Management (DSM) Programs,” Request for Information Summary. May 30, 2008.

PSEB, 2004. Pennsylvania Sustainable Energy Board 2003 Annual Report, May 11, 2004.

PU, 2005. Factors that Affect the Design and Implementation of Clean Coal Technologies in Indiana, Purdue Energy Research Modeling Groups, Purdue University, R. Rardin, Y. Zuwei. F. Holland, A. Black, J. Overbeck, June 2005, Website: http//www.purdue.edu/dp/energy/pdf/Purdue-InterimReport-Jun10-2005.pdf, Date accessed: June 3, 2007.

REW, 2001. Minimizing the Environmental Impact of Large-Scale Rural PV, Renewable Energy World, Volume 4, Number 1, M. Real, H. Bader, and R. Scheidegger, January-February 2001.

USDA, 2004. 2002 Census of Agriculture, United States Summary and State Data, Volume 1 Geographic Area Series, Part 51, AC-02-A-51, U.S. Department of Agriculture, June 2004.

USEPA, 1995. AP 42, Volume I, Fifth Edition, U.S. Environmental Protection Agency, January 1995.

USEPA, 2006a. Electricity from Municipal Solid Waste, U.S. Environmental Protection Agency, Website: http://www.epa.gov/cleanenergy/muni.htm, Date accessed: May 19, 2007.

USEPA, 2006b. Municipal Solid Waste: Basic Facts, U.S. Environmental Protection Agency, Website: http://www.epa.gov/msw/facts.htm, Date accessed: May 19, 2007.

Table 9.2-1— Impacts Comparison Table
(Page 1 of 7)

Impact Category	Proposed Action (BBNPP)	Coal-Fired Generation	Gas Fired Generation	Combinations (wind and solar with natural gas)
Land Use	The Limit of Disturbance for the construction of the BBNPP and supporting facilities is approximately 687 ac (278 ha). The BBNPP site occupies an area of 935.6 acres (378.6 hectares) within the BBNPP Project Boundary which is 2.055 acres (831.6 hectares). Federal, state, and local requirements will be followed to limit impact. Therefore, the impact will be SMALL during both the construction and operation phases of the proposed project (Sections 4.1.1.1, 5.1.1).	This alternative would require approximately 690 ac (279 ha) for the power block and coal storage and 360 ac (146 ha) for waste management (NRC, 2008). Therefore, land use impact would be MODERATE.	Approximately 160 ac (65 ha) would be required for the facility and 12 ac (4.9 ha) for a pipeline that would be needed to connect to an existing line (PPL Susquehanna, LLC, 2006). Land use impact would be SMALL.	Wind facilities would require about 200 ac (81 ha) for 1,600 MWe (about 0.25 acres for each 2 MWe wind (AE, 2008). Solar facilities require 56,000 acres (22,662 ha) per 1,600 MWe generation for photovoltaic and 22,400 ac (9,065 ha) per 1,600 MWe for solar thermal systems (NRC, 1996). Impacts from wind and solar facilities would be SMALL to LARGE. Approximately 160 ac (65 ha) for a gas-fired generation facility and 12 ac (4.9 ha) for pipelines would be needed. A new gas pipeline would be needed to connect to the existing line (PPL Susquehanna, LLC, 2006). Land use impact for a gas-fired facility would be SMALL.
Air Quality	During construction, limited air emissions from temporary sources such as diesel generators and boilers and fugitive dust and particulate matter would be generated (Section 4.4.1.3). Impacts would be mitigated and impacts would be SMALL. During operations of the SSES Units 1 and 2 cooling towers, no impact would be observed from salt drift. This would be similar for the BBNPP. Operations air emission sources would be managed in accordance with federal, state, and local laws and regulations. Therefore, impacts to air quality during operations are SMALL (Section 5.5.1.3).	Similar construction activities as proposed action for construction, therefore, impacts would be SMALL. Based on the air emissions data provided in Table 9.2-2, during operations, impacts would be MODERATE.	Similar construction activities as proposed action for construction, therefore, impacts would be SMALL. Based on the air emissions data provided in Table 9.2-2, during operations, impacts would be MODERATE.	Similar construction activities as proposed action for construction, therefore, impacts would be SMALL. No air emissions would results from wind or solar facilities during operations. If natural gas is used in this combination, calculated estimates of SO_2 19 tons/yr NO_2 729 tons/yr CO 168 tons/yr PM 37 tons/yr PM-less than 10 microns 26 tons/yr CO_2 equivalent 622,791 tons/yr (USEPA, 1995) during operations impacts would be MODERATE.

Table 9.2-1— Impacts Comparison Table
(Page 2 of 7)

Impact Category	Proposed Action (BBNPP)	Coal-Fired Generation	Gas Fired Generation	Combinations (wind and solar with natural gas)
Water Use and Quality	Impact would be SMALL to surficial groundwater from construction activities. These impacts would be localized and water use and quality would be expected to recover during the operations mode. (Sections 4.2.2.3, 5.2.2.2) Impacts to surface water bodies are SMALL during construction and operation primarily due to loss of wetlands and wetland buffers (Section 4.2.1.5). Increased surface water use during operations would be SMALL. (Section 5.2.2.1)	Impact would be SMALL to surficial groundwater from construction activities. These impacts would be localized and water use and quality would be expected to recover during the operations mode (Sections 4.2.2.3, 5.2.2.2). Impacts to surface water bodies are MODERATE during construction primarily due to loss of wetlands and wetland buffers. Although coal pile runoff could affect surface water quality, impacts to water resources and quality would be minimized due to the coal power generating facility's use of a new cooling water system would be SMALL. As groundwater will not be used during operations, impact to groundwater would be SMALL. (NRC, 2008)	Impact would be SMALL to surficial groundwater from construction activities. These impacts would be localized and water use and quality would be expected to recover during the operations mode. (Sections 4.2.2.3, 5.2.2.2) Impacts to surface water bodies are MODERATE during construction primarily due to loss of wetlands and wetland buffers. Water consumption is likely to be less for gas turbine power generating facilities during operations (NRC, 1996) (PPL Susquehanna, LLC, 2006). As a result, water quality impacts would be SMALL.	Impacts of solar and wind facilities on water quality during construction and operation is assumed to be SMALL. If natural gas is used in conjunction with solar and wind, impact would be SMALL to surficial groundwater from construction activities. These impacts would be localized and water use and quality would be expected to recover during the operations mode. (PPL Susquehanna, LLC, 2006) (NRC, 2008) Impacts to surface water bodies are MODERATE during construction primarily due to loss of wetlands and wetland buffers. Water consumption is likely to be less for gas turbine power generating facilities during operations (NRC, 1996) (PPL Susquehanna, LLC, 2006). As a result, water quality impacts would be SMALL.

Table 9.2-1— Impacts Comparison Table
(Page 3 of 7)

Impact Category	Proposed Action (BBNPP)	Coal-Fired Generation	Gas Fired Generation	Combinations (wind and solar with natural gas)
Ecology	Terrestrial habitat loss during construction is small in comparative acreage to the region but may be locally significant. Impacts from construction activity to terrestrial habitat and aquatic ecosystems, except wetlands, would be limited and temporary; therefore, impacts during construction are anticipated to be SMALL (Sections 4.3.1, 4.3.2). Recovery of some species during operations is anticipated and impacts would be SMALL (Sections 5.2.2, 5.2.3). Aquatic ecology impacts during construction would be MODERATE because there would be wetlands disturbances (Section 4.3.2.1). Aquatic ecology impacts during operation would be SMALL (Section 5.3.2.2).	Terrestrial habitat loss during construction is small in comparative acreage to the region but may be locally significant. Impacts from construction activity to terrestrial habitat and aquatic ecosystems, except wetlands, would be limited and temporary; therefore, impacts during construction are anticipated to be SMALL. Recovery of some species during operations is anticipated and impacts would be SMALL. (Ecology III, Inc., 2007b) (NRC, 2008) Habitat loss in coal-mining areas would have MODERATE impact. (NRC, 2008)	Terrestrial habitat loss during construction is small in comparative acreage to the region but may be locally significant. Impacts from construction activity to terrestrial habitat and aquatic ecosystems, except wetlands, would be limited and temporary; therefore, impacts during construction are anticipated to be SMALL. Recovery of some species during operations is anticipated and impacts would be SMALL. (Ecology III, Inc., 2007b) (NRC, 2008)	For Gas Fired Generation, terrestrial habitat loss during construction is small in comparative acreage to the region but may be locally significant. No important aquatic species are present on site. Impacts from construction activity to terrestrial habitat and aquatic ecosystems, except wetlands, would be limited and temporary; therefore, impacts during construction are anticipated to be SMALL. Recovery of some species during operations is anticipated and impacts would be SMALL. (Ecology III, Inc., 2007b) (NRC, 2008) Construction impacts of the wind and solar facilities within the ROI could potentially be MODERATE to LARGE. The impact of Solar Generation would be LARGE. Operations impacts are assumed to be SMALL.
Waste Management	Construction (land clearing and solid wastes) and operational wastes would be minimal because of regulatory control and the small quantities generated. Relatively small quantities of mixed waste would be generated. This waste would be stored temporarily onsite and then shipped to an offsite facility for treatment (Sections 5.5.1, 5.5.2). Therefore, impact will be SMALL.	Construction wastes (land clearing and solid wastes) would be minimal because of regulatory control and the small quantities generated. Therefore, impact will be SMALL. (PPL Susquehanna, LLC, 2006) (NRC, 2008) Approximately 73,000 tons of coal ash and 808,000 tons of scrubber sludge would be generated annually from operations and would require 193 acres onsite over a 20-year renewal term (PPL Susquehanna, LLC, 2006). These impacts would, therefore, be MODERATE.	Construction wastes (land clearing and solid wastes) would be minimal because of regulatory control and the small quantities generated. Therefore, impact will be SMALL. (PPL Susquehanna, LLC, 2006) (NRC, 2008) Approximately 1,500 cubic ft spent SCR catalyst per year would be generated for a 2,400 MWe plant (PPL Susquehanna, LLC, 2006). This waste volume would be less for a 1,600 MWe plant. Therefore, waste management impacts would be SMALL.	Because they are renewable energy sources, it is assumed that the impact from waste generated during the construction and operation of the solar and wind facilities would be SMALL. Approximately 1,500 cubic ft spent SCR catalyst is expected to be generated per year for a 2,400 MWe gas-fired plant (PPL Susquehanna, LLC, 2006). This waste volume would be less for a 1,600 MWe plant. Therefore, waste management impacts would be SMALL.

Table 9.2-1— Impacts Comparison Table
(Page 4 of 7)

Impact Category	Proposed Action (BBNPP)	Coal-Fired Generation	Gas Fired Generation	Combinations (wind and solar with natural gas)
Socioeconomics	Cumulative beneficial and adverse impacts due to construction would be SMALL to MODERATE. During operation, beneficial impacts would be SMALL to LARGE and adverse impacts would be SMALL. (Sections 4.4.1, 4.4.2, 5.8.3.1)	Construction and operation employment impacts would be MODERATE. Several hundred mining and construction and operation jobs as well as additional tax revenues would be associated with the coal mining. (NRC, 2008)	Construction employment impacts would be MODERATE. Operations employment would decrease and these impacts would be SMALL. (NRC, 1996) (NRC, 2008)	Construction employment impacts would be MODERATE. Operations employment would decrease and these impacts would be SMALL. (NRC, 1996) (NRC, 2008).
Human Health	Impacts to the public from thermophilic microorganisms associated with fresh water, noise, and air emissions from operations would be SMALL. (Sections 5.3.3.1, 5.3.4.1, 5.8.1.3, 5.8.1.7)	During construction, impacts to human health would be SMALL. As a result of increased air emissions and associated public health risks, human health impacts during operations would be MODERATE. (NRC, 2008)	During construction, impacts to human health would be SMALL. As a result of increased air emissions and associated public health risks, human health impacts during operations would be MODERATE. (NRC, 2008)	It is assumed that construction and operational impacts from solar and wind technologies would be SMALL. During construction, impacts to human health would be SMALL. As a result of increased air emissions and associated public health risks from gas-fired facilities, human health impacts during operations would be MODERATE. (NRC, 2008)
Historic and Cultural Resources	Although archaeological, cultural, and historical sites were identified as a result of the Phase I and Phase II cultural resource investigations conducted, it is likely that there will be SMALL impacts to these resources from construction and operation (Sections 4.1.3, 5.1.3).	Although archaeological, cultural, and historical sites were identified as a result of the Phase I and Phase II cultural resource investigations conducted, it is likely that there will be SMALL impacts to these resources from construction and operation (Sections 4.1.3, 5.1.3).	Although archaeological, cultural, and historical sites were identified as a result of the Phase I and Phase II cultural resource investigations conducted, it is likely that there will be SMALL impacts to these resources from construction and operation (Sections 4.1.3, 5.1.3).	Although archaeological, cultural, and historical sites were identified as a result of the Phase I and Phase II cultural resource investigations conducted, it is likely that there will be SMALL impacts to these resources from construction and operation of the gas-fired facility (Sections 4.1.3, 5.1.3). The wind and solar facilities would be located offsite but in the ROI, therefore, impacts to historic and cultural resources could be SMALL to LARGE. Due to the large areas associated with Solar Generation, impacts to historic and cultural resources could be SMALL to LARGE.

Table 9.2-1— Impacts Comparison Table
(Page 5 of 7)

Impact Category	Proposed Action (BBNPP)	Coal-Fired Generation	Gas Fired Generation	Combinations (wind and solar with natural gas)
Environmental Justice	Demographic characteristics of the area surrounding BBNPP determined that no significant numbers of minority or low-income populations are represented in the vicinity; therefore, the environmental justice impact is SMALL during construction and operation. (Sections 4.4.3.1, 5.8.3.1) (NRC, 2008)	Demographic characteristics of the area surrounding BBNPP determined that no significant numbers of minority or low-income populations are represented in the vicinity; therefore, the environmental justice impact is SMALL during construction and operation. (Sections 4.4.3.1, 5.8.3.1) (NRC, 2008)	Demographic characteristics of the area surrounding BBNPP determined that no significant numbers of minority or low-income populations are represented in the vicinity; therefore, the environmental justice impact during construction and operation is SMALL. (Sections 4.4.3.1, 5.8.3.1)	For the gas-fired facility, demographic characteristics of the area surrounding BBNPP determined that no significant numbers of minority or low-income populations are represented in the vicinity; therefore, the environmental justice impact during construction and operation is SMALL. (NRC, 2008) The wind and solar facilities which would be located within the ROI (but not at the BBNPP) could have environmental justice impacts that range from SMALL to MODERATE.
Aesthetics	Because the BBNPP site is already aesthetically altered by the presence of the existing SSES Units 1 and 2 structures, the visual impact of the cooling towers and plumes associated with the BBNPP is expected to be SMALL. (Section 4.4.1.6)	Because the BBNPP site is already aesthetically altered by the presence of the existing SSES Units 1 and 2 structures, the visual impact of the cooling towers and plumes from a coal-fired facility is expected to be SMALL during construction and SMALL to MODERATE during plant operation. Noise impacts during construction would be SMALL and during operations would be MODERATE (NRC, 2006)	The BBNPP site is already aesthetically altered by the presence of the existing SSES Units 1 and 2 structures. However, these gas-fired plant structures are smaller than the existing SSES Units 1 and 2 structures. Impacts during construction and operation would be SMALL. Noise would be limited and impacts during construction and operation would be SMALL. (NRC, 2006) (NRC, 2008)	Because of their size and visual impact, solar arrays and wind turbines constructed at other locations within the ROI would have aesthetics impacts that are MODERATE to LARGE. For the gas-fired facility, the BBNPP site is already aesthetically altered by the presence of the existing SSES Units 1 and 2 structures. However, these gas-fired plant structures are smaller than the existing SSES Units 1 and 2 structures. Noise would be limited during construction and operation and resulting impacts would be SMALL. (NRC, 2006) (NRC, 2008)

Table 9.2-1— Impacts Comparison Table
(Page 6 of 7)

Impact Category	Proposed Action (BBNPP)	Coal-Fired Generation	Gas Fired Generation	Combinations (wind and solar with natural gas)
Threatened and Endangered Resources	State and federally protected animal species, including the endangered Indiana bat and state-protected yellow lampmussel (rare), green floater (rare), and Northern cricket frog (endangered) are known to exist in the vicinity of the site. None have been directly observed at the site, and mitigation measures, where appropriate, could be conducted to reduce any impacts to these species. Ten threatened and endangered species and species of special concern are known to have distribution in the area. Four important habitats, including wetlands will be impacted (Sections 4.3.1.1, 4.3.1.2, 4.3.2.2, 5.3.1.2). Impact to wetlands and wetland buffer would require mitigation. Impacts will be MODERATE.	State and federally protected animal species, including the endangered Indiana bat and state-protected yellow lampmussel (rare), green floater (rare), and Northern cricket frog (endangered) are known to exist in the vicinity of the site. None have been directly observed at the site, and mitigation measures, where appropriate, could be conducted to reduce any impacts to these species. Ten threatened and endangered species and species of special concern are known to have distribution in the area. Impacts to terrestrial and aquatic ecology would be SMALL during both construction and operation. Four important habitats, including wetlands will be impacted (PDCNR, 2008a) (PDCNR, 2008b) (PPL, 2006) (Ecology III, Inc., 1995) (Ecology III, Inc., 2007a). Impact to wetlands and wetland buffer would require mitigation. Impacts will be MODERATE.	State and federally protected animal species, including the endangered Indiana bat and state-protected yellow lampmussel (rare), green floater (rare), and Northern cricket frog (endangered) are known to exist in the vicinity of the site. None have been directly observed at the site, and mitigation measures, where appropriate, could be conducted to reduce any impacts to these species. Ten threatened and endangered species and species of special concern are known to have distribution in the area. Impacts to terrestrial and aquatic ecology would be SMALL during both construction and operation. Four important habitats, including wetlands will be impacted (PDCNR, 2008a) (PDCNR, 2008b) (PPL, 2006) (Ecology III, Inc., 1995) (Ecology III, Inc., 2007a). Impact to wetlands and wetland buffer would require mitigation. Impacts will be MODERATE.	State and federally protected animal species, including the endangered Indiana bat and state-protected yellow lampmussel (rare), green floater (rare), and Northern cricket frog (endangered) are known to exist in the vicinity of the site. None have been directly observed at the site, and mitigation measures, where appropriate, could be conducted to reduce any impacts to these species. Ten threatened and endangered species and species of special concern are known to have distribution in the area. Impacts to terrestrial and aquatic ecology would be SMALL during both construction and operation. Four important habitats, including wetlands will be impacted (PDCNR, 2008a) (PDCNR, 2008b) (PPL, 2006) (Ecology III, Inc., 1995) (Ecology III, Inc., 2007a). Impact to wetlands and wetland buffer would require mitigation. Impacts will be MODERATE. Impact to threatened and endangered species for the wind and solar facilities within the ROI can not be determined, therefore, construction and operational impacts range from SMALL to LARGE.
Accidents	As a result of increased safety technologies, accident impacts would be SMALL. (Sections 4.7.2, 5.4, 7.2, 7.4)	As a result of increased safety technologies, accident impacts would be SMALL.	As a result of increased safety technologies, accident impacts would be SMALL.	As a result of increased safety technologies, accident impacts would be SMALL.

Table 9.2-1— Impacts Comparison Table
(Page 7 of 7)

Impact Category	Proposed Action (BBNPP)	Coal-Fired Generation	Gas Fired Generation	Combinations (wind and solar with natural gas)
Facility Footprint	The Limit of Disturbance for the construction of the BBNPP and supporting facilities is 687 ac (278 ha). The BBNPP site occupies an area of 935.6 acres (378.6 hectares) within the BBNPP Project Boundary which is 2.055 acres (831.6 hectares) (Section 4.1.1.1).	1050 ac (425 ha) for 1,600 MWe generation	110 acres per 1,000 MWe generation (excludes well fields)	Wind facility footprint would be approximately 125 acres for 1,000 MWe (about 0.25 acres for each 2 MWe wind. (AE, 2008) Solar facility footprint would be approximately 35,000 acres per 1,000 MWe generation for photovoltaic and 14,000 acres per 1,000 MWe for solar thermal systems (NRC, 1996). Gas-fired facility footprint would be 110 acres per 1,000 MWe generation (excludes well fields)
Costs	The projected cost associated with operating a new nuclear facility similar to the BBNPP is in the range of $0.031 to $0.046/kWh. (DOE, 2002) (DOE, 2004)	The estimated cost of generating electricity from a coal facility to be approximately $0.049/kWh. (DOE, 2002) (DOE, 2004)	The estimated cost of generating electricity from a gas fired facility to be $0.047/kWh. (DOE, 2002) (DOE, 2004)	In 2000, wind power was produced at a cost between $0.03/kWh and $0.06/kWh, depending on wind speeds. By 2020, production costs are projected to be between $0.03/kWh and $0.04/kWh. (ELPC, 2001) In 2005, concentrating solar power systems had a benchmark cost of $0.12/kWh to $0.14/kWh with a target cost of $0.035/kWh to $0.06/kWh by 2025. (EERE, 2006a). The estimated cost of generating electricity from a gas fired facility to be $0.047/kWh. (DOE, 2002) (DOE, 2004)

Table 9.2-2— Air Emissions from Alternative Power Generation Facilities

Fuel	Bituminous Coal	Natural Gas
Combustion Facility	Circulating FBC	Combined Cycle GTG
Generation Capacity	1,600 MWe	1,600 MWe
Air Pollutant Emissions - metric tons (tons) per year		
Sulfur Dioxide (SO_2)	415 (457)	17 (19)
Nitrogen Dioxide (NO_2)	734 (809)	661 (729)
Carbon Monoxide (CO)	4,402 (4,852)	152 (168)
Particulate Matter (PM)	21 (23)	34 (37)
PM less than 10μm (PM_{10})	15 (17)	24 (26)
Carbon Dioxide, equiv. (CO_2e)	1,731,000 (1,908,000)	565,000 (623,000)
Notes: CO_2e = CO_2 equivalent FBC = fluidized bed combustor GTG = gas turbine generator		

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, 2011) 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 9.3-9 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 PJM 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 will 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 ReliabilityFirst 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.

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, 2011). 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 9.3-10). 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 9.3-11 [PJM, 2008b]).
- Dedicated Land – Not located on Dedicated Land (e.g., within national or state parks, tribal lands, etc.) (Figure 9.3-12 [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 9.3-13).

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 9.3-14. 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 9.3-4.

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, 2011). The summarized totals from the underlying assessment (UniStar, 2011) are provided in Table 9.3-10. The three sites with the highest scores were selected for comparison as the *Alternative Sites*.

- Montour
- Humboldt
- Seedco

In 2010, because the three *Alternative Sites* were located within the Susquehanna River Basin along with the *Proposed Site*, the USEPA requested that an alternative site outside of the Susquehanna River Basin be considered in the federal National Environmental Policy Act (NEPA) analyses. In response to that request, the Martins Creek site, the most favorable non-Susquehanna River Basin alternative, was added for consideration as a fourth *Alternative Site* in federal NEPA analyses by the NRC, U.S. Army Corps of Engineers, and/or USEPA.

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 9.3-15.

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
- Martin's Creek

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, 2011), 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

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 9.3-5 contains a location map showing a 6 mi (9.7 km) radius surrounding the BBNPP site. Figure 9.3-16 provides an aerial photograph of the BBNPP site and immediate vicinity. Also shown on Figure 9.3-16 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. In order to allow comparison to the *Alternative Sites*, an area within the BBNPP property encompassing the power block and adjacent facilities and structures of approximately 420 acres (170 ha) is referred to throughout this section as the BBNPP site (see Figure 9.3-5). 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 project involves substantial land alteration with a total area of disturbance of approximately 687 ac (278 ha). Table 2.2-1 provides pre- and post-construction land use changes and acreages.

The BBNPP property 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 BBNPP 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 BBNPP 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 more 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 project boundary for about 2 mi (3.2 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 BBNPP 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 825 ft (251m) south of the BBNPP Intake Structure. The lowest 7-day average flow in a 10-year period (7Q10) for the period of record (1902 to 2010) 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 542 MGD (2,052 mld) (USGS, 2011a). 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 SMALL.

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 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)

Fourteen 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), two amphibians (northern cricket frog and eastern spadefoot); and two insects (the Mulberry Wing butterfly and the Baltimore Checkerspot butterfly.). (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 and 2010 terrestrial faunal surveys or reported in previous studies (ER Section 2.4.1).

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 small-footed 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.

A total of five potentially important rare reptiles or amphibians have ranges that include Luzerne County (eastern spadefoot, redbelly turtle, timber rattlesnake, eastern hognose snake, and northern cricket frog). Only the northern cricket frog has been documented to occur at the BBNPP site. The other four species are 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 Mullberry Wing butterfly or Baltimore Checkerspot butterfly was located 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, and 2010. 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 signs (tracks and scat) have been located on the BBNPP site and several bears have been observed, but the 234 ac (94.5 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 site, 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, Unnamed Tributary 5, North Branch Canal and adjacent water bodies, and offsite in the Susquehanna River and Unnamed Tributaries 3 and 4, 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. One unusual species occurence in the Canal Outlet was the collection of a single brook stickleback. The species is currently considered a candidate species in Pennsylvania. No previous occurrences of the brook stickleback are known from water bodies in the vicinity of BBNPP, and this observation likely represents an introduction through human action. A more detailed discussion of brook stickleback is provided in Section 2.4.2.1.3. 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 BBNPP 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 with the exception of one brook stickleback which is considered a candidate species in Pennsylvania (Normandeau Associates, Inc. 2010). 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 rare by the Pennsylvania Fish and Boat Commission (PFBC, 2011), 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 site. 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 BBNPP 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.

Nineteen of the 46 protected wetland and aquatic plant species listed in Table 9.3-19 could occur on the BBNPP site due to the presence of potentially suitable habitat. However, none of these species has been documented from the site during previous studies and their occurrence is considered unlikely. *Alopecurus aequalis, Bidens discoidea, Cyperus diandrus, Dryopteris clintoniana, Eurybia radula, Gaultheria hispida, Goodyera repens, Lonicera hirsuta, Muhlenberghia uniflora, Platanthera blephaglottis, Platanthera ciliaris, Poa languida, Poa paludigena, Polemonium vanbruntiae, Ribes lacustre,* and *Stellaria borealis* are non-aquatic wetland plants that could occur in emergent and forested wetlands or along streambanks within the BBNPP site. *Ranunculus aquatilis* variety *diffusus*, *Utricularia cornuta,* and *Orontium aquaticum* are aquatic species that could occur in streams on the BBNPP site; however, *Orontium aquaticum* is now known to be much more common in Pennsylvania and has been recommended for removal from the state list (Morris Arboretum, 2010). Because these species have not been documented from the BBNPP site and it is considered unlikely that any would occur there, any impacts from construction of the BBNPP to state- or federal-listed wetland and aquatic species would likely be SMALL. No further impact to aquatic or wetland habitats or associated species onsite would be expected during operation.

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)

Detailed archaeological and historical surveys of the BBNPP site and associated onsite transmission corridors supporting BBNPP have been conducted. The cultural resources investigations consisted of Phase 1a reconnaissance, three separate Phase 1b surveys, and Phase II National Register site evaluations of the proposed project area between June 2007 and August 2011. Information on the survey findings are provided in ER Section 2.5.3.

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.

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 site 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 9.3-6 provides a location map showing a 6 mi (9.7 km) radius surrounding the Montour site. Figure 9.3-17 provides an aerial photograph of the Montour site and immediate vicinity. Also shown on Figure 9.3-17 are the FEMA 100 and 500 year floodplains (FEMA, 2008), mapped NWI wetlands (USFWS, 2009a), 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 approximately 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 approximately 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.

Cumulative Impacts

The assessment of land use impacts during construction and operation of the proposed new unit at the Montour site also considered other past, present, and reasonably foreseeable future actions that could impact land use in the region, including federal and non-federal projects listed in Table 9.3-23. For the purpose of evaluating the potential for cumulative land use impacts in the region, including the impacts attributable to a new unit at the Montour site, the primary geographic area of interest for the Montour site was assumed to be the area within approximately 15 mi (24 km) of the site. This geographic area of interest was selected to include the primary communities that would be affected by the proposed project if it were located at the Montour Site. This area includes Montour County, the western portion of Columbia County, the southeast portion of Lycoming County, the eastern portion of Union County, and the northern portion of Northumberland County. Key land use issues, as presented in county land use and growth management profiles, include the need to update land use plans and ordinances, the preservation of farmland and open spaces, and the improvement of transportation infrastructure (PDCED, 2005).

The most significant contributors to cumulative land use impacts in the geographic area of interest include the existing PPL Montour Power Plant (1,552 MW, coal fired, Montour County), located adjacent to the south side of the proposed Montour site, and a U.S. Gypsum Plant (wallboard manufacturing plant, Montour County) less than 1 mi (1.6 km) southwest of the proposed site. Both of these plants have current and/or proposed projects that will contribute to the cumulative land use impacts in the geographic area of interest, including a new 12-mile water pipeline to the West Branch of the Susquehanna River for the PPL Montour Power Plant (USACE, 2006a; USACE, 2007a; PPL, 2010c), and railroad track, freight shipping, and trucking improvements at the U.S. Gypsum Plant (USACE, 2007a; PA Bulletin, 2007; ARRA, 2010; Governors Center for Local Government Services, 2010; PennDOT, 2010b). Other existing energy facilities that have been in operation for a number of years that have contributed, and may continue to contribute, to cumulative land use impacts in the area include Viking Energy of Northumberland Cogeneration Plant (18 MW wood waste and solids fired power plant, Northumberland County), Cherokee Pharmaceutical Plant in Northumberland County, and Lycoming County Landfill methane to electricity project (PADEP, 2010b).

Existing and proposed local and regional roadway and rail infrastructure projects, as well as water and wastewater infrastructure improvements projects, have contributed and will continue to contribute to cumulative land use impacts in the geographic area of interest. If constructed, projects such as proposed watershed improvements, restoration, and flood control (such as the Bloomsburg Area Flood Damage Reduction Project, a flood protection project for the town of Bloomsburg which is currently in the design phase [Senator Arlen Specter, 2010a; Senator Arlen Specter, 2010b; Senator Robert P. Casey, 2010a; USEPA, 2010a]) may contribute to cumulative land use impacts in the geographic area of interest.

Past coal mining activities and associated acid mine drainage (AMD) may have contributed to cumulative land use impacts in the southeastern portion of the geographic area of interest. Ongoing and proposed Abandoned Mine Lands (AML) surface mine reclamation projects and AMD reclamation activities within the geographic area of interest may continue to contribute to cumulative land use impacts in the area. However, these AML and AMD projects are intended to reduce the land and water impacts from past mining activities in the area. Existing and future urbanization have contributed and will continue to contribute to decreases in forested areas, agricultural land, and undeveloped lands in the geographic area of interest. Global climate change (GCC) may also contribute to cumulative impacts in the geographic area of interest including a projected reduction in hardwood tree species, habitat for resident and migratory birds, agricultural crop yields, and livestock productivity (Union of Concerned Scientists, 2008).

Construction and operation of the proposed new unit at the Montour site will contribute to land use impacts in the geographic area of interest through the use of conversion of existing forest and farmland, including prime farmland.

Based on the review and analysis of impacts on land use of the proposed new unit at the Montour site, as well as the projected cumulative impacts from past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the site, the cumulative land use impacts have been evaluated and determined to be MODERATE. The incremental contribution from construction of the proposed new unit at this site on cumulative land use impacts would be significant due to the conversion of prime farmland.

Land use impacts associated with the transmission corridors are discussed separately in Section 9.3.2.2.10.

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.

Cumulative Impacts

The assessment of air quality impacts during construction and operation of the proposed new unit at the Montour site also considered other past, present, and reasonably foreseeable future actions that could impact air quality in the region, including other federal and non-federal projects listed in Table 9.3-23. For the purpose of evaluating the potential for cumulative air quality impacts in the region, including the impacts attributable to a new unit at the Montour site, the primary geographic area of interest for the Montour site was assumed to be the area within approximately 12.5 mi (20.2 km) of the site, which includes Montour County, the western portion of Columbia County, the southeast portion of Lycoming County, the eastern portion of Union County, and the northern portion of Northumberland County. Because of the inherently low air emissions that will be associated with the construction and operation of the new unit, it is expected that the emissions would not be noticed, nor would they destabilize air quality within this relatively small area. It is noted that the air quality attainment status for Montour County, as designated by USEPA, reflects the effects of past and present emissions from all existing pollutant sources in the region. Montour County and the counties that surround it are in attainment of all National Ambient Air Quality Standards (USEPA, 2011f).

Taking into account the existing and proposed projects listed and described in Table 9.3-23, it is noted that the largest industrial facilities within 5 mi (8.1 km) of the Montour site include PPL's Montour Power Plant (1,552 MW, coal fired, Montour County), located to the south of the proposed Montour site, and the U.S. Gypsum Plant, a minor source of emissions located adjacent to the Montour Power Plant. The next closest facility is the existing Cherokee Pharmaceutical Plant in Northumberland County, which is located approximately 9 mi (14.5 km) south of the Montour site. There are no other industrial facilities within 12.5 mi (20.2 km) of the Montour site. Since these three facilities have been in operation for a number of years, their emissions are already included in the baseline air quality for the region that has been used to classify the area as attainment. The air emissions from the coal-fired Montour Power

Plant are substantial and significantly greater than the emissions from the proposed new unit or from the other facilities in the region surrounding the Montour site. Based on the close proximity of the Montour site to the coal-fired Montour Power Plant, the air quality in the vicinity of the site is expected to be significantly influenced by the emissions from the existing Montour Power Plant. There will be a cumulative impact of emissions from the construction and operation of the proposed new unit at the Montour site and the emissions from the existing facilities as described above. However, the inherently low emissions from the new unit will not be noticeable, nor will they have a destabilizing effect on existing ambient air quality during either construction or operation when added to the existing county and regional emissions inventory.

The impacts of greenhouse gas emissions are not sensitive to the location of the source of emissions; rather, they are believed to contribute to global emissions, which have the potential to influence climate change. While national and worldwide cumulative impacts of greenhouse gas emissions are thought to occur (primarily associated with the combustion of fossil fuels), those impacts are currently considered to be noticeable but not necessarily destabilizing. The emissions of greenhouse gases from the proposed new nuclear generating unit and nuclear plants in general (primarily consisting of CO2 and lesser amounts of some precursor emissions), will be very small compared to regional emissions. It is expected that the cumulative impacts of all greenhouse gases (regionally, nationally, or globally) would continue to be noticeable but not necessarily destabilizing, with or without the addition of greenhouse gas emissions from the proposed new unit at the Montour site.

Based on the review and analysis of the air emissions from the proposed new unit at the Montour site, as well as the projected cumulative impacts from other past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the Montour site, the impact on ambient air quality would be SMALL for criteria pollutants, and SMALL to MODERATE for greenhouse gas emissions. However, the incremental contribution to the local and regional impacts on air quality resources due to the construction and operation of the new unit at the Montour site would be insignificant for both criteria pollutants and greenhouse gas emissions.

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. The segment of the river in which the Montour site water intake/discharge will be located is identified as part of Drainage List L (§ 93.9l - Main Stem) of the West Branch of the Susquehanna River 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 (1941 to 2010) 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 446 MGD (1,688 mld) (USGS, 2011b). 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.

The intake and discharge structures for the Montour site are expected to be similar to those utilized for the existing Montour Power Plant. They consist of a perforated intake pipe extending laterally across a portion of the river and a diffuser pipe discharge also extending into the river. The existing pumping structure is conspicuously elevated based upon local flooding experience.

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 approximately 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. 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.

Cumulative Impacts

For the cumulative analysis of impacts on surface water, the geographic area of interest for the Montour site is the West Branch Susquehanna River subbasin (Figure 2.3-1), which is upstream and downstream of the site location. This area will include the withdrawal and discharge location, and is the primary area where the proposed new unit could contribute to a cumulative effect on surface waters. This geographic area of interest includes the Upper West Branch Susquehanna watershed, HUC 02050201; Sinnemahoning Creek watershed, HUC 02050202; Middle Branch Susquehanna watershed, HUC 02050203; Bald Eagle Creek watershed, HUC 02050204; Pine Creek watershed, HUC 02050205; and the Lower West Branch Susquehanna watershed, HUC 02050106. The Lower Susquehanna River subbasin was also considered for this analysis. However, estimated 7Q10 on the West Branch Susquehanna River at Lewisburg near the proposed Montour site is less than half (approximately 32 percent) of the estimated 7Q10 flow on the Susquehanna River at Sunbury and thus consumptive use impacts would be minor in the lower watershed (USGS, 2009g and USGS, 2010b). Regulatory and permitting requirements would provide mitigation for the consumptive use. For water quality impacts, the area of interest also includes downstream waters as strategies to protect the Chesapeake Bay could impact the permits that would be required for the proposed facility.

Key actions that have past, current, and reasonably foreseeable potential future impacts to water use/supply and water quality in the geographic area of interest include: the operation of upstream reservoirs; the 3 MGD [11 mld] water diversion in the City of Dubois, Pennsylvania; and the operation of power generation facilities, including the Montour Power Plant and

Shawville Generating Station. Mining is also an essential activity within the West Branch Susquehanna River subbasin, and primary impacts are related to AMD and reclamation activities. Other key actions include two planned fossil fuel power plants within the Susquehanna River Basin (SRBC, 2008a), as well as other municipal and industrial activities in the West Branch Susquehanna River subbasin including water supply and wastewater treatment and disposal. Natural gas well development is an additional action that has present and reasonably foreseeable future relevance to the Susquehanna River Basin and has been included in this cumulative analysis. The impact of other projects listed in Table 9.3-23 were considered in this analysis but would have little or no impact on water use or water quality.

For the cumulative analysis of impacts on groundwater, the geographic area of interest is the extent of the groundwater aquifers, including the glacial overburden aquifer and the shale bedrock aquifer, in the vicinity of the proposed Montour site.

Water Use

Surface water use impacts from construction and operation of a proposed new unit at the Montour site would be primarily attributed to the demands that would occur during normal operation of the unit; minimal impacts would occur from construction of the unit. Construction impacts would be minimal since the water requirements for construction are limited to smaller uses such as hydrostatic testing and dust control. Uses above threshold minimums would require a permit.

The consumptive water use of the proposed new unit at the Montour Site would be approximately 28 MGD [106 mld], which would be the maximum consumptive use. This value represents approximately 6 percent of the 7Q10 flow at the nearest downstream USGS stream gage in Lewisburg, PA where the 7Q10 is estimated at 446 MGD [1,688 mld] (USGS, 2011b). This low flow value reflects the cumulative consumptive use of current users upstream of the Montour site's withdrawal.

There is a potential for climate change to have an impact on water availability in the Susquehanna River Basin, and the SRBC has considered this in its Comprehensive Plan for Water Resources of the Susquehanna River (SRBC, 2008b). The impacts from climate change would be similar for all of the alternative sites and would not distinguish between alternatives.

Increases in consumptive use are anticipated in the future as a result of population growth, municipal demands, industry, agriculture, and power generating facilities, including new facilities, within the West Branch Susquehanna River. A cumulative analysis of consumptive use in the West Branch Susquehanna River subbasin was completed as part of the SRBC Mitigation Plan (SRBC, 2008b). The objective of the SRBC's Mitigation Plan was to quantify existing and future consumptive uses within the Susquehanna River Basin and develop a mitigation strategy based on the elimination of manmade impacts caused by consumptive water use during low flows. The plan identifies mitigation strategies to return and maintain rivers in the basin to natural flow conditions, including water storage projects to mitigate for uses during low flow conditions.

The Mitigation Plan identified a total of 112.1 MGD [424.3 mld] of total consumptive uses in the West Branch Susquehanna River subbasin by 2025, with 17 MGD [64 mld] of that volume being from new power generating facilities (SRBC, 2008b). This volume is less than the consumptive use associated with a new unit at the Montour site, suggesting that the consumptive use for the Montour site was likely not identified during the development of this plan. Consequently, the plan and strategies set forth by this plan would need to be modified for this alternative. The regulations governing the SRBC require mitigation for projects which exceed consumptive use thresholds, which would include the Montour site. This project-specific mitigation can include low flow mitigation, surface storage, monetary payments, and other alternatives approved by the SRBC.

Three of the alternative sites occur within the Susquehanna River Basin, and will be required to adhere to the use regulations and planning of the SRBC outlined in its Mitigation Plan. The application of the SRBC's regulations, planning and measures to mitigate consumptive use will minimize the cumulative impact of past, present and reasonably foreseeable future water use within the Susquehanna River Basin.

Given the identified level of existing and future consumptive uses within the West Branch Susquehanna River subbasin, past, present, and future projects in the area of interest could result in a noticeable cumulative impact on surface water use during low flow periods if mitigation does not occur for those consumptive uses. The operation of the proposed new unit at the Montour site would result in a minimal contribution to the cumulative impact of consumptive surface water use during low flow periods due to the mitigation that would be required under the SRBC's regulations.

The cumulative impact on surface water use in the Susquehanna River and the drainages within the West Branch Susquehanna River subbasin would be SMALL to MODERATE. The SRBC's required mitigation could minimize the impact of consumptive use during low flow periods to the point of returning flows to natural low flow conditions, and therefore cumulative impacts on water use would be SMALL. The impact of the proposed new unit at the Montour site would be MODERATE under the existing SRBC Mitigation Plan, but as stated above, the SRBC regulations would require mitigation. With mitigation, the impact of the proposed new unit at Montour would be SMALL.

The effect on groundwater resources would be temporary and limited to dewatering activities during construction. Groundwater use would not be required during operation. As discussed in the SRBC's Groundwater Management Plan (SRBC, 2005), the Montour site does not fall within a potentially stressed area (PSA), an area where there may be groundwater availability issues. Due to the availability of groundwater from both the glacial overburden aquifer and the shale bedrock aquifers, and the negligible impact of groundwater use from the Montour site, impact to nearby groundwater resources would be SMALL.

Water Quality

A PADEP issued NPDES permit would be required to operate a nuclear plant at the Montour site and would ensure that the discharges complied with the Clean Water Act. Point and nonpoint pollution sources have historically impacted the water quality of the drainages of the West Branch Susquehanna River subbasin upstream and downstream of the site. Currently, a number of the surface water bodies that drain to the West Branch Susquehanna River are listed as impaired by the PADEP due to their inability to support the State-identified use designations. Approximately 843 streams on the Pennsylvania 303(d) list within the West Branch Susquehanna River subbasin for water quality impairments primarily related to nutrient and pH levels, and the presence of metals (PADEP, 2010a); over 90 percent of these streams are located within the Upper and Lower West Susquehanna River watersheds. The source of impairment has been identified as agriculture and AMD (PADEP, 2010a). A TMDL will be required for all surface waters that cannot be returned to a supporting use designation. A TMDL to reduce nutrient and sediment loading to the Chesapeake Bay is under development (USEPA, 2010f).

Because the surface water quality in the vicinity of the Montour site is already impaired from past and current actions, the cumulative impact on surface water quality from other past, present, and reasonably foreseeable future projects, and potential effects of climate change, would be SMALL to MODERATE. The principal contributors to this cumulative impact characterization are other point and nonpoint pollution sources in the West Branch Susquehanna River subbasin. Past, present, and reasonably foreseeable future projects will be required to adhere to existing and future water quality regulations, including those to reduce nutrient and sediment loadings to the Chesapeake Bay. As outlined in the preceding paragraph, the Montour site will be issued NPDES discharge limits to be met through operational controls and monitoring, and the NPDES permit will address thermal impacts. Under state and federal regulations, a permit will not be issued that individually or cumulatively results in further degradation to water quality. In addition, a construction stormwater NPDES permit would be issued, and proper construction practices would be followed to minimize impacts from erosion and sedimentation, minimize the potential for a chemical spill, and provide containment in the event of a spill. Therefore, the contribution from construction and operation of the proposed new unit at the Montour site to cumulative surface water quality impacts would be SMALL.

AMD and agriculture have affected groundwater quality in portions of the Susquehanna River Basin (SRBC, 2005). During construction and operation of the Montour site, proper practices to avoid spills and provide containment in chemical storage areas minimize any potential impacts to groundwater. Appropriate stormwater management and treatment will be implemented in accordance with any permitting requirements. If any spills did occur, there would be dilution and attenuation of the spill.

Given the existing impacts to groundwater quality from past and current actions, the cumulative impacts to groundwater quality are SMALL to MODERATE. Because proper construction and operations procedures would be followed to minimize the potential for and to contain any spills, the contribution from construction and operation of the proposed new unit at the Montour site to cumulative groundwater quality impacts 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.

Although the proposed Montour site is in Montour County, the conceptual transmission corridor for the Montour site would extend across Montour County, Pennsylvania and into Columbia County, Pennsylvania. The water makeup and blowdown lines would extend across Montour County and into the West Branch Susquehanna River in Northumberland County, Pennsylvania. Table 9.3-1 (Pennsylvania Natural Heritage Program [PNHP], 2009a; PNHP, 2009c; PNHP, 2009d; PNHP, 2011b) provides a list of federally listed and state-listed threatened and endangered terrestrial species known to occur in Montour County, Pennsylvania. Table 9.3-15 (PNHP, 2010a; PNHP, 2009d) provides a list of federally- and state listed threatened and endangered species known to occur in Columbia County, Pennsylvania. Table 9.3-5 (PNHP, 2009d; PNHP, 2009i; PNHP, 2009k; PNHP, 2011c) provides a list of federally- and state-listed threatened and endangered species known to occur in Northumberland 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, 2008a). 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 17 state- or federally-protected species listed in Montour and Columbia Counties. Table 9.3-16 provides information on habitat requirements and potential for occurrence of these species along the conceptual transmission corridor in Montour County. Table 9.3-17 provides this information for Columbia County. The transmission lines would be co-located to the extent possible with existing transmission lines to minimize the amount of clearing associated with construction. There would be 0.7 mile of new transmission line/corridor constructed to connect to 15.5 miles of existing transmission line/corridor that would be expanded. 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. Even though the number of state- and federally-protected species that may be encountered along the conceptual Montour transmission line is substantial (17 potential species), much of the route is through agricultural land and the amount of potentially suitable habitat for protected species is limited. Of the 17 listed species, 4 species would be unlikely to occur due to lack of specific habitat requirements. Therefore, any impacts to state- or federally-protected species along the Montour transmission line corridor would be SMALL.

There are 28 state- or federally-protected species listed in Montour and Northumberland Counties. Table 9.3-16 provides information on habitat requirements and potential for occurrence of these species along the conceptual water line corridor in Montour County. Table 9.3-18 provides this information for Northumberland County. Of these 28 listed species, 15 species would be unlikely to occur due to lack of specific habitat requirements. There would be a greater potential for impacts along the conceptual water line corridor than the conceptual transmission corridor due to greater ground disturbance, but impacts 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. Even though the number of state- and federally-protected species that may be encountered along the conceptual Montour water line corridor is substantial (13 potential species), the water line would be co-located with or near an existing water line for most of the route and would be placed in previously disturbed areas. Therefore, any impacts to state- or federally-protected species along the conceptual Montour water line corridor would be SMALL.

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. The Indiana bat and the protected avian species could occur along the conceptual 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.

Cumulative Impacts

Construction and operation of the proposed new nuclear unit at the Montour site and the associated offsite water and electrical transmission lines could contribute to the effect of other past, present, and reasonably foreseeable future activities within the region. The projects listed in Table 9.3-23 with potential for land-disturbance and potential for interaction with the proposed Montour facility to produce subsequent cumulative impacts to terrestrial ecology are considered the relevant projects for the Montour site cumulative impacts analysis.

For the cumulative analysis of potential impacts to terrestrial resources, the geographic area of interest includes projects within 50 miles of the Montour site that also are within the Anthracite Upland and Susquehanna Lowlands Sections of the Ridge and Valley Physiographic Province (Pennsylvania Department of Conservation and Natural Resources Geological Survey [PA Geologic Survey], 2000). Projects within 50 miles of the Montour site but outside these physiographic areas and projects more than 50 miles from the Montour site and within these physiographic areas would be unlikely to have impacts that could interact with impacts from construction and operation of the Montour facility. The geographic area of interest is expected to encompass the ecologically relevant landscape features and species. The geographic area of interest consists of primarily agricultural croplands, pasture, forests, and some mined land. The Montour site is within the Susquehanna Lowlands Section of the Ridge and Valley Province (PA Geologic Survey, 2010a). The Montour site primarily consists of pastures and old fields, with two wooded riparian corridors.

The Susquehanna Lowlands Section extends generally to the southwest from the area of the Montour site and comprises many small communities and small agricultural operations. Farming was and is the primary land use within this Section. Row crop, hay, livestock, and dairy operations occur through the Susquehanna lowlands. Persons employed in business or industry typically commute to larger urban centers to the east or southeast (PA Geologic Survey, 2010a). The Anthracite Valley Section extends into the Susquehanna Lowlands Section from the northeast and lies north and east of the Montour site. The Anthracite Valley Section contains urban centers, including the Scranton/Wilkes-Barre metropolitan area, and follows the Susquehanna River. That portion of the Anthracite Valley Section is west of Wilkes-Barre and has been the site of much historical coal mining. Mining, forested land, and urban centers are the primary land uses, but there are agricultural lands interspersed (PA Geologic Survey, 2010b).

The direct and indirect effects of coal mining have influenced the terrestrial ecology of the geographic area of interest. Remedial work has corrected some of the past damage but miningrelated environmental impacts will likely persist into the future (Edmunds, 2002; Commonwealth of Pennsylvania, 2008a). Much of the northern and western part of the geographic area of interest was cleared of forest and converted to agricultural production, resulting in loss and fragmentation of forest and wetland habitat. Construction of farm or livestock ponds caused areas to be inundated, further eliminating terrestrial habitat when wetland areas were filled or drained and converted to cropland. These past actions may incrementally interact with construction and operation of the proposed new unit at the Montour site and its associated transmission and water lines to create cumulative impacts to terrestrial ecology. Table 9.3-23 identifies past actions in the geographic area of interest that may combine with construction and operation of the proposed new unit at the Montour site and its associated transmission and water lines to create cumulative impacts to terrestrial ecology, generally through incremental loss or degradation of habitat or through increased fragmentation. Table 9.3-23 also identifies current and reasonably foreseeable future projects in the geographic area of interest that may contribute to cumulative impacts to terrestrial ecology. These projects are discussed below.

There are 17 other electrical power generation facilities identified for the geographic area of interest, 12 constructed in the past, 4 that would be constructed concurrent with the development of the Montour site, and 1 planned for future development. Two landfill sites are proposed for methane capture projects that could include onsite power generation. Each of the existing projects has associated transmission corridors and, with the exception of wind farms, also have water lines. Historical, ongoing, and future land clearing associated with construction of these electric power generation facilities or the methane capture projects and any associated transmission and water lines could result in incremental reductions in terrestrial habitats. Cleared transmission corridors may result in disruption of contiguous habitat and increased habitat fragmentation. Other past actions that have contributed to loss or degradation of terrestrial and wetland habitat in the geographic area of interest include water and wastewater treatment facilities, industrial and municipal development, and residential growth.

Transportation infrastructure development has resulted in loss and fragmentation of terrestrial and wetland habitats within the geographic area of interest. The Pennsylvania Department of Transportation (PennDOT) has identified current and future improvements and additions to the transportation system within the geographic area of interest (PennDOT, 2010a). County development plans from within the geographic area of interest forecast future commercial and residential growth that will result in impacts to terrestrial habitats (Lackawanna-Luzerne Plans.com, 2011; Lycoming County Board of Commissioners, 2006; Montour County Planning Commission, 2009; Union County Board of Commissioners, 2009). Development of previously undeveloped areas will result in loss of terrestrial habitats and may result in disruption of contiguous habitat and increased habitat fragmentation.

Cumulative impacts to terrestrial resources could result from displacement of animal species. Typically, displaced animals relocate to other suitable habitat and experience limited incidental mortality that does not affect species at the population level. However, in areas where multiple projects occur in a short time span, displacement may result in overpopulation and deterioration of habitat quality that could lead to extreme population declines for plants and animals. These population-level impacts could result when incremental habitat loss forces too many animals onto remaining habitat or when habitat fragmentation creates barriers to animal movements forcing animals to concentrate in available habitat patches (The Wildlife Society, 2007).

Cumulative impacts to terrestrial ecology in the geographic area of interest from past activities have resulted in incremental habitat degradation, fragmentation, and loss. These effects can be exacerbated as additional habitat areas are further fragmented, disrupting the movement and migration of species that use terrestrial and wetland systems. The cumulative effects of these past and present actions on fragmentation and habitat degradation on the geographic area of interest are MODERATE. However, the effect of the proposed development of the Montour site and associated infrastructure on cumulative impacts to terrestrial ecology associated with past, present, and other reasonably foreseeable actions is SMALL, because of the Montour site is largely cleared and open land with little potential for further fragmentation and because of the efficacy of public policy and regulations protecting environmental resources and because of the beneficial effects from implementation of reclamation and mitigation projects throughout the geographic area of interest.

Development of the Montour site would result in removal of one of the wooded riparian corridors (East Branch Chillisquaque Creek), which could disrupt movement patterns of terrestrial animals. Transmission and water lines associated with the proposed new unit at the Montour site would be co-located with existing disturbed corridors to the extent practicable. Although the lines would cross undeveloped areas, they would do so adjacent to existing transportation or utility corridors, which would minimize the fragmentation effects. The incremental effect on habitat fragmentation of constructing and operating the proposed new unit at the Montour site with its associated transmission and water line corridors would be SMALL relative to the cumulative impacts from other past, present, and reasonably foreseeable actions.

Important species in terrestrial ecosystems were described in Section 9.3.2.2 and include protected plant species and plant species that are considered key contributors to the overall structure and ecological function of vegetation communities on and near the Montour site and the offsite water and electric transmission lines, and animal species either considered important according to rarity criteria defined in NUREG-1555 (NRC, 1999) or considered commercially or recreationally important. The projects identified in Table 9.3-23 would have the potential to interact with the proposed new unit at the Montour site and the offsite water and electric transmission lines and create cumulative impacts on important species. Mitigation and reclamation projects discussed in Table 9.3-23 would have the potential to offset some negative cumulative impacts through habitat creation and restoration. State game lands and state parks in the geographic area of interest preserve habitats that support important species, including protected plants and animals and commercially and recreationally important species and may help to minimize cumulative impacts that result from habitat loss or fragmentation.

The interaction of past and present projects has had a MODERATE impact on important terrestrial species in the geographic area of interest. Future projects would be expected to further impact important species. However, because of the presence of the numerous state game lands and state parks in the geographic area of interest that provide large blocks of contiguous habitat that would be available for displaced animals, construction and operation of the proposed new unit at the Montour site and the offsite water and electric transmission lines would be expected to have a SMALL contribution to cumulative impacts to important species in the geographic area of interest.

Cave-dwelling bat populations have begun to decline steeply in the northeastern United States and adjacent Canada because of mortality during hibernation resulting from white-nose syndrome (WNS) (U.S. Fish and Wildlife Service [USFWS], 2009b; USFWS, 2010b). Development of the Montour site and its associated transmission and water line would result in tree clearing on the site and along the transmission and water line corridors and also would result in removal of a potential flight corridor from the Montour site. These impacts would increase the potential for summer mortality of adults and subadults and would increase the potential for reduced reproduction due to potential for loss of foraging and reproductive habitat. In turn, this could make the bat populations more susceptible to collapse as a result of winter death from WNS. The impact to common and important bat species from WNS has been severe, with up to 90 percent winter mortality in populations. However, WNS is a recent occurrence and the contribution of past and present projects to the impacts of WNS in unknown. Future projects that reduce summer or winter habitat have the potential to interact with WNS to produce cumulative impacts to bat populations. Any contribution of the Montour site to cumulative impacts to common or important bat species from summer mortality would be expected to be SMALL to MODERATE, depending on hibernation locations of bats using the project area.

The Montour site is not within a concentrated migration pathway for migratory songbirds or waterfowl. Common bird species, including migratory birds, in the geographic area of interest would be at risk for collisions with structures of transmission lines. Such collisions may incrementally interact with other causes of mortality to negatively impact populations. Cumulative impacts to bird species associated with past and present projects is estimated as SMALL to MODERATE, varying among species due to species-specific habitat needs. Because stationary transmission lines pose a lesser collision threat to birds than the moving blades of wind turbines, and multiple wind power generating projects are proposed in the geographic area of interest, any contribution of the proposed new unit at the Montour site and the associated offsite electrical transmission lines to cumulative impacts to local bird species, migratory birds, and migrating raptors from collisions would be expected to be SMALL.

There are reclamation projects identified in Table 9.3-23 and mitigation projects that would be implemented for future projects as requirements of permitting that would have the potential to offset some negative cumulative impacts through habitat creation and restoration and can reestablish historical migration pathways. Potential beneficial cumulative impacts may result from these actions through replacement of lost ecosystem services or these restoration and mitigation projects may help to offset negative cumulative impacts from future development. Preserved areas on state game lands and state parks may serve as refugia that could minimize some of the cumulative impacts that would result from habitat loss or clearing.

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 BBNPP Intake Structure. According to the EDR database, there are wetlands located within 0.5 mi (0.8 km) of the Montour site. Table 9.3-12, Table 9.3-13, and Table 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, 2009a). The Middle Branch Chillisquaque Creek flows along the southwestern boundary of the Montour Site and would not be impacted.

The former ash basin of the Mountour Coal Plant appears in some older aerial and topographic figures, including ER Figure 9.3-17, Mountour Site Vicinity Map, as a water body/lake just to the southeast of the Montour site boundary (see ER Figure 9.3-17 Legend). The former ash basin has been reclaimed, filled and reseeded, and is now a grass-covered field. There is no other water body located at the southeast corner of the proposed Montour site boundary.

It is anticipated that, while much of the supporting structure will be located onshore, the BBNPP Intake Structure 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 BBNPP 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 BBNPP 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 BBNPP 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 BBNPP 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.

BBNPP 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 BBNPP 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 1.3 ac (0.6 ha) of wetlands and 3,417 lf (1,042 m) of stream, including the East Branch Chillisquaque Creek, Chillisquaque Creek, County Line Branch, Beaver Run, and Warrior Run (Table 9.3-12 and Table 9.3-14). New/expanded transmission line corridor, described in ER Section 9.3.2.2.10, may impact an additional 4.1 ac (1.6 ha) of wetlands and 2,321 lf (707.4 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. Table 9.3-12, Table 9.3-13, and Table 9.3-14 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.

As stated previously, although the proposed Montour site is in Montour County, the conceptual transmission corridor would extend across Montour County and into Columbia County. The conceptual water pipelines would extend across Montour County to the West Branch Susquehanna River in Northumberland County. Table 9.3-1 (PNHP, 2009a; PNHP, 2009c; PNHP, 2009d; PNHP, 2011b) provides a list of federally and state-listed threatened and endangered aquatic species located within Montour County, Pennsylvania. Table 9.3-15 (PNHP, 2010a; PNHP, 2009d) provides a list of federally- and state listed threatened and endangered species located within Columbia County, Pennsylvania. Table 9.3-5 (PNHP, 2009d; PNHP, 2009i; PNHP, 2009k; PNHP, 2011c) provides a list of federally- and state-listed threatened and endangered species located within Northumberland County, Pennsylvania. According to the EDR database, no federally or state-listed threatened or endangered species are located on site (EDR, 2008a); however, there are five federally- or state listed threatened or endangered plant species, including one wetland species, with potential to occur on the site (PNHP, 2011b), as identified in Table 9.3-16. No protected fully aquatic plants are known from Montour County; therefore, there would not be any impacts on protected aquatic plant species from construction of the proposed new unit at the Montour site. Because the amount of potentially suitable wetland plant habitat on the Montour site is limited, any impacts on protected wetland plant species from construction of the proposed new unit at the Montour site would be SMALL. No further impact to aquatic or wetland habitats or associated species onsite would be expected during operation.

There are 13 state- or federally-protected species that may occur in Montour and Columbia Counties along the conceptual transmission corridors that would serve the Montour site, including multiple aquatic protected species. Table 9.3-16 provides information on habitat requirements and potential for occurrence of these species along the conceptual transmission corridor in Montour County. Table 9.3-17 provides this information for Columbia County. There would be a potential for construction-related impacts on these species along the conceptual 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. 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). Trout are not stocked in streams that pass through or near the Montour site (PFBC, 2010a).

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 are 28 state- or federally-protected species that may occur in Montour and Northumberland Counties along the conceptual water line corridors that would serve the Montour site, including multiple aquatic protected species. Table 9.3-18 provides information on habitat requirements and potential for occurrence of these species along the conceptual water line corridor in Montour County. Table 9.3-18 provides this information for Northumberland County. There would be a potential for construction-related impacts on these species along the conceptual 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 conceptual water line corridor than the conceptual transmission 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 moderate (approximately 9,629 lf [2,935 m] of stream and approximately 5.6 ac [2.3 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 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.

Cumulative Impacts

Cumulative impacts to aquatic and wetland resources may result from past, present, and future actions that cause loss of habitat, alter the physical or chemical integrity of waters within aquatic and wetland habitats, alter the physical structure of aquatic or wetland habitats, or alter populations of aquatic or wetland flora and fauna. The impacts of construction and operation of the proposed new unit at the Montour site and the associated offsite water and electrical transmission lines could contribute to the effect of other past, present, and reasonably foreseeable future activities within the region. All of the projects listed in Table 9.3-23 have the potential to directly or indirectly affect aquatic or wetland flora and fauna through land or water disturbing activities, habitat alternations, or discharges to waterbodies. Accordingly, they have the potential to contribute to cumulative impacts in the region.

For the cumulative analysis of potential impacts to wetland resources, the geographic area of interest is the same area defined for terrestrial resources defined in Section 9.3.2.2.4. The impacts of actions occurring outside this area would be unlikely to interact with or contribute to the impacts resulting from development of the Montour site and associated offsite water and transmission lines.

For the cumulative analysis of potential impacts to aquatic resources, the geographic area of interest is limited to the area where impacts from development of the Montour site would be likely to interact with impacts of other past, present, and future projects with regard to aquatic resources. The geographic area of interest includes the northeastern part of the Ridge and Valley Physiographic Province and includes the portion of the Anthracite Valley Section west of the City of Wilkes-Barre, the Susquehanna Lowlands Section, and the portion of the Anthracite Upland Section in the Susquehanna River Basin extending from the Shamokin Creek watershed northeast to the divide with the Delaware River Basin. Cumulative impacts to aquatic resources within the Susquehanna River would include potential cumulative impacts to the West Branch Susquehanna River from the Lycoming County Line downstream to its confluence with the North Branch Susquehanna River at Sunbury, the North Branch Susquehanna River from Wilkes-Barre downstream to its confluence with the West Branch Susquehanna River at Sunbury, and on the Susquehanna River from Sunbury downstream to the confluence of the Susquehanna River with the Juniata River. Cumulative impacts to aquatic resources would not be expected to extend into the Blue Mountain Section or the Appalachian Mountain Section of the Ridge and Valley Physiographic Province or to extend into other physiographic provinces.

Much of the northern and western part of the geographic area of interest was cleared of forest and converted to agricultural production, resulting in loss of riparian cover for water courses and increased nutrient and sediment loading to streams. Construction of farm or livestock ponds has inundated small streams and some small wetlands and has created barriers to the movement of aquatic organisms, further altering aquatic habitat. These past actions may incrementally add to the impacts from construction and operation of the proposed new unit at the Montour Site and the offsite water and transmission lines to create cumulative impacts to aquatic ecology.

In addition to dams, coal mining, and agriculture, past actions in the geographic area of interest have contributed to cumulative impacts to aquatic ecology, generally through incremental loss or degradation of habitat, and are identified in Table 9.3-23. Table 9.3-23 also identifies current and reasonably foreseeable future projects in the geographic area of interest that may contribute to cumulative impacts to aquatic ecology. These projects are discussed below.

There are 17 other electrical power generation facilities identified for the geographic area of interest, 12 constructed in the past, 4 that would be constructed concurrent with the proposed new unit at the Montour Site and the offsite water and transmission lines, and 1 planned for future development. In addition, two landfill sites are proposed for methane capture projects that could include onsite power generation. Each of these projects would have associated transmission corridors and the 13 combustion facilities would have associated water lines. The four wind-powered facilities would not be served by water lines and would not be expected to contribute to cumulative impacts on aquatic ecology except for minor contributions along transmission corridors. Historical, ongoing, and future land clearing associated with construction of these facilities and any associated transmission and water lines could result in incremental impacts to aquatic habitats through removal of riparian vegetation that could cause an increase in water temperature; increased siltation/sedimentation from disturbed soils; increased levels of nitrogen or phosphorus from agricultural operations or wastewater discharges; increased water temperature from discharge of heated water;

incidental spills of fuels or fluids from construction equipment; and blockage of migration pathways. Other past actions that have contributed to loss or degradation of aquatic habitat in the geographic area of interest include water and wastewater treatment facilities, industrial and municipal development, transportation infrastructure improvements, and residential growth. County development plans from within the geographic area of interest project future commercial and residential growth that will result in impacts to aquatic habitats (Lackawanna-Luzerne Counties Planning Committee, 2010; Lycoming County Board of Commissioners, 2006; Montour County Planning Commission, 2009; Union County Board of Commissioners, 2009). Development of previously undeveloped areas will result in loss of aquatic habitats and deterioration of habitat quality. Cumulative impacts to aquatic ecology resources could result when incremental habitat loss forces too many animals onto remaining habitat or when habitat fragmentation creates barriers to animal movements forcing animals to concentrate in available habitat patches (The Wildlife Society, 2007).

Stream and wetland restoration projects identified in Table 9.3-23, and stream and wetland mitigation that may be required through the Clean Water Act permitting process for future projects could result in restoration or creation of stream habitats within the geographic area of interest and can re-establish historical migration pathways. Potential beneficial cumulative impacts may result from these actions through replacement of lost ecosystem services and/or these restoration and mitigation projects may help to offset negative cumulative impacts from future development. State game lands and state parks preserve generally large and contiguous areas of natural watersheds and these preserved areas may serve as refugia that could minimize some of the cumulative impacts that would result from habitat loss or clearing.

The combined effects of past and present projects have resulted in substantial degradation of aquatic and wetland resources in the geographic area of interest as a result of incremental habitat degradation, habitat alteration, and habitat loss. This degradation can be exacerbated by the effects of future projects. Primary causes of past impacts to aquatic ecology have been loss of riparian habitat, nutrient inputs from agricultural operations, siltation and sedimentation from land clearing and agriculture, and construction of mill, canal, and hydropower dams. The cumulative effect of these past and present actions is MODERATE to LARGE, depending on the degree of development within a given watershed. However, the potential for the impacts of future projects, including construction of the proposed new unit at the Montour site, to further contribute to cumulative impacts to aquatic ecology is SMALL, because of the efficacy of public policy and regulations protecting environmental resources and the implementation of reclamation and mitigation projects throughout the geographic area of interest.

The greatest potential for increased interaction of impacts from current and future projects with the impacts of past projects to create cumulative impacts to aquatic resources is through increased thermal and chemical changes to the West Branch Susquehanna River as a result of discharges of cooling and blowdown water. The impacts of past and current projects on the aquatic resources of the West Branch Susquehanna River have resulted in degradation of its habitats. These impacts can be exacerbated if there are further chemical or thermal changes. There are two major stream inflows downstream of the proposed discharge site for the proposed new unit at the Montour site. The inflow of water from Buffalo Creek and Muddy Run, along with inflow from multiple smaller streams downstream of the discharge location for the proposed new unit at the Montour site, would dilute the effects to aquatic ecology from thermal and chemical loading from the discharge of cooling and blowdown water. In addition, the West Branch Susquehanna River confluence with the North Branch Susquehanna

River is approximately 15.2 miles (24.5 km) downstream of the proposed discharge location. In the geographic area of interest, no further noticeable effects to aquatic ecology from the thermal and chemical loading resulting from the discharge of cooling and blowdown water would be expected below this confluence. Impacts to the West Branch Susquehanna River from chemical and thermal loading such as discharge of cooling blowdown water from the proposed new unit at the Montour site would be SMALL.

Construction of the proposed new unit at the Montour site would eliminate a small stream's headwaters that occur onsite. The incremental loss of this small stream would not contribute greatly to the potential for cumulative impacts to aquatic ecology in the geographic area of interest and any contribution to cumulative impacts on aquatic ecology would be SMALL.

The potential for impacts from development of the Montour site to further contribute to cumulative impacts to aquatic resources in the immediate vicinity of the proposed site would be limited. Onsite post-construction stormwater systems would minimize the potential for increased sediment and turbidity resulting from construction activities to reach nearby streams. Any contribution to cumulative impacts on aquatic ecology from construction of the proposed new unit at the Montour site would be SMALL.

Construction of the conceptual water line corridor for the proposed new unit at the Montour site would have impact on approximately 3,417 lf (1,042 m) of stream. Streams in the new corridors would experience riparian clearing and may subsequently experience water temperature increases from the greater exposure to sunlight. These streams will be maintained in as wellshaded a state as practicable to minimize the warming effect of direct sunlight. Increased turbidity from soil disturbance during construction would not be expected to contribute to cumulative impacts to aquatic resources because these impacts would be temporary and end once construction was complete. Because the water lines would be collocated with existing lines to the extent possible, the incremental impact would be minimized. The contribution of impacts from construction of the conceptual water lines for the Montour site to contribute to cumulative impacts to aquatic resources would be expected to be SMALL.

To the extent possible, the Montour site would upgrade/expand existing transmission lines. This upgrade could impact up to 2,321 lf (707.4 m) of stream within the expanded transmission corridor and could contribute to cumulative impacts to aquatic resources as a result of riparian clearing, which may cause stream water temperature to increase from the greater exposure to sunlight. These streams will be maintained in as well-shaded a state as practicable to minimize the warming effect of direct sunlight. The transmission lines would span streams and support infrastructure would be placed outside of waters to the extent practicable, which would avoid or minimize impacts to instream habitat. Therefore, little to no contribution to cumulative impacts to aquatic resources would be expected from instream habitat degradation resulting from construction of the transmission lines. Because the utility lines would be collocated with existing lines to the extent possible, the incremental impact would be minimized. The contribution of impacts from construction of the conceptual transmission lines for the Montour facility to contribute to cumulative impacts to aquatic resources would be expected to be SMALL.

Because the water lines and transmission lines would cross different waters, no interaction effects between the impacts associated with water and transmission line crossings would be expected. Impacts to water resources from operational maintenance of transmission and water lines would be minimal. Onsite post-construction stormwater systems would minimize the potential for increased sediment and turbidity reaching streams. Streams and wetlands in the rights-of-way that connect with offsite water bodies containing fish will be maintained in as wellshaded a state as practicable to minimize the warming effect of direct sunlight. Any contribution of operation of the water and transmission lines for the proposed new unit at the Montour site to cumulative impacts on aquatic ecology would be SMALL.

Aquatic and Wetland Species

The cumulative effect to protected aquatic species throughout the geographic area of interest from past, present, and foreseeable future projects is expected to be SMALL to MODERATE due to the level of historical disturbance to aquatic and wetland communities and because of efforts to avoid and mitigate for potential effects. No federal or state threatened or endangered aquatic or wetland species are historically known to be present at the Montour site. Therefore, no impacts to these species would be expected to occur from construction or operation of the proposed new unit at the Montour site and no contribution to cumulative impacts to federal or state threatened or endangered aquatic or wetland species would result from construction and operation of the new unit.

Migratory fish were severely impacted by human activities following settlement of Pennsylvania. Mill dams on tributary streams and canal dams on the Susquehanna River restricted access to much of the river in the 1800s. Four large hydroelectric dams were built on the lower Susquehanna River in the early 1900s and eliminated access to all but the lower 10 mi (16 km) of the river. Overfishing and pollution from lumbering, mining, and untreated sewage discharges also contributed to the decline of migratory fish species (Susquehanna River Anadromous Fish Restoration Cooperative [SRAFRC], 2010). Actions are being taken to restore migratory fish passages and to eliminate or reduce the impacts associated with mining, agriculture, and silviculture. Construction and operation of the proposed new unit at the Montour site and its offsite water and transmission lines would not impede fish movement. Thermal loading from cooling water discharge may make the immediate discharge area unsuitable for migratory fish species, but the West Branch Susquehanna River is wide enough that migratory fish could still move up and down the river. Historical cumulative impacts to migratory fish species in the Susquehanna River basin have been LARGE, but current and future reclamation and recovery efforts are expected to reduce these impacts to MODERATE. The potential for entrainment would be the same as discussed for BBNPP in Section 5.3.1, and any impacts from entrainment or impingement from operation of the cooling water intake system would be expected to be SMALL. Therefore, because entrainment and impingement would be the principal means of interacting with migratory fish species, any contribution of the proposed new unit at the Montour site to cumulative impacts to migratory fish species would be SMALL.

Impacts from operation of the proposed new unit at the Montour site would have the potential to interact with other past, present, and future projects and contribute to cumulative impacts to federal or state protected aquatic species through the discharge of cooling and blowdown water to the West Branch Susquehanna River. The cumulative effect to aquatic resources of past, present, and future projects contributing chemical and thermal loading to the river is expected to be MODERATE. The potential for a contribution to cumulative impacts from chemical and thermal loading to the West Branch Susquehanna River resulting from discharge of cooling blowdown water from the proposed new unit at the Montour Site would be similar to that described for the other alternatives and would not distinguish the Montour site from any of the considered alternative sites. This contribution to cumulative impacts to aquatic ecology from operation of the proposed new unit at the Montour Site would be SMALL.

Federal or state threatened or endangered aquatic species could occur along the transmission and water lines that would serve the proposed new unit at the Montour site. Because aquatic habitats that may harbor threatened or endangered aquatic species would be avoided through route selection to the extent practicable and because of the SMALL impacts expected to general aquatic resources discussed above, the potential for impacts from construction of the water and transmission lines to make incremental contributions to cumulative impacts to these protected species would be SMALL.

Operation of the water and transmission lines would not be expected to contribute to cumulative impacts to federal or state threatened or endangered aquatic species beyond the previously discussed discharges of cooling and blowdown water to the West Branch Susquehanna River.

The projects identified in Table 9.3-23 also would have the potential to interact with the proposed new unit at the Montour site and the offsite water and electrical transmission lines and create cumulative impacts on other important aquatic species, included ecologically important and recreationally or economically important species. Mitigation and reclamation projects identified in Table 9.3-23 would have the potential to offset some negative cumulative impacts through habitat creation and restoration. State game lands and state parks in the geographic area of interest preserve generally large and contiguous areas of natural watersheds and may help to minimize the cumulative impacts that result from habitat loss or clearing. The most likely areas for increased interaction of current and future projects with the impacts of past projects to create cumulative impacts on important aquatic species is through increased thermal and chemical changes to aquatic habitat. The cumulative impacts of past and present projects on aquatic habitats have been MODERATE, and these impacts can be exacerbated if remaining habitat areas are further degraded or altered. Cooling tower blowdown effluent will be discharged to the West Branch Susquehanna River within the limits of an NPDES permit and, when discharged and diluted, the small amount of discharge water would have no more than SMALL impacts. The construction and operation of a new unit at the Montour site would not create any new barriers to movements of important aquatic species and any contribution to cumulative impacts on important aquatic species would be SMALL.

Wetlands

The cumulative impact to wetlands from past, present, and foreseeable future projects is expected to be MODERATE because of the magnitude of wetland losses in the past. Construction of the Montour site would not impact any wetlands, except for approximately 0.5 ac (0.2 ha) from construction of new access roadways. This loss would be mitigated as directed by requirements of the Clean Water Act Section 404 permit that would be required prior to development. With implementation of the required mitigation, any contribution of impacts from construction of the Montour facility to cumulative impacts to wetland resources, including threatened and endangered species, would be SMALL.

Operation of the proposed new unit at the Montour site would not affect wetland resources and there would be no potential for wetland impacts from operation to interact with other past, present, and future projects to contribute to cumulative impacts to federal or state threatened or endangered wetland species.

The new and upgraded/expanded transmission lines that would serve the Montour facility would impact 4.1 ac (1.6 ha) of wetlands, which would be mitigated as directed by requirements of the Clean Water Act Section 404 permit required for the work. With implementation of the required mitigation, any contribution of impacts from upgrades to transmission lines for the Montour site to cumulative impacts to wetland resources, including threatened and endangered species, would be SMALL.

Construction of the water lines that would serve the Montour facility would impact 1.3 ac (0.6 ha) of wetlands, which would be mitigated as directed by requirements of the Clean Water Act Section 404 permit required for construction. With implementation of the required mitigation, any contribution of impacts from the water lines for the Montour site to cumulative impacts to wetland resources, including threatened and endangered species, would be SMALL.

The cumulative impact to wetlands from past, present, and foreseeable future projects, including the Montour site and associated transmission and water lines, is expected to be MODERATE, however, because of the magnitude of wetland losses in the past.

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 U.S. Census Bureau (USCB, 2000c), there were a total of 497,086 housing units within a 50-mile (80km) radius of the Mountour site. Of that total, 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.

Cumulative Impacts

In addition to impacts from construction and operation of the proposed new unit at the Montour site, projected cumulative impacts from other past, present, and reasonably foreseeable future projects that may not be a part of general growth in the region were also considered. A geographic area of interest within a 50-mi (80-km) radius of the Montour site was reviewed for projects that may have potential cumulative socioeconomic impacts. Within this radius, the projects reviewed included: Intelliwatt Renewable Energy, Limited Liability Company (LLC) 13- MW biomass energy facility; Future Fuels, LLC IGCC clean coal technology facility; Mount Carmel Municipal Authority (MCMA) sewage pump station; Hazelton City Water Authority improvement plan; an Amazon warehouse; and Chesapeake Gardens manufacturing facility. The following summarizes the socioeconomic review of each of these potential future projects.

The Intelliwatt Renewable Energy, LLC 13-MW biomass energy facility is anticipated to be completed in 2011. The facility is proposed to be located in Northumberland County in the Coal Township Seedco Industrial Park, which is located approximately 10 to 15 mi (16 to 24 km) away from the Montour site. In addition to jobs created during construction of the facility, at least 32 employees would be employed at the beginning of operations and could double by the third year (The News Item, 2010a). The biomass facility would have a different construction schedule than BBNPP. Therefore, the biomass facility construction is not anticipated to impact the available workforce for the area if the proposed new unit were to be built at the Montour site. Based on the number of employees hired by the biomass facility, cumulative impacts to public services, education, and housing would not be expected to occur. Due to the distance of the Intelliwatt Renewable Energy facility from the Montour site, cumulative aesthetic impacts during operation would be minimal.

The Future Fuels, LLC 270-MW IGCC clean coal technology facility is being considered in Northumberland County in Coal Township and is located approximately 10 to 15 mi (16 to 24 km) southeast of the Montour site. The project is anticipated to employ 200 people, which would include 120 plant jobs and 80 additional roles such as delivery truck drivers. However, the current status or anticipated construction dates for this proposed facility are currently unknown (The News Item, 2010b). If both the IGCC facility and the proposed new unit at the Montour site were to have peak construction occur simultaneously, impacts to the available workforce, public services, education, and housing could occur. Due to the distance of the IGCC facility from the Montour site, cumulative aesthetic impacts during operation would be minimal.

MCMA anticipates construction of a $1.8 M sewage pump station in Northumberland County located approximately10 to 15 mi (16 to 24 km) southeast of the Montour site. Timing for construction of the facility is not currently known. The addition of the sewage pump station would have a positive impact on available sewage capacity in the area (The News Item, 2010c). Assuming the sewage pump station will not require a large workforce during construction or operation, it is not anticipated to impact the available workforce for the Montour site during construction or operation. Cumulative impacts to public services, education, housing, and aesthetics are also not expected to occur.

Hazelton City Water Authority received a $2.8 M grant to replace more than 1 mile of deteriorated water distribution mains, construct a new 88,000 gallon water storage tank, and construct new water treatment facilities. These improvements are expected to eliminate leaks and water loss while improving facility efficiency (Office of the Governor, 2009). These planned improvements are located approximately 35 to 40 mi (56 to 64 km) east-southeast of the Montour site. The project would result in an improvement to the existing water treatment system in the area. Due to the distance of this project from the Montour site, this project is not expected to impact the available workforce for the Montour site during construction or operation. Cumulative impacts to public services, education, housing, and aesthetics would also not be expected to occur.

Amazon.com is proposing to open a distribution center in the Humboldt Industrial Park located over 15 mi (24 km) west-southwest of the Montour site. The warehouse is expected to create more than 1,100 jobs within 3 years (Trade & Industry Development, 2010). Due to the different construction trades needed for this project, impact to the available workforce for the Montour site is not anticipated during construction or operation. Due to the potential number of additional employees that could migrate into the area, cumulative impacts to public services, education, and housing could occur. Cumulative aesthetic impacts would not occur.

Chesapeake Gardens, a 25,000 square-foot plant for manufacturing of soup, sauce, gravy, and frozen casseroles, is anticipated to be built in Northumberland County, Coal Township. This facility would be located 10 to 15 mi (16 to 24 km) southwest of the Montour site and is anticipated to create approximately 30 to 50 jobs within the first 18 months of being operational. The facility may move to the area sometime in 2011 or early 2012 (The News Item, 2010c). Due to the schedule of this project and the size of the anticipated workforce, the impact to the available workforce, public services, education, and housing would not be expected to occur. Cumulative aesthetic impacts would also not occur.

The remaining projects identified in Table 9.3-23 are either already operational or part of the general growth in the region. The projects within the geographic area of interest would be consistent with applicable county plans and policies. Based on the review and analysis of the impacts from construction and operation of the proposed new unit at the Montour site, as well as the projected cumulative impacts from other past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the site, cumulative socioeconomic impacts from the projects are expected to be manageable, particularly over time.

Under some circumstances, building the proposed new unit at the Montour site could make temporary, detectible, adverse cumulative impacts associated with some socioeconomic issues. They could include SMALL to MODERATE impacts including available workforce and local infrastructures and public services (recreation, housing, police, fire and medical services, and schools). The beneficial cumulative effects on regional economies and tax revenues would be beneficial and SMALL to LARGE due to annual taxes and revenue generated by the new workers contributing to the local economy and the productivity of the region. Building the proposed new unit at the Montour site in addition to other past, present, and reasonably foreseeable projects would have a SMALL cumulative impact on aesthetics. Construction and operation of the proposed new unit at the Montour site would be a significant contributor to these incremental impacts.

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.

Cumulative Impacts

The assessment of transportation impacts during construction and operation of the proposed new unit at the Montour site also considered other past, present, and reasonably foreseeable future actions within a 50-mi (80-km) radius of the Montour site that could impact transportation in the region. These projects include federal and non-federal projects and are listed in Table 9.3-23. A review of the existing and planned projects that could potentially add to the impact on transportation from the Montour site include two projects at the U.S. Gypsum Plant and two bridge replacements projects over the Susquehanna River.

The two projects at the U.S. Gypsum Plant, located approximately 1 mi (1.6 km) from the Montour site involve expanding the plant's shipping capabilities. The first project, planned freight shipping and trucking improvements, would increase the plant's railcar and truck unloading operations (PA Bulletin, 2007). The second project, an ancillary improvements project, would expand raw product receiving and finished sheetrock shipping via 26,000 feet (7,925 m) of new track and 11 switches (PennDOT, 2007, PennDOT, 2010b, USACE, 2007a). These projects would increase truck and rail traffic close to the Montour site.

There are several bridge replacement projects occurring or planned across the Susquehanna River on the river course within the state. In particular, two projects could add to transportation disruption near the Montour site—one in Mifflinville, approximately 17.5 mi (28.2 km) away (USACE, 2009e) and one in Williamsport, approximately 22.7 mi (36.5 km) away (USACE, 2009d). The replacement projects are being conducted to repair the Mifflinville Bridge spans and to address structural deficiencies in the Arch Street Bridge spans. Construction on the Mifflinville Bridge would affect I-80 traffic and the Arch Street Bridge could affect I-180 traffic. Major interstate traffic would be disrupted during these construction projects, possibly resulting in impacts to traffic around the Montour site.

There will be cumulative transportation impacts from the construction and operation of the new unit at the Montour Site and the projects described above, particularly during its construction. However, these construction impacts would be temporary. There would also be cumulative impacts to transportation during operation due to increased worker and delivery traffic.

Based on the review and analysis of impacts from transportation of the proposed new unit at the Montour site, as well as the projected cumulative impacts from other past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the Montour site, the cumulative impacts on transportation would be MODERATE during construction and SMALL during operation. However, the incremental contribution from construction and operation of the proposed new unit at the Montour site on the cumulative impacts would be SMALL.

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, 2008a; 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.

Cumulative Impacts

Cultural resources, by definition, are non-renewable. Therefore, the impact of their destruction is cumulative. The assessment of historic, cultural, and archaeological resource impacts from construction, preconstruction, and operation of the proposed new unit at the Montour site considered other past, present, and reasonably future foreseeable projects that could affect the resources in the region. Table 9.3-23 identifies other past, present, and reasonably foreseeable future projects and other actions considered in the cumulative impact analysis of the Montour site.

Projects within the geographic area of interest may have a potential cumulative impact to cultural resources if ground disturbing activities occur, or if new above-ground structures visually impact the area. For cultural resources, the geographic area of interest is based on the characteristics of the specific resource. For archaeological resources, the geographic area of interest is limited to the area where ground disturbing activities would occur. For historic buildings and structures, impacts can be physical and visual and the geographic area of interest is 5 mi (8.1 km) or less. The geographic area of interest for the conceptual transmission and water lines serving the facility is defined as 1 mi (1.6 km), 0.5 mi (0.8 km) on either side, from the center line of the corridor extending the entire length of the corridor. These lines would cross both developed and undeveloped areas. Location of these corridors is adjacent to existing transportation or utility corridors where possible, which would minimize any potential cumulative visual impacts to historic, cultural, or archaeological resources.

Based on the existing conditions and the past, present, and reasonably foreseeable future projects, the cumulative impacts from preconstruction, construction, and operation of the proposed new unit at the Montour site and from other projects would be SMALL. Similarly, the incremental contribution to local and regional impacts on cultural resources due to the construction and operation of a new unit at the Montour site and related utilities would be insignificant.

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. Figure 9.3-18 through Figure 9.3-20 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 9.3-21 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.

Cumulative Impacts

In addition to the impacts from construction and operations, the cumulative impacts analysis also considered other past, present, and reasonably foreseeable future projects that could cause environmental justice impacts on minority and low-income populations. For this cumulative impacts analysis, a geographic area of interest within the region was selected that included Montour, Northumberland, and Columbia counties within Pennsylvania.

While there are minority and low-income populations within the geographic area of interest of the Montour site, the numbers of census block groups meeting these criteria were a small percentage of the total census block groups within the geographic area of interest. Based on the location and types of past, present, and reasonably foreseeable future projects identified in Table 9.3-23, it does not appear that the projects likely did or will contribute to environmental justice impacts to the region.

Based on the review and analysis of the impacts from construction and operation of the proposed new unit at the Montour site, as well as the projected cumulative impacts from other past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the site, there would be no disproportionate and adverse cumulative impacts to minority and low-income populations in the above areas, and the environmental justice impacts would be SMALL. Construction and operation of the proposed new unit at the Montour site would not contribute additional environmental justice cumulative impacts.

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.

Cumulative Impacts

The assessment of impacts associated with transmission corridors during construction and operation of the proposed new unit at the Montour site also considered other past, present, and reasonably foreseeable future actions that could contribute to cumulative impacts associated with transmission corridors in the region, including federal and non-federal projects listed in Table 9.3-23. For the purpose of evaluating the potential for cumulative impacts in the region associated with transmission corridors, including the impacts attributable to a new unit at the Montour site, the geographic area of interest was assumed to be the area within approximately 15 mi (24 km) of the site, consistent with the geographic area of interest for analysis of land use impacts. Cumulative impacts of the transmission corridors on terrestrial ecology; aquatic ecology; and historic, cultural, and archeological resources from construction and operation of the proposed new unit at the Montour site are described in Sections 9.3.2.2.4, 9.3.2.2.5, and 9.3.2.2.8, respectively. This section focuses on land use impacts associated with the construction and operation of transmission corridors associated with the proposed new unit at the site. Cumulative impacts on land use from construction and operation of a proposed new unit at the Montour site are described in Section 9.3.2.2.1.

Land use impacts associated with construction and operation of approximately 0.7 mi (1.1 km) of new 500-kV transmission corridor and upgrade/expansion of approximately 15.5 mi (24.9 km) of existing 230-kV transmission corridor for the proposed new unit at the Montour site would add to those associated with over 75 mi (120.7 km) of existing 230- and 500-kV transmission lines within the geographic area of interest. The transmission corridors pass through land that is primarily agricultural or forest land. The areas are mostly remote, with low population densities. The longer lines cross numerous state and U.S. highways. The impact of these transmission corridors on land usage is minimal; farmlands that have corridors passing through them generally continue to be used as farmland (PPL, 2006). Upgrades to or expansion of an existing transmission corridor would experience only minimal change. However, transmission corridors passing through previously undisturbed forest land would result in forest fragmentation..

As stated previously, operational activities within the transmission corridors may include visual inspection and appropriate vegetation maintenance of transmission line ROWs. Impacts associated with operational activities are expected to be minimal because the initial forest/ vegetation clearing/trimming would have occurred during construction activities and operational activities would only maintain and promote previously established vegetation status.

There are no known future energy-related projects that could contribute to cumulative transmission corridor impacts within the geographic area of interest.

Based on the review and analysis of the impacts from the proposed new unit at the Montour site, as well as the projected cumulative impacts from other past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the Montour site, the cumulative impacts on land use of the transmission corridors would be SMALL to MODERATE. However, construction and operation of transmission corridors associated with the proposed new unit at the Montour site would only provide a SMALL incremental contribution to the cumulative impacts on land use from the transmission corridors within the geographic area of interest.

9.3.2.2.11 Nonradiological Health Impacts

The analysis of nonradiological health impacts to members of the public and site workers for the Montour site includes construction-related activities for the proposed new 1,600 MWe nuclear unit and its associated structures and facilities, as well as routine operation of the plant when it is complete. The analysis also considers other past, present, and reasonably foreseeable future actions that could impact nonradiological health, including other federal and non-federal projects, and those projects listed in Table 9.3-23 and shown in Figure 9.3-35 within the geographic area of interest. The construction-related activities that have the potential to impact the health of members of the public and workers at the site include exposure to dust and vehicle exhaust, occupational injuries, noise, and the transport of construction materials and personnel to and from the site. The operation-related activities that have the potential to impact the health of members of the public and workers at the site includes exposure to etiological agents such as noise, EMFs, and impacts from the transport of workers to and from the site. For the analysis of nonradiological health impacts at the Montour site, the geographic area of interest is considered to include projects within a 5 mi (8.1 km) radius of the site center based on the localized nature of the impacts. For impacts associated with transmission lines and other utility corridors (i.e., water and wastewater), the geographic area of interest would typically be limited to corridor rights of way and the areas immediately adjacent to them.

Construction Impacts

Nonradiological health impacts to construction workers and members of the public attributable to the construction of a new nuclear unit at the Montour site would be similar to those evaluated in Section 4.7, Nonradiological Health Impacts, for the BBNPP site. The impacts include noise, vehicle exhaust, dust, occupational injuries, and transportation accidents, injuries, and fatalities. Applicable federal and state regulations on air quality and noise would be complied with during the site preparation and construction phase. The incidence of construction worker accidents would not be expected to differ from the incidence of accidents estimated for the BBNPP site.

The Montour site is located in a rural area and construction impacts on the surrounding populations are expected to be minimal and typical of other large construction projects. Access routes to the site for construction workers would include I-80, which is approximately 6.5 mi (10.5 km) south of the site and I-180, which is approximately 8 mi (12.9 km) west of the site. Local 2-lane roads would be used to provide access from I-80 and I-180 to the site and from areas to the north and east. As described in ER Section 4.4.1.5, Transportation Routes, for the BBNPP site, local 2-lane roads may become more congested during peak construction-related activities and mitigation may be necessary to ease congestion, thereby improving traffic flow and reducing nonradiological health impacts (e.g., traffic accidents, injuries, and fatalities) during the construction period.

No past or current actions in the geographic areas of interest were identified that would be expected to significantly impact the public or workers. The only existing major industrial facilities within 5 mi (8.1 km) of the Montour site are a US Gypsum wallboard production facility (where some minor improvements for truck and rail access are planned) and the existing Montour 1,550 MWe coal-fired power plant, which is adjacent to the Montour site. The US Gypsum facility recycles gypsum scrubber waste from the adjacent PPL Montour Power Plant to produce wallboard, thus avoiding the need to landfill the waste material. The development of the Montour site would result in additional traffic and air emissions in the area, but the increase above existing levels is not expected to be substantial, except during peak construction periods. Proposed future actions would also include general transmission line development and/or upgrading in the region, and future urbanization associated with population growth, both of which would occur throughout the designated geographical areas of interest. These actions would be expected to result in nonradiological health impacts similar to those discussed above for the construction of a nuclear unit and associated facilities at the Montour site.

Operational Impacts

Nonradiological health impacts to site workers and members of the public attributable to the operation of a nuclear unit at the Montour site would be similar to those evaluated in Section 5.8, Socioeconomic Impacts, for the BBNPP site. Occupational health impacts to workers (e.g., falls, electric shock or exposure to other hazards) at the Montour site would be expected to be the same as those evaluated for workers at the new unit at the BBNPP site. Based on the configuration of the proposed new unit at the Montour site (closed-cycle, wet cooling system with mechanical draft cooling towers), etiological agents would not likely increase the incidence of water-borne diseases in the vicinity of the site. Noise and EMF exposure would be monitored and controlled in accordance with applicable Occupational Safety and Health Administration (OSHA) regulations. Effects of EMF on human health would be controlled and minimized by conformance with National Electrical Safety Code (NESC) criteria. Nonradiological impacts of traffic associated with the operations workforce can be expected to be less than the impacts during construction. Mitigation measures taken during construction to improve traffic flow would also be expected to minimize traffic impacts during operation of a new unit. Mitigation measures used during the operational phase would likely be similar to those described in Section 5.10, Measures and Controls to Limit Adverse Impacts During Operation, for the BBNPP site.

Past and present actions in the geographic area of interest associated with existing industrial facilities (i.e., the US Gypsum plant and the 1,550 MWe coal-fired Montour Power Plant) and existing transmission lines represent the only significant potential sources of nonradiological health impacts from operations to the public and workers. Proposed future actions that would impact nonradiological health in a similar way to operation activities at the Montour site would include regional transmission line expansions and upgrades, and future urbanization due to population growth, both of which are likely to occur within the geographical areas of interest.

The potential exists for future climate changes that could have an impact on human health. Projected changes in the climate for the region are currently based on observed cycles and fluctuations in average temperature and average precipitation, both of which are expected to increase slightly over time, based on current trends. These trending increases in temperature and precipitation could potentially alter the presence of microorganisms and parasites in surface water; however, insufficient information exists to reliably quantify any specific changes in these parameters, and there is no evidence to suggest that the operation of a nuclear generating facility at the Montour site would cause or contribute to those changes, or that there would be any significant change in the presence of etiological agents or the incidence of water-borne diseases.

Summary

The impacts of the construction and operation of a new nuclear unit at the Montour site on nonradiological health are expected to be similar to the impacts evaluated for the BBNPP site. While there are past, present, and future activities in the geographic area of interest that could affect nonradiological health in ways similar to the construction and operation of a new unit and associated facilities at the Montour site, those impacts are expected to be localized and managed through adherence to existing regulatory requirements. Therefore, the cumulative impacts of the construction and operation of a nuclear generating unit and associated facilities at the Montour site on nonradiological health would be SMALL.

9.3.2.2.12 Radiological Impacts of Normal Operations

The analysis of radiological health impacts to members of the public and site workers for the Montour site includes construction-related activities for the new 1,600 MWe nuclear unit and its associated structures and facilities, as well as routine operation of the plant once construction is complete. The analysis also considers other past, present, and reasonably foreseeable future actions that impact radiological health, including other federal and non-federal projects, and those projects listed in Table 9.3-23 within the geographic area of interest. As described in Section 9.3.2.2.1, Land Use, the Montour site is located adjacent to an existing 1,550 MWe coal-fired Montour Power Plant owned by PPL; currently, there are no nuclear facilities on or adjacent to the site. The geographic area of interest is the area within a 50 mi (80.5 km) radius of the Montour site. Existing nuclear generating facilities potentially affecting radiological health within this area are the Peach Bottom Atomic Power Station (Units 2 and 3, 95 mi [153 km] south-southeast), Three Mile Island Nuclear Generating Station (Unit 1, 65 mi [104.6 km] south), Limerick Generating Station (Units 1 and 2, 82 mi [132 km] southeast), Salem Nuclear Power Plant (Units 1 and 2, 127 mi [204.4 km] southeast), SSES (Units 1 and 2, 25 mi [40.2 km] east) and the Hope Creek Nuclear Generation Station (Unit 1, 126.7 mi [203.9 km] southeast). There are also likely to be hospitals and industrial facilities within 50 mi (80.5 km) of the Montour site that use radioactive materials.

The radiological impacts of constructing and operating a nuclear unit at the Montour site would include doses from direct radiation, and liquid and gaseous radioactive effluents. These pathways would result in low doses to people and biota offsite that would be well below regulatory limits. These impacts are expected to be similar to those estimated for the BBNPP site as described in Section 5.4, Radiological Impacts of Normal Operations.

The radiological impacts of the other operating nuclear power plants listed above also include doses from direct radiation, and liquid and gaseous radioactive effluents. These pathways result in low doses to people and biota offsite that are well below regulatory limits as demonstrated by the required ongoing radiological environmental monitoring programs (REMP) conducted around these plants. These pathways are expected to result in low doses to people and biota offsite that would be well below regulatory limits. Doses attributable to direct radiation and radioactive effluents from hospitals and industrial facilities that use radioactive materials would represent an insignificant contribution to the cumulative impact around the Montour site. This conclusion is based on data from REMPs conducted around currently operating nuclear power plants, which consistently demonstrate that radiological levels at offsite locations are well below acceptable limits at all offsite locations, as required by each facility's operating license. It is concluded that the cumulative radiological impacts from constructing and operating a proposed nuclear unit and other existing and planned projects and actions in the geographic area of interest around the Montour site would be SMALL.

9.3.2.2.13 Postulated Accidents

The analysis of postulated accidents includes accidental radiological releases during operation of a nuclear unit at the Montour site. The analysis also considers other past, present, and reasonably foreseeable future actions that impact radiological health from postulated accidents, including other federal and non-federal projects, and those projects listed in Table 9.3-23 within the geographic area of interest. As described in Section 9.3.2.2.1, Land Use, the Montour site is located north and adjacent to the existing 1,550 MWe coal-fired Montour

Power Plant owned by PPL. There are currently no nuclear facilities on the site. The geographic area of interest considers all existing and proposed nuclear power plants that have the potential to increase the probability-weighted consequences (i.e., risks) from a severe accident at any location within 50 mi (80.5 km) of the Montour site. Existing facilities potentially affecting radiological accident risk within this geographic area of interest include the existing Peach Bottom Atomic Power Station (Units 2 and 3, 95 mi [152.9 km] south-southeast), Three Mile Island Nuclear Generating Station (Unit 1, 65 mi [104.6 km] south), Limerick Generating Station (Units 1 and 2, 82 mi [132 km] southeast), Salem Nuclear Power Plant (Units 1 and 2, 127 mi [204.4 km] southeast), SSES (Units 1 and 2, 25 mi [40.2 km] east) and the Hope Creek Nuclear Generation Station (Unit 1, 126.7 mi [203.9 km] southeast). No other reactors have been proposed within the geographic area of interest or within the region that would affect accident risk in the geographic area of interest.

The environmental consequences of design basis accidents (DBAs) at the Montour site are expected to be minimal and similar to those that have been predicted for the U.S. EPR that would be built at the BBNPP site as described in Section 7.1, Design Basis Accidents. DBAs have been specifically addressed for the BBNPP site to demonstrate that the reactor design is robust enough to meet all applicable NRC safety criteria. It is also noted that the U.S. EPR design is independent of site conditions and the meteorology of the Montour and BBNPP sites are considered to be generally similar. Because the meteorology, population distribution, and land use for the Montour site are all expected to be similar to the proposed BBNPP site, risks from a severe accident for a U.S. EPR reactor located at the Montour site are expected to be similar to those analyzed for the proposed BBNPP site and described in Section 7.2, Severe Accidents. Although there are no new reactors currently planned within the geographic area of interest, any applications for new reactors would need to demonstrate that the risks would be well below NRC's regulatory requirements for safety. Based on this assessment, the cumulative risks of severe accidents at any location within 50 mi (80.5 km) of the Montour site would be SMALL.

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 9.3-7 provides a location map showing a 6-mi (9.7-km) radius surrounding the Humboldt site. Figure 9.3-22 provides an aerial photograph of the Humboldt site and the immediate vicinity. Also shown on Figure 9.3-22 are the FEMA 100- and 500-year floodplains (FEMA, 2008), mapped NWI wetlands (USFWS, 2009a), 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 approximately 420-ac (170-ha) site necessary to accommodate an EPR nuclear plant, the construction process could result in impacts on the entire approximately 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) wide, 12.5-mi (20.1-km) long ROW for the 14.3-mi (23.0-km) water pipelines would extend north from the site for approximately 2 miles crossing Black Creek, turn northwest for approximately 3 miles, and then west and north again to cross the Nescopeck Mountain Ridge. The pipeline would then parallel I-80 and Black Creek north for approximately 1.1 miles until turning northeast and ending at the Main Branch Susquehanna River, approximately 2.5 miles south of the BBNPP water intake/discharge structure. . 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.

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.

Cumulative Impacts

The assessment of land use impacts during construction and operation of the proposed new unit at the Humboldt site also considered other past, present, and reasonably foreseeable future actions that could impact land use in the region, including federal and non-federal projects listed in Table 9.3-23. This cumulative impact analysis focuses on past land use in the area that has contributed to land use impacts and land use impacts from present and future land-disturbing construction and operations activities. For the purpose of evaluating the potential for cumulative land use impacts in the region, including the impacts attributable to a new unit at the Humboldt site, the geographic area of interest was assumed to be the area within approximately 15 mi (24 km) of the site. This geographic area of interest was selected to include the primary communities that would be affected by the proposed project if it were located at the Humboldt site. This area includes southern Luzerne County, a western portion of Carbon County, a northeastern portion of Schuylkill County, and an eastern portion of Columbia County. Key land use issues, as presented in county land use and growth management profiles, include the need to update land use plans and ordinances, the preservation of farmland and open spaces, the improvement of infrastructure, and population loss (PDCED, 2005).

A major contributor to cumulative land use impacts in the geographic area of interest is past coal mining activities and associated acid mine drainage (AMD). Ongoing and proposed Abandoned Mine Lands (AML), surface mine reclamation projects (PDCED, 2011b; PDCED, 2011c), and AMD reclamation activities within the geographic area of interest identified in Table 9.3-23, including the Hazleton Acid Mine Reclamation Site (USACE, 2010g) and Sandy-Longs Run (USACE, 2011e), will continue to contribute to cumulative land use impacts in the area. However, these AML and AMD projects are intended to reduce the land and water impacts from past mining activities in the area.

Other existing projects that have contributed and may continue to contribute to cumulative land use impacts in the geographic area of interest include existing energy production facilities that have been in operation for a number of years, such as the Williams Generation facility (171.5 MW, natural gas-fired peaking facility, Luzerne County), SSES (2,451 MW, two-unit nuclear power plant, Luzerne County), Wheelabrator Frackville Energy power plant (48 MW, waste coal fired, Schuylkill County), John B. Rich Memorial Power Station (80 MW, waste coal, Schuylkill County), St. Nicholas Cogeneration Plant (99.2 MW, waste coal, Schuylkill County), Panther Creek Energy Facility (94 MW, waste coal, Carbon County), and Kline Cogeneration Facility (57.5 MW, waste coal, Schuylkill County). Existing and proposed local and regional roadway and rail projects, including the SR-424 Extension Project (Congressman Paul E. Kanjorski, 2010a; Congressman Paul E. Kanjorski, 2010b) and Susquehanna River Bridges Replacement Projects (USACE, 2009d; USACE, 2009e; Congressman Paul E. Kanjorski, 2010b) have contributed and will continue to contribute to cumulative land use impacts in the geographic area of interest. Proposed water infrastructure improvement projects, such as the Hazleton City Water Authority project to replace more than a mile of deteriorated water distribution mains, construct a new 88,000 gallon water storage tank, and construct new water treatment facilities, will also contribute to cumulative land use impacts in geographic area of interest.

Existing and future urbanization have contributed and will continue to contribute to decreases in forested areas and undeveloped lands in the geographic area of interest. GCC may also contribute to cumulative impacts in the geographic area of interest including a projected reduction in hardwood tree species, habitat for resident and migratory birds, agricultural crop yields, and livestock productivity (Union of Concerned Scientists, 2008).

Construction of the proposed new unit at the Humboldt site will contribute to land use impacts in the geographic area of interest, although a portion of the site has already been impacted by past land disturbance activities, including mining and ongoing AML reclamation activities.

Based on the review and analysis of impacts on land use from the proposed new unit at the Humboldt site, as well as the projected cumulative impacts from past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the site, the cumulative land use impacts in the geographic area of interest have been evaluated and determined to be MODERATE to LARGE. However, because of prior land disturbance at the site, the incremental contribution from construction and operation of the proposed new unit at the Humboldt site on cumulative land use impacts would be SMALL.

Land use impacts associated with the transmission corridors are discussed separately in Section 9.3.2.3.10.

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.

Cumulative Impacts

The assessment of air quality impacts during construction and operation of the proposed new unit at the Humboldt site also considered other past, present, and reasonably foreseeable future actions that could impact air quality in the region, including other federal and non-federal projects listed in Table 9.3-23. For the purpose of evaluating the potential for cumulative air quality impacts in the region, including the impacts attributable to a new unit at the Humboldt site, the primary geographic area of interest was assumed to be the area within approximately 12.5 mi (20.2 km) of the site, which includes southern Luzerne County, a western portion of Carbon County, a northeastern portion of Schuylkill County, and an eastern portion of Columbia County. Because of the inherently low air emissions that will be associated with the construction and operation of the new unit, it is expected that the emissions would not be noticed, nor would they destabilize air quality within this relatively small area. It is noted that the air quality attainment status for Luzerne County, as designated by USEPA, reflects the effects of past and present emissions from all existing pollutant sources in the region. Luzerne County and the counties that surround it are in attainment of all National Ambient Air Quality Standards (USEPA, 2011f); however, as discussed above, Luzerne County was at one time designated nonattainment for ozone, so the county is currently designated a maintenance area.

Taking into account the existing and proposed projects listed and described in Table 9.3-23, it is noted that the largest industrial facility within 5 mi (8.1 km) of the Humboldt site is the existing Williams Generation facility (171.5 MW, natural gas-fired peaking facility, Luzerne County). There are no other existing or proposed industrial facilities within 5 mi (8.1 km) of the Humboldt site that would generate emissions substantial enough to result in a noticeable impact or that would destabilize air quality in the region. It is noted that the Humboldt site is located within the Humboldt Industrial Park; however, typical tenants in the park include only commercial warehouses, food production, and light industry, all of which represent minor sources of air emissions. Within 12.5 mi (20.2 km) of the Humboldt site, major facilities include the existing SSES, a nuclear power plant with inherently low air emissions, located approximately 12.0 mi (19.4 km) northwest of the Humboldt site. The closest industrial facilities with the potential for significant air emissions are: the existing Wheelabrator Frackville Energy Power Plant (48 MW, waste coal fired, Schuylkill County) located approximately 11.5 mi (18.5 km) southwest; the existing John B. Rich Memorial Power Station (80 MW, waste coal, Schuylkill County) located approximately 11.5 km (18.5 km) southwest; the existing St. Nicholas Cogeneration Plant (99.2 MW, waste coal, Schuylkill County) located approximately 10 mi (16.1 km) southwest; the existing Panther Creek Energy Facility (94 MW, waste coal, Carbon County) located approximately 11.5 mi (18.5 km) southeast; and the existing Kline Cogeneration Facility (57.5 MW, waste coal, Schuylkill County) located approximately 5.5 mi (8.9 km) southeast. There are no other existing or proposed industrial facilities within 12.5 mi (20.2 km) of the Humboldt site that would generate noticeable ambient air quality impacts in the region surrounding the Humboldt site. Since the above described facilities are currently operational, their emissions are already included in the baseline air quality for the region that has been used to classify the area as attainment.

There will be a cumulative impact of emissions from the construction and operation of the proposed new unit at the Humboldt site and the emissions from the existing facilities as described above. However, the inherently low emissions from the new unit will not be noticeable, nor will they have a destabilizing effect on existing ambient air quality during either construction or operation when added to the existing county and regional emissions inventory.

The impacts of greenhouse gas emissions are not sensitive to the location of the source of emissions; rather, they are believed to contribute to global emissions, which have the potential to influence climate change. While national and worldwide cumulative impacts of greenhouse gas emissions are thought to occur (primarily associated with the combustion of fossil fuels), those impacts are currently considered to be noticeable but not necessarily destabilizing. The emissions of greenhouse gases from the proposed new nuclear generating unit and nuclear plants in general (primarily consisting of CO2 and lesser amounts of some precursor emissions), will be very small compared to regional emissions. It is expected that the cumulative impacts of all greenhouse gases (regionally, nationally, or globally) would continue to be noticeable but not necessarily destabilizing, with or without the addition of greenhouse gas emissions from the proposed new unit at the Humboldt site.

Based on the review and analysis of the air emissions from the proposed new unit at the Humboldt site, as well as the projected cumulative impacts from other past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the Humboldt site, the impact on ambient air quality would be SMALL for criteria pollutants, and SMALL to MODERATE for greenhouse gas emissions. However, the incremental contribution to the local and regional impacts on air quality resources due to the construction and operation of the new unit at the Humboldt site would be insignificant for both criteria pollutants and greenhouse gas emissions.

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. The segment of the river in which the Humboldt site water intake/discharge would be located 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 (1902 to 2010) 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 542 MGD (2,052 mld) (USGS, 2011a). 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.

The intake and discharge structures for the Humboldt site would probably be similar in configuration to the Bell Bend design. They would be located in the vicinity of the discharge of Nescopek Creek into the Susquehanna River. Their actual locations would be established to avoid impacting the wetlands around Nescopek Creek and to allow the least intrusive construction methodology. Conditions at the selected locations would be expected to be similar to those at the Bell Bend locations, thereby allowing the installation to be made using cofferdams and excavation, however, the actual methodology cannot be stated with assurance in the absence of specific site data.

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 north from the site for approximately 2 miles crossing Black Creek, turn northwest for approximately 3 miles, and then west and north again to cross the Nescopeck Mountain Ridge. The pipeline would then parallel I-80 and Black Creek north for approximately 1.1 miles until turning northeast and ending at the Main Branch Susquehanna River, approximately 2.5 miles south of the BBNPP water intake/discharge structure. Impacts associated with construction of the water pipelines in a 120 foot (36.6 m) wide, 12.5-mi (20.1-km) long 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 approximately 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. 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.

Cumulative Impacts

For the cumulative analysis of impacts on surface water, the geographic area of interest for the Humboldt site is the Middle Susquehanna River subbasin (Figure 2.3-1), which is upstream and downstream of the site location. This geographic area includes the withdrawal and discharge location, and is the primary area where the proposed new unit could contribute to a cumulative effect on surface waters. This geographic area of interest includes the Upper Susquehanna- Lackawanna watershed, HUC 02050107, and the Upper Susquehanna-Tunkhannock watershed, HUC 02050106. The Lower Susquehanna River subbasin was also considered for this analysis. However, estimated 7Q10 on the Susquehanna River at Wilkes-Barre near the proposed Humboldt site is less than half (approximately 39 percent) of the estimated 7Q10 flow on the Susquehanna River at Sunbury and thus consumptive use impacts would be minor in the lower watershed (USGS, 2009g and USGS, 2010a). Regulatory and permitting requirements would provide mitigation for the consumptive use. For water quality impacts, the area of interest also includes downstream waters as strategies to protect the Chesapeake Bay could impact the permits that would be required for the proposed facility.

There are several key actions that have past, current, and reasonably foreseeable potential future impacts to water use/supply and water quality in the geographic area of interest. These actions include the operation of upstream reservoirs and the operation of power generation facilities, including the SSES facility, Hunlock Power Station, Archbald Power Station, Mt. Carmel Cogeneration Facility, Viking Energy of Northumberland County, Williams Generation Plant, and the Cherokee Plant (a steam generation facility for a pharmaceutical production facility). Mining is also an essential activity within the geographic area of interest, and primary impacts are related to AMD and reclamation activities. Agriculture and land development activities in the basin that can also impact water quality. Two planned fossil fuel power plants within the Susquehanna River Basin (SRBC, 2008a) are actions that may have impacts. In addition, impacts may occur from other municipal and industrial activities in the Middle Susquehanna River subbasin including water supply and wastewater treatment and disposal. Natural gas well development is another action that has current and reasonably foreseeable future relevance to the Susquehanna River Basin and has been included in this cumulative analysis. The impact of other projects listed in Table 9.3-23 were considered in this analysis, but would have little or no impact on water use or water quality.

For the cumulative analysis of impacts on groundwater, the geographic area of interest is the extent of the groundwater aquifers, with the glacial overburden aquifer and shale bedrock aquifer being the primary aquifers, in the vicinity of the proposed Humboldt site.

This site's withdrawal and discharge location will be located in the vicinity of the proposed site (BBNPP) and, therefore, the cumulative impacts to water use and water quality would be similar.

Water Use

The surface water use impacts from construction and operation of a proposed new unit at the Humboldt site would be primarily attributed to the demands that would occur under normal operation; minimal impacts would occur from construction of the new unit. Construction impacts would be minimal since the water requirements for construction are limited to smaller uses such as hydrostatic testing and dust control. Uses above threshold minimums would require permits.

The consumptive water use of the proposed new unit at the Humboldt site would be approximately 28 MGD [106 mld], which would be the maximum consumptive use. The 7Q10 flow, which is estimated at 542 MGD [2,052 mld] at Wilkes-Barre, reflects water withdrawals and cumulative consumptive use of current users upstream of the Humboldt project (USGS, 2011a). The 28 MGD consumptive use represents approximately 5 percent of the 7Q10 flow at the Wilkes-Barre USGS stream gage.

There is potential for climate change to have an impact on water availability in the Susquehanna River Basin, and the SRBC has considered this in its Comprehensive Plan for Water Resources of the Susquehanna River Basin (SRBC, 2008b). The impacts from climate change would be similar for all of the alternative sites and would not distinguish the alternatives.

Increases in consumptive use due to population growth, municipal demands, industry, agriculture, and power generating facilities (including new facilities within the Middle Susquehanna River subbasin) are anticipated in the future. A cumulative analysis of consumptive use in the Middle Susquehanna River subbasin was completed as part of the SRBC Mitigation Plan (SRBC, 2008b). The Mitigation Plan identified a total of 225.2 MGD [852.5 mld] of total consumptive use in the Middle Susquehanna River subbasin in 2025, and 54 MGD [204 mld] of that volume would be from new power generating facilities; the proposed Humboldt site would require 52 percent of the consumptive use volume from power generating facilities (SRBC, 2008b).

The objective of the SRBC's Mitigation Plan was to quantify existing and future consumptive uses within the Susquehanna River Basin, identify future consumptive use mitigation requirements, and identify future strategies to eliminate the impact of consumptive water use during droughts. The proposed site and three Alternative Sites occur within the Susquehanna River Basin, and will be required to adhere to the use regulations and planning of the SRBC's Mitigation Plan. The application of the SRBC's regulations, planning, and measures to mitigate consumptive use will minimize the cumulative impact of past, present, and reasonably foreseeable future water use within the Susquehanna River Basin.

Given the identified level of existing and future consumptive uses within the Middle Susquehanna River subbasin, past, present, and future projects in the area of interest could result in a noticeable cumulative impact on surface water use during low flow periods if mitigation for those consumptive uses does not occur. Mitigation for the proposed Humboldt site would be required under SRBC regulations. The operation of the proposed new unit at the Humboldt site would result in a minimal contribution to the cumulative impact of consumptive surface water use during low flow periods.

The cumulative impact on surface water use in the Susquehanna River and the drainages within the Middle Susquehanna River subbasin would be SMALL to MODERATE. If the SRBC Mitigation Plan is implemented successfully and individual projects mitigate consumptive use as required in the SRBC's regulations, there is potential to minimize the impact of consumptive use during low flow periods to the point of returning flows to natural low flow conditions. Cumulative impacts on water use would then be SMALL. The impact of the proposed new unit at the Humboldt site on surface water use would be SMALL.

The effect on groundwater resources would be temporary and limited to dewatering activities during construction. Groundwater use would not be required during operation. As discussed in the SRBC's Groundwater Management Plan (SRBC, 2005), the Humboldt site does not fall within a PSA where there may be groundwater availability issues. Due to the availability of groundwater from the glacial overburden aquifer and shale bedrock aquifers, and the negligible effect of groundwater use associated with development of the Humboldt site, impact to nearby groundwater resources would be SMALL.

Water Quality

A PADEP issued NPDES permit would be required to operate a nuclear power plant at the Humboldt site and would ensure that the discharges complied with the Clean Water Act. Point and non-point pollution sources have historically impacted the water quality of the drainages of the Middle Susquehanna River subbasin upstream and downstream of the site. Currently, a number of the surface water bodies that drain to the Susquehanna River, within the Middle Susquehanna River Basin, are listed as impaired by the PADEP due to their inability to support the State-identified use designations. Approximately 260 streams within the Middle Susquehanna River subbasin are on the Pennsylvania 303(d) list for water quality impairments primarily related to siltation, pH, and metals (PADEP, 2010a). The section of the Susquehanna River from which water would be withdrawn to support the Humboldt site is listed as impaired, and a TMDL for metals was developed in 2009 (PADEP, 2009g; PADEP, 2010a). A TMDL will be required for all surface waters that cannot be returned to a supporting use designation. A TMDL to reduce nutrient and sediment loading to the Chesapeake Bay is under development (USEPA, 2010f).

Because the surface water quality in the vicinity of the Humboldt site is already impaired from past and current actions, the cumulative impact on surface water quality from other past, present, and reasonably foreseeable future projects, and potential effects of climate change, would be SMALL to MODERATE. The principal contributors to this cumulative impact characterization are other point and nonpoint pollution sources in the Middle Susquehanna River subbasin. Past, present, and reasonably foreseeable future projects will be required to adhere to existing and future water quality regulations, including those to reduce nutrient and sediment loadings to the Chesapeake Bay. As outlined in the preceding paragraph, an NPDES permit for the Humboldt site will establish discharge limits to be met through operational controls and monitoring, including thermal impacts. Under state and federal regulations, a permit would not be issued that individually or cumulatively resulted in further degradation to water quality. In addition, a construction stormwater NPDES permit would be issued, and proper construction practices would be followed to minimize impacts from erosion and sedimentation, minimize potential for a chemical spill, and provide containment in the event of a spill. Therefore, the contribution from construction and operation of the proposed new unit at the Humboldt site to cumulative surface water quality impacts would be SMALL.

AMD and agriculture have affected groundwater quality in portions of the Susquehanna River Basin (SRBC, 2005). During construction and operation of the Humboldt site, proper practices to avoid spills and provide containment in chemical storage areas minimize any potential impacts to groundwater. Appropriate stormwater management and treatment would be implemented in accordance with any permitting requirements. If any spills did occur, there would be dilution and attenuation of the spill.

Given the existing impacts to groundwater quality from past and current actions, the cumulative impacts to groundwater quality are SMALL to MODERATE. Because proper construction and operation procedures would be followed to minimize the potential for and to contain any spills, the contribution from construction and operation of the proposed new unit at the Humboldt site to cumulative groundwater quality impacts 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.

The proposed Humboldt site and its associated conceptual transmission and water line corridors would be within Luzerne County. The conceptual water intake and discharge structures would be placed in the Susquehanna River. Table 9.3-3 (PNHP, 2009d; PNHP, 2009e; PNHP, 2009g; PNHP, 2011a) 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.

As stated previously, the conceptual transmission and water lines that would serve the Humboldt site would be entirely within Luzerne County and the conceptual intake/discharge location would be on the Susquehanna River.Table 9.3-19 lists state and federally- protected species and other species of ecological importance that may occur in Luzerne County, identifies their habitat requirements, and identifies whether they could occur along the conceptual transmission and water lines that would serve the Humboldt site. Review of habitat information identified 41 protected species with potential to occur along the conceptual transmission line corridor and 34 protected species with potential to occur along the conceptual water line corridor.

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 conceptual 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. Because the number of protected species with potential to occur along the conceptual transmission and water line corridors is high, any impacts on protected species from installation of pipelines or powerlines to serve the proposed unit at the Humboldt site would be MODERATE.

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.

Cumulative Impacts

Construction and operational impacts of the proposed new nuclear unit at the Humboldt site and the associated offsite water and electrical transmission lines could contribute to the effect of other past, present, and reasonably foreseeable future activities within the region. Because of the proximity of the Humboldt site to the proposed Montour site and location within the Susquehanna River basin, the same geographic area and terrestrial resources were used in considering cumulative impacts to terrestrial ecology. The projects listed in Table 9.3-23 with potential for interaction and subsequent cumulative impacts to terrestrial ecology are considered the relevant projects for the Humboldt site alternative evaluation.

For the cumulative analysis of potential impacts to terrestrial resources, the geographic area of interest include projects within 50 miles of the Humboldt site that also are within the Anthracite Upland and Susquehanna Lowlands Sections of the Ridge and Valley Physiographic Province (Pennsylvania Department of Conservation and Natural Resources Geological Survey [PA Geologic Survey], 2000). Projects within 50 miles of the Humboldt site but outside these physiographic areas and projects more than 50 miles from the Humboldt site and within these physiographic areas would be unlikely to have impacts that could interact with impacts from construction and operation of the Humboldt facility. This geographic area of interest is expected to encompass the ecologically relevant landscape features and species. The geographic area of interest consists primarily of agricultural croplands, pasture, forests, and some mined land. The Humboldt site is within the Anthracite Upland Section of the Ridge and Valley Province (PA Geologic Survey, 2010c).

Cumulative impacts to terrestrial ecology in the geographic area of interest from past activities have resulted in incremental habitat degradation, fragmentation, and loss. These effects can be exacerbated as additional habitat areas are further fragmented, disrupting the movement and migration of species that use terrestrial and wetland systems. The cumulative effects of these past and present actions on fragmentation and habitat degradation on the geographic area of interest are MODERATE. However, the contribution of the proposed development of the proposed new unit at the Humboldt site and the associated offsite water and electrical transmission lines to cumulative impacts to terrestrial ecology associated with past, present, and other reasonably foreseeable actions is SMALL, because of the efficacy of public policy and regulations protecting environmental resources, and the beneficial effects of implementation of reclamation and mitigation projects throughout the geographic area of interest.

The proposed Humboldt site primarily consists of reclaimed mine land and heath or heath-shrub habitats. There are several emergent wetlands within the Humboldt site. Development of the Humboldt site would result in loss of a portion of a contiguous forested habitat that covers the northern portion of the site. This habitat loss would not create any new barriers to species movements because the habitat loss would be reduced from the edge of the existing habitat and would not divide the habitat. Because the habitat patch would remain contiguous, fragmentation effects would be minimal. Transmission and water lines associated with the site would be colocated with existing disturbed corridors to the extent practicable. The new lines would cross undeveloped areas, but would do so adjacent to existing transportation or utility corridors, which would minimize the fragmentation effects. The incremental effect on habitat fragmentation of constructing and operating the facility at the

Humboldt site with its associated offsite facilities would be SMALL relative to cumulative impacts associated with other past, present, and reasonably foreseeable actions.

Construction of the proposed new unit at the Humboldt site and the associated offsite water and electrical transmission lines may have SMALL to MODERATE cumulative impacts to ecologically important insect species, primarily dragonflies and damselflies. These species forage in terrestrial habitats and may occur on the northern portion of the property and the adjoining property. Cumulative impacts to these species may occur due to the incremental loss of foraging habitat in the heath community and due to the incremental loss of reproductive habitat as a result of loss of emergent wetlands on the site. Cumulative impacts to ecologically important insect species associated with past and present is estimated as MODERATE, as a result of water quality impairment and habitat loss.

The effect of developing the proposed new unit at the Humboldt site and the associated offsite water and electrical transmission lines on common and important bat species experiencing population loss from WNS would be similar to that described for the Montour site. The impact to common and important bat species from WNS has been severe, with up to 90 percent winter mortality in populations. However, WNS is a recent occurrence and the contribution of past and present projects to the impacts of WNS in unknown. Future projects that reduce summer or winter habitat have the potential to interact with WNS to produce cumulative impacts to bat populations. Any contribution of the proposed new unit at the Humboldt site and the associated offsite water and electrical transmission lines to cumulative impacts to common or important bat species from summer mortality would be expected to be SMALL to MODERATE, depending on hibernation locations of bats using the project area.

The potential for local bird species, migratory birds, and migrating raptors to collide with tall structures and transmission lines would be similar to that described for the Montour site. Cumulative impacts to bird species associated with past and present projects is estimated as SMALL to MODERATE, varying among species due to species-specific habitat needs. Because stationary transmission lines pose a lesser collision threat to birds that the moving blades of wind turbines, and multiple wind power generating projects are proposed for the geographic area of interest, any contribution of the proposed new unit at the Humboldt site and the associated offsite electrical transmission lines to cumulative impacts to local bird species, migratory birds, and migrating raptors from collisions would be expected to 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 BBNPP Intake Structure. Table 9.3-12, Table 9.3-13, and Table 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).

There are five freshwater ponds on the Humboldt site, ranging in size from 0.2 acre to 1.4 acres. The total surface area of the five ponds is 8.0 acres. For the alternative site evaluation described in ER Section 9.3.2.3.5 and ER Table 9.3-13, pond habitat was considered collectively, encompassing approximately 8.0 acres. All ponds occuring on the site were included in the evalutation.

The Humboldt Reservoir, a man-made impoundment, is the only lake in the vicinity of the Humboldt site. It is approximately 500 feet north of the Humboldt site and occupies 31.2 acres. This reservoir is a drinking water supply (one of many) for Hazleton City Authority Water Department, which supplies Hazleton and 13 other municipalities. No impacts to the Humboldt Reservoir or the stream that drains into the Humboldt Reservoir would be expected from the Humboldt site.

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 stated previously in Section 9.3.2.3.4, the conceptual transmission line and water lines that would serve the Humboldt site would be entirely within Luzerne County and the conceptual intake/discharge location would be on the Susquehanna River. Table 9.3-19 lists state and federally- protected species and other species of ecological importance that may occur in Luzerne County, identifies their habitat requirements, and identifies whether they could occur along the conceptual transmission and water lines that would serve the Humboldt site. Review of habitat information identified 59 animal species that utilize aquatic habitats with potential to occur along both the conceptual transmission line and the conceptual water lines.

As described in ER Section 9.3.2.3.3, an approximate 12.5 mi (20.1-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 9.3.2.3.10). The water pipeline may cross 1.1 ac (0.4 ha) of wetlands and 596.3 lf (181.8 m) of stream, including Black Creek (Table 9.3-12 and Table 9.3-14). New and expanded transmission line ROW, described in ER Section 9.3.2.3.10, may cross an additional 7.2 ac (2.9 ha) of wetlands and 2,210 lf (673.7 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 as they have not been observed during sampling at SSES, which is in the same reach of the river. Any impacts on protected aquatic species would be SMALL as a result of construction of the proposed new unit at the Humboldt site.

Only 11 of the 46 listed aquatic and wetland plant species identified in Table 9.3-19 have potentially suitable habitat on the Humboldt site. Of these, seven species (*Aletris farinosa, Alopecurus aequalis, Cladium mariscoides, Goodyera repens, Lonicera hirsuta, Poa languida,* and *Polemonium vanbruntiae*) would have been observable at the time of the site walkover in June 2010, but none were observed. These seven species are considered unlikely to occur on the site and no impacts to these species would be expected. The potential habitat for *Platanthera ciliaris* occurs in the open areas recently restored as part of a mine reclamation project. Because of the recent disturbance of this site, *Platanthera ciliaris* would not likely occur on the Humboldt site at this time and no impacts to this species would be expected. *Cyperus diandrus, Stellaria borealis*, and *Utricularia cornuta* are the only protected wetland and aquatic plant species that could reasonably occur on the site. However, the amount of potentially suitable habitat for these species is very limited on the Humboldt site and, should any impacts result from construction of the proposed new unit at the site, the impacts would be SMALL. No further impact to aquatic or wetland habitats or associated species onsite would be expected during operation.

There would be a potential for construction-related impacts on these species along the conceptual 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 conceptual 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 MODERATE.

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. Trout are not stocked on the Humboldt site. Stony Creek, a natural trout stream, is the nearest trout stream to the Humboldt site, but is upstream of the site (PFBC, 2010a).

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 expanding these existing lines would be minimally intrusive and primarily cross over aquatic habitat. There would be a greater potential for impacts along the conceptual 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 moderate (approximately 7,863 lf [2,397 m] of stream and approximately 12.3 ac [4.9 ha] of wetlands combined between the Humboldt site and the conceptual 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.

Cumulative Impacts

Cumulative impacts to aquatic and wetland resources may result from past, present and future actions that cause loss of habitat, alter the physical or chemical integrity of waters within aquatic and wetland habitats, alter the physical structure of aquatic or wetland habitats, or alter populations of aquatic or wetland flora and fauna. The impacts of construction and operation of the proposed new unit at the Humboldt site and the associated offsite water and electrical transmission infrastructure could contribute to the effects of other past, present, and reasonably foreseeable future activities within the region. All of the projects listed in Table 9.3-23 have the potential to directly or indirectly affect aquatic or wetland flora and fauna through land or water disturbing activities, habitat alternations, or discharges to waterbodies. Accordingly, they have the potential to contribute to cumulative impacts in the region.

For the cumulative analysis of potential impacts to wetland resources, the geographic area of interest is the same area defined for terrestrial resources in Section 9.3.2.3.4. The impacts of actions occurring outside this area would be unlikely to interact with or contribute to the impacts resulting from development of the Humboldt site.

For the cumulative analysis of potential impacts to aquatic resources, the geographic area of interest is limited to the area where impacts from development of the Humboldt site would be likely to interact with impacts of other past, present, and future projects. The geographic area of interest includes the northeastern part of the Ridge and Valley Physiographic Province and includes the portion of the Anthracite Valley Section west of the City of Wilkes-Barre, the Susquehanna Lowlands Section, and the portion of the Anthracite Upland Section in the Susquehanna River Basin extending from the Shamokin Creek watershed northeast to the divide with the Delaware River Basin. Cumulative impacts to aquatic resources within the Susquehanna River would include potential cumulative impacts to the West Branch Susquehanna River from the Lycoming County Line downstream to its confluence with the North Branch Susquehanna River at Sunbury, the North Branch Susquehanna River from Wilkes-Barre downstream to its confluence with the West Branch Susquehanna River at Sunbury, and on the Susquehanna River from Sunbury downstream to the confluence of the Susquehanna River with the Juniata River. Cumulative impacts to aquatic resources would not be expected to extend into the Blue Mountain Section or the Appalachian Mountain Section of the Ridge and Valley Physiographic Province or to extend into other physiographic provinces.

The combined effects of past and present projects have resulted in substantial degradation of aquatic and wetland resources in the geographic area of interest as a result of incremental habitat degradation, habitat alteration, and habitat loss. This degradation can be exacerbated by the effects of future projects. Primary causes of impacts to aquatic ecology have been loss of riparian habitat from forestry and clearing activities, nutrient inputs from agricultural operations, siltation and sedimentation from land clearing and agriculture, and construction of mill, canal, and hydropower dams. The cumulative effect of these past and present actions is MODERATE to LARGE, depending on the degree of development within a given watershed. However, the potential for the impacts of future projects, including the construction of the proposed Humboldt project, to further contribute to incremental impacts to aquatic and wetland resources, including recreationally important fish species or ecologically important aquatic species, that have resulted from these activities is SMALL. This is because of the efficacy of public policy, regulations protecting environmental resources, and the implementation of reclamation and mitigation projects, particularly low head dam removal and mine reclamation throughout the geographic area of interest.

The greatest potential for interaction of impacts from current and future projects with the impacts from development of the Humboldt site, including its associated utility corridors, is through increased thermal and chemical changes to waters within aquatic habitats of the Susquehanna River from operation of the new unit. The impacts of past and current projects on the aquatic resources of the Susquehanna River have resulted in degradation of its habitats. These impacts can be exacerbated if there is further chemical or thermal change. Impacts from chemical and thermal loading to the Susquehanna River from discharge of cooling blowdown water from the Humboldt site would diluted by the inflow from four major streams (Catawissa Creek, Fishing Creek, Little Fishing Creek, and Roaring Creek prior to the confluence with the West Branch Susquehanna River). There also are four metropolitan areas along the river upstream of the confluence with the West Branch Susquehanna River and the permitted wastewater discharges from these areas would further dilute the chemical and thermal loading from the proposed new unit at the Humboldt site and minimize the potential for contribution to cumulative impacts. The cumulative effect to aquatic resources of past, present, and future projects contributing chemical and thermal loading to the river is expected to be MODERATE. However, the contribution of the proposed new unit at the Humboldt site to cumulative impacts from thermal and chemical loading would be SMALL and would not distinguish the Humboldt site from the other alternative sites. Operation of the water and transmission lines would not be expected to contribute to cumulative impacts to aquatic resources beyond that associated with discharges of cooling and blowdown water to the Susquehanna River.

The potential for impacts from development of the Humboldt site to further contribute to cumulative impacts to aquatic resources would be limited. Onsite post-construction stormwater systems would minimize the potential for increased sediment and turbidity resulting from construction activities to reach nearby streams. Any contribution to cumulative impacts on aquatic ecology from construction of the proposed new unit at the Humboldt site would be SMALL.

Construction of the water corridor for the Humboldt site would have a smaller potential to contribute to cumulative impacts to aquatic resources than described for the Montour site. The water lines are approximately the same length as the Montour site, but less stream length would be affected—approximately 596.3 lf (181.8 m). Streams in the new corridors would experience riparian clearing and may subsequently experience water temperature increases from the greater exposure to sunlight. These streams will be maintained in as well-shaded a state as practicable to minimize the warming effect of direct sunlight. Increased turbidity from soil disturbance during construction would not be expected to contribute to cumulative impacts to aquatic resources because these impacts would be temporary and end once construction was complete. Because the water lines would be collocated with existing lines to the extent possible, the contribution of impacts from construction of the conceptual water lines for the Humboldt site to contribute to cumulative impacts to aquatic resources would be expected to be SMALL.

The Humboldt site would use existing transmission lines that would be upgraded to increase capacity. Impacts from this upgrade would be small, with minimal potential to contribute to cumulative impacts to aquatic resources as a result of riparian clearing, which may cause stream water temperature to increase from the greater exposure to sunlight. These streams will be maintained in as well-shaded a state as practicable to minimize the warming effect of direct sunlight. The transmission lines would span streams and support infrastructure for the transmission lines would be placed outside of waters to the extent practicable, which would avoid or minimize impacts to instream habitats. Therefore, little to no contribution to cumulative impacts to aquatic resources from degradation of instream habitats would be expected from construction of the transmission lines. Because the utility lines would be collocated with existing lines to the extent possible, the contribution of impacts from construction of the conceptual transmission lines for the Humboldt site to contribute to cumulative impacts to aquatic resources would be expected to be SMALL.

Aquatic and Wetland Species

The cumulative effect to protected aquatic species throughout the geographic area of interest from past, present, and foreseeable future projects is expected to be SMALL to MODERATE due to the level of historical disturbance to aquatic and wetland communities and because of efforts to avoid and mitigate for potential effects.

Federal or state threatened or endangered aquatic species could occur along the transmission and water lines that would serve the Humboldt site. Because aquatic habitats that may harbor threatened or endangered aquatic species would be avoided through route selection to the extent practicable and because of the SMALL impacts expected to general aquatic resources discussed above, the potential for impacts from construction of the water and transmission lines to make incremental contributions to cumulative impacts to these protected species would be SMALL.

Operation of the water and transmission lines would not be expected to contribute to cumulative impacts to federal or state threatened or endangered aquatic species beyond the previously discussed discharges of cooling and blowdown water to the Susquehanna River.

Operation of the proposed new unit at the Humboldt site would not affect wetland resources and there would be no potential for wetland impacts from operation to interact with other past, present, and future projects to contribute to cumulative impacts to federal or state threatened or endangered wetland species.

Wetlands

Construction of the proposed new unit at the Humboldt site would result in loss of approximately 3.8 ac (1.5 ha) of wetlands, which would be mitigated as directed by requirements of the Clean Water Act Section 404 permit required to develop the site. With implementation of the required mitigation, any contribution of impacts from construction of the proposed new unit at the Humboldt site to cumulative impacts to wetland resources, including threatened and endangered species, would be SMALL.

Upgrades of the transmission lines that would serve the Humboldt site would impact 7.2 ac (2.9 ha) of wetlands, which would be mitigated as directed by requirements of the Clean Water Act Section 404 permit required for the work. With implementation of the required mitigation, any contribution of impacts from upgrades to transmission lines to serve the Humboldt site to cumulative impacts to wetland resources, including threatened and endangered species, would be SMALL.

Construction of the water lines that would serve the Humboldt site would impact 1.1 ac (0.4 ha) of wetlands, which would be mitigated as directed by requirements of the Clean Water Act Section 404 permit required for construction. With implementation of the required mitigation, any contribution of impacts from the water lines to serve the Humboldt site to cumulative impacts to wetland resources, including threatened and endangered species, would be SMALL.

The cumulative impact to wetlands from past, present, and foreseeable future projects, including the Humboldt site and associated transmission and water lines, is expected to be MODERATE, however, because of the magnitude of wetland losses in the past.

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) The Humboldt site is also located adjacent to and east of the Eagle Rock Country Club.

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. Of the 1,022,818 housing units available within a 50-mile (80-km) radius of the Humboldt site (UCSB, 2000e), 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). 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. The Humboldt site is also located adjacent to and east of a recreational area, the Eagle Rock

Country Club. Aesthetic impacts from the cooling towers on this nearest recreational area and the character and quality of views in the area would be MODERATE to LARGE.

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 to LARGE 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.

Cumulative Impacts

In addition to impacts from construction and operation of the proposed new unit at the Humboldt site, projected cumulative impacts from other past, present, and reasonably foreseeable future projects that may not be a part of general growth in the region were also considered. A geographic area of interest within a 50-mile (80-km) radius of the Humboldt site was reviewed for projects that may have a potential impact to cumulative socioeconomic impacts. Within this radius, the projects reviewed included: Intelliwatt Renewable Energy, LLC 13-MW biomass energy facility; Future Fuels, LLC IGCC clean coal technology facility; a 2.6-MW hydroelectric project, a waste to energy project utilizing Perfect Catalytic Thermal Oxidation Technology; MCMA sewage pump station; Hazelton City Water Authority expansion; an Amazon warehouse; and Chesapeake Gardens manufacturing facility; and expansion of the Palgram manufacturing facility. The following summarizes the socioeconomic review of each of these potential future projects.

The Intelliwatt Renewable Energy, LLC 13-MW biomass energy facility is proposed to be located approximately 10 to 15 mi (16 to 24 km) away from the Humboldt site (The News Item, 2010a), and is anticipated to be completed in 2011. The biomass facility would have a different construction schedule than BBNPP, and therefore, biomass facility construction is not anticipated to impact the available workforce if the proposed new unit were to be built at the Humboldt site. Based on the number of employees hired by the biomass facility, cumulative impacts to public services, education, and housing would not be expected to occur. Due to the distance of the Intelliwatt Renewable Energy facility from the Humboldt site, cumulative aesthetic impacts would be minimal.

The Future Fuels, LLC 270-MW IGCC clean coal technology facility is being considered in Northumberland County in Coal Township and is located between 10 to 15 mi (16 to 24 km) west-southeast of the Humboldt site. The project is anticipated to employ 200 people, which would include 120 plant jobs and 80 additional roles such as delivery truck drivers. However, the current status or anticipated construction dates for this proposed facility are currently unknown (The News Item, 2010b). If both the IGCC facility and the proposed new unit at the Humboldt site were to have a peak construction workforce occur simultaneously, impacts to the available workforce, public services, education, and housing could occur. Due to the distance of the IGCC facility from the Humboldt site, cumulative aesthetic impacts during operation would be minimal.

Construction of a 2.6-MW hydroelectric project is being proposed in Carbon County, Pennsylvania, located approximately 20 to 25 mi (32 to 40 km) east-southeast from the Humboldt site. The proposed project would be located on the downstream side of the Beltzville Dam next to an existing stilling basin. A license was issued by the FERC in September

2008. Paragraph 63 of the Order Issuing Original License states that Article 301 of the license terms requires the licensee to start project construction within 2 years of the issuance date of this license and complete construction within 5 years from the issuance date (FERC, 2008a). The hydroelectric facility would have a different construction schedule than BBNPP. Therefore, construction of the hydroelectric facility is not anticipated to impact the available workforce if a proposed new unit were to be built at the Humboldt site. Cumulative impacts to public services, education, and housing would also not be expected to occur. Due to the distance of the hydroelectric project from the Humboldt site, aesthetic impacts would also not be expected to occur.

An appropriations request was submitted in Fiscal Year 2010 to supply funding to a waste to energy project utilizing Perfect Catalytic Thermal Oxidation Technology. This project would include research and development to demonstrate municipal waste combustion for electric generating purposes (Senator Arlen Specter, 2010a). This project would be over 35 mi (56 km) southeast of the Humboldt site. Due to the distance of this facility, the impact to the available workforce, public services, education, and housing would not be expected to occur. In addition, cumulative aesthetic impacts would also not be expected to occur.

MCMA anticipates construction of a $1.8M sewage pump station in Northumberland County, located approximately 15 mi (24 km) west-southeast of the Humboldt site. Timing for construction of the facility is not currently known. The project would result in a beneficial increase in the sewage capacity for the area (The News Item, 2010c). Assuming the sewage pump station will not require a large workforce during construction or operation, the sewage pump station is not anticipated to impact the available workforce for the Humboldt site during construction or operation. Cumulative impacts to public services, education, housing, and aesthetics are also not expected to occur.

Hazelton City Water Authority received a $2.8M grant to replace more than 1 mile of deteriorated water distribution mains, construct a new 88,000 gallon water storage tank and, construct new water treatment facilities. These improvements are expected to eliminate leaks and water loss while improving facility efficiency (Office of the Governor, 2009). The location of these planned improvements is approximately 5 to 10 mi (8 to 16 km) northeast of the Humboldt site. The project would result in an improvement to the existing water treatment system. If construction of these improvements and construction of an NPP were to occur simultaneously, impacts to the available workforce for the Humboldt site during construction could occur. Cumulative impacts could occur during construction could also occur to public service, education, and housing. Cumulative aesthetic impacts would not occur.

Amazon.com is proposing to open a distribution center less than 5 mi (8 km) from the Humboldt site. The warehouse is expected to create more than 1,100 jobs within 3 years (Trade & Industry Development, 2010). Due to the different construction trades needed for this project, impact to the available workforce is not anticipated for the Humboldt site during construction or operation. Due to the potential number of additional employees that could migrate into the area, cumulative impacts to public services, education, and housing could occur. Cumulative impacts to aesthetics would not occur.

Chesapeake Gardens, a 25,000 square-foot manufacturing plant, is anticipated to be built in Northumberland County, Coal Township. This facility would be located over 40 mi (64 km) westsouthwest of the Humboldt site and is anticipated to create approximately 30 to 50 jobs within the first 18 months of being operational (The News Item, 2010c). Due to the distance of the project, the impact to the available workforce, public services, education, housing, and aesthetics would not be expected to occur. Cumulative aesthetic impacts would also not occur.

Palgram, a manufacturer of a wide range of thermoplastic sheets, is anticipating installing a new line of production equipment approximately 45 to 50 mi (72 to 80 km) southeast of the Humboldt site. This $3.6 M project will create at least 40 jobs within 3 years (Governor Tom Corbett, 2011c). Due to the distance from the Humboldt site, cumulative impacts to the available workforce, public services, education, housing, and aesthetics would not be expected to occur.

The remaining projects identified in Table 9.3-23 are either already operational or part of the general growth in the region. The projects within the geographic area of interest would be consistent with applicable county plans and policies. Based on the review and analysis of the impacts from construction and operation of the proposed new unit at the Humboldt site, as well as the projected cumulative impacts from other past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the site, cumulative socioeconomic impacts from the projects are expected to be manageable, particularly over time.

Under some circumstances, building the proposed new unit at the Humboldt site could make a temporary, detectible, adverse cumulative effects associated with some socioeconomic issues. These could include SMALL to MODERATE impacts including available workforce, local infrastructures, and public services (recreation, housing, police, fire and medical services, and schools). The cumulative effects on regional economies and tax revenues would be beneficial and SMALL to LARGE due to annual taxes and revenue generated by the new workers contributing to the local economy and the productivity of the region. Building the proposed new unit at the Humboldt site in addition to other past, present, and reasonably foreseeable future projects would have a MODERATE to LARGE cumulative impact on aesthetics. Construction and operation of the proposed new unit at the Humboldt site would be a significant contributor to these incremental impacts.

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.

Cumulative Impacts

The assessment of transportation impacts during construction and operation of the proposed new unit at the Humboldt site also considered other past, present, and reasonably foreseeable future actions within a 50-mi (80-km) radius of the Humboldt site that could impact transportation in the region. These projects include federal and non-federal projects and are listed in Table 9.3-23. A review of the existing and planned projects that could potentially add to the impact on transportation from the Humboldt site includes the State Route 424 project and seven existing mine reclamation projects.

The State Route 424 project would extend the highway approximately 3.3 mi (5.3 km) to the Humboldt Industrial Park and would be undertaken to encourage business investment at this location (Congressman Paul E. Kanjorski, 2010a; Congressman Paul E. Kanjorski, 2010b). This project could be undertaken either in conjunction with the construction of the Humboldt NPP site or in tandem with the project and could increase transportation impacts at the Humboldt location.

The mine reclamation projects are all within 10 mi (16 km) of the site (USACE, 2010g; Commonwealth of Pennsylvania, 2008a). Some of the projects such as the Hazleton acid mine reclamation project could impact I-81 traffic during the reclamation and remediation work. Others could add to increased traffic on the local roadways through hauling and material delivery activities.

These ongoing projects, along with the construction of the Humboldt site, could impact transportation with increased truck traffic. There would be cumulative transportation impacts from the construction and operation of the new unit at the Humboldt Site and the projects described above, particularly during the construction at the Humboldt site. However, these construction impacts would be temporary. There would also be cumulative impacts to transportation during operation due to increased worker and delivery traffic.

Based on the review and analysis of impacts on transportation of the proposed new unit at the Humboldt site, as well as the projected cumulative impacts from other past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the

Humboldt site, the cumulative impacts on transportation would be SMALL during construction and SMALL during operation. The incremental contribution from construction and operation of the proposed new unit at the Humboldt site on the cumulative impacts would be SMALL.

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.

Cumulative Impacts

Cultural resources, by definition, are non-renewable. Therefore, the impact of their destruction is cumulative. The assessment of historic, cultural, and archaeological resource impacts from construction, preconstruction, and operation of the proposed new unit at the Humboldt site considered other past, present, and reasonably foreseeable future projects that could affect the resources in the region. Table 9.3-23 identifies other past, present, and reasonably foreseeable future projects and other actions considered in the cumulative analysis of the Humboldt site.

Projects within the geographic area of interest may have a potential cumulative impact to cultural resources if ground disturbing activities occur, or if new above-ground structures visually impact the area. For cultural resources, the geographic area of interest is based on the characteristics of the specific resource. For archaeological resources, the geographic area of interest is limited to the area where ground disturbing activities would occur. For historic buildings and structures, impacts can be physical and visual and the geographic area of interest is 5 mi (8.1 km) or less. The geographic area of interest for the conceptual transmission and water lines serving the facility is defined as 1 mi (1.6 km), 0.5 mi (0.8 km) on either side, from the center line of the corridor extending the entire length of the corridor. The lines would cross through both developed and undeveloped areas. Location of these corridors is adjacent to existing transportation or utility corridors where possible, which would minimize any potential cumulative visual impacts to historic, cultural, or archaeological resources.

Based on the existing conditions and the past, present, and reasonably foreseeable future projects, the cumulative impacts from preconstruction, construction, and operation of the proposed new unit at the Humboldt site and from other projects would be SMALL. Similarly, the incremental contribution to local and regional impacts on cultural resources due to the construction and operation of a new unit at the Humboldt site and related utilities would be insignificant.

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. Figure 9.3-23 through Figure 9.3-27 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 9.3-28 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.

Cumulative Impacts

In addition to the impacts from construction and operations, the cumulative impacts analysis also considered other past, present, and reasonably foreseeable future projects that could cause environmental justice impacts on minority and low-income populations. For this cumulative impacts analysis, a geographic area of interest within the region was selected that included Luzerne, Carbon, and Schuylkill counties within Pennsylvania.

While there are minority and low-income populations within the geographic area of interest of the Humboldt site, the numbers of census block groups meeting these criteria were a small percentage of the total census block groups within the geographic area of interest. Based on the location and types of past, present, and reasonably foreseeable future projects identified in Table 9.3-23, it does not appear that the projects likely have or will contribute to environmental justice impacts to the geographic area of interest.

Based on the review and analysis of the impacts from construction and operation of the proposed new unit at the Humboldt site, as well as the projected cumulative impacts from other past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the site, there would be no disproportionate and adverse cumulative impacts to minority and low-income populations in the above areas, and the environmental justice impacts would be SMALL. Construction and operation of the proposed new unit at the Humboldt site would not contribute additional environmental justice cumulative impacts.

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.

Cumulative Impacts

The assessment of impacts associated with transmission corridors during construction and operation of the proposed new unit at the Humboldt site also considered other past, present, and reasonably foreseeable future actions that could contribute to cumulative impacts associated with transmission corridors in the region, including federal and non-federal projects listed in Table 9.3-23. For the purpose of evaluating the potential for cumulative impacts in the region associated with transmission corridors, including the impacts attributable to a new unit at the Humboldt site, the geographic area of interest was assumed to be the area within approximately 15 mi (24 km) of the site, consistent with the geographic area of interest for analysis of land use impacts. Cumulative impacts of the transmission corridors on terrestrial ecology; aquatic ecology; and historic, cultural, and archeological resources from construction and operation of the proposed new unit at the Humboldt site are described in Sections 9.3.2.3.4, 9.3.2.3.5, and 9.3.2.3.8, respectively. This section focuses on land use impacts associated with the construction and operation of transmission corridors associated with the proposed new unit at the site. Cumulative impacts on land use from construction and operation of a proposed new unit at the Humboldt site are described in Section 9.3.2.3.1.

Land use impacts associated with construction and operation of approximately 0.7 mi (1.1 km) of new 500-kV transmission corridor and upgrade/expansion of approximately 13.6 mi (21.9 km) of existing 230-kV transmission corridor for the proposed new unit at the Humboldt site would add to those associated with over 90 mi (144.8 km) of existing 230- and 500-kV transmission lines within the geographic area of interest. The transmission corridors pass through land that is primarily considered agricultural or forest land. The areas are mostly remote, with low population densities. The longer lines cross numerous state and U.S. highways. The impact of these transmission corridors on land usage is minimal; farmlands that have transmission corridors passing through them generally continue to be used as farmland (PPL, 2006). Upgrades to or expansion of an existing transmission corridor would experience only minimal change. However, transmission corridors passing through previously undeveloped forest land, however, would result in forest fragmentation.

As stated previously, operational activities within the transmission corridors may include visual inspection and appropriate vegetation maintenance of transmission line ROWs. Impacts associated with operational activities are expected to be minimal because the initial forest/ vegetation clearing/trimming would have occurred during construction activities and operational activities would only maintain and promote previously established vegetation status.

Future energy-related projects that could contribute to cumulative impacts within the geographic area of interest include the proposed Susquehanna-Roseland electrical transmission line, which would run from a substation near Berwick, Pennsylvania to a substation in Roseland, New Jersey for a total distance of approximately 130 mi (209 km) (FERC, 2008b). This proposed electrical transmission line would create a new power transmission corridor expected to traverse terrain relatively undisturbed, such as a national recreation area, the Pocono Mountains, and state parks; and would cross land use types including developed lands, freshwater wetlands, and forestlands.

Based on the review and analysis of the impacts from the proposed new unit at the Humboldt site, as well as the projected cumulative impacts from other past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the Humboldt site, the cumulative impacts on land use of the transmission corridors would be MODERATE. However, the incremental contribution to the cumulative impacts on land use from the transmission corridors associated with the proposed new unit at the Humboldt site would be SMALL.

9.3.2.3.11 Nonradiological Health Impacts

The analysis of nonradiological health impacts to members of the public and site workers for the Humboldt site includes construction-related activities for the proposed new 1,600 MWe nuclear unit and its associated structures and facilities, as well as routine operation of the plant when it is complete. The analysis also considers other past, present, and reasonably foreseeable future actions that could impact nonradiological health, including other federal and non-federal projects, and those projects listed in Table 9.3-23 and shown in Figure 9.3-35 within the geographic area of interest. The construction-related activities that have the potential to impact the health of members of the public and workers at the site include exposure to dust and vehicle exhaust, occupational injuries, noise, and the transport of construction materials and personnel to and from the site. The operation-related activities that have the potential to impact the health of members of the public and workers at the site includes exposure to etiological agents such as noise, EMFs, and impacts from the transport of workers to and from the site. For the analysis of nonradiological health impacts at the Humboldt site, the geographic area of interest is considered to include projects within a 5 mi (8.1 km) radius of the site center based on the localized nature of the impacts. For impacts associated with transmission lines and other utility corridors (i.e., water and wastewater), the geographic area of interest would typically be limited to corridor rights of way and the areas immediately adjacent to them.

Construction Impacts

Nonradiological health impacts to construction workers and members of the public attributable to the construction of a new nuclear unit at the Humboldt site would be similar to those evaluated in Section 4.7, Nonradiological Health Impacts, for the BBNPP site. The impacts include noise, vehicle exhaust, dust, occupational injuries, and transportation accidents, injuries, and fatalities. Applicable federal and state regulations on air quality and noise would be complied with during the site preparation and construction phase. The incidence of construction worker accidents would not be expected to differ from the incidence of accidents estimated for the BBNPP site.

The Humboldt site is located in a rural area approximately 5 mi (8.1 km) west of Hazleton, PA (population of approximately 22,000) and construction impacts on the surrounding populations are expected to be minimal and typical of other large construction projects. Access routes to the site for construction workers would include I-81, which is approximately 2.2 mi (3.5 km) east of the site and I-80, which is approximately 6.5 mi (10.5 km) north of the site and can be accessed by I-81. Local 2-lane roads would be used to provide access to and from I-81. As described in ER Section 4.4.1.5, Transportation Routes, for the BBNPP site, local 2-lane roads may become more congested during peak construction-related activities and mitigation may be necessary to ease congestion, thereby improving traffic flow and reducing nonradiological health impacts (e.g., traffic accidents, injuries, and fatalities) during the construction period.

The Humboldt site is located in the northwestern portion of the existing Humboldt Industrial Park, whose tenants consist primarily of light industry, food manufacturing, and warehousing. No past or current actions in the geographic areas of interest were identified that would be expected to significantly impact the public or workers. The largest projects or facilities within 5 mi (8.1 km) of the Humboldt site (Table 9.3-23) include an Amazon distribution warehouse (1,000 employees projected), Williams Cogeneration (171.5 MWe gas-fired peaking facility), and an expansion of SR 424 (Humboldt Industrial Park access improvements, east of the Humboldt site). The development of the Humboldt site would result in additional traffic and air emissions in the area, but the increase above existing levels is not expected to be substantial, except during peak construction periods. Proposed future actions would also include general transmission line development and/or upgrading in the region, and future urbanization associated with population growth, both of which would occur throughout the designated geographical areas of interest. These actions would be expected to result in nonradiological health impacts similar to those discussed above for the construction of a nuclear unit and associated facilities at the Humboldt site.

Operational Impacts

Nonradiological health impacts to site workers and members of the public attributable to the operation of a nuclear unit at the Humboldt site would be similar to those evaluated in Section 5.8, Socioeconomic Impacts, for the BBNPP site. Occupational health impacts to workers (e.g., falls, electric shock or exposure to other hazards) at the Humboldt site would be expected to be the same as those evaluated for workers at the new unit at the BBNPP site. Based on the configuration of the proposed new unit at the Humboldt site (closed-cycle, wet cooling system with mechanical draft cooling towers), etiological agents would not likely increase the incidence of water-borne diseases in the vicinity of the site. Noise and EMF exposure would be monitored and controlled in accordance with applicable OSHA regulations. Effects of EMF on human health would be controlled and minimized by conformance with NESC criteria. Nonradiological impacts of traffic associated with the operations workforce can be expected to be less than the impacts during construction. Mitigation measures taken during construction to improve traffic flow would also be expected to minimize traffic impacts during operation of a new unit. Mitigation measures used during the operational phase would likely be similar to those described in Section 5.10, Measures and Controls to Limit Adverse Impacts During Operation, for the BBNPP site.

Past and present actions in the geographic area of interest associated with existing Humboldt Industrial Park (i.e., the Amazon warehouse and the 171.5 MWe Williams Cogeneration Facility) and existing transmission lines represent the primary and most significant potential sources of nonradiological health impacts from operations to the public and workers. Proposed future actions that would impact nonradiological health in a similar way to operation activities at the Humboldt site would include regional transmission line expansions and upgrades, and future urbanization due to population growth, both of which are likely to occur within the geographical areas of interest.

The potential exists for future climate changes that could have an impact on human health. Projected changes in the climate for the region are currently based on observed cycles and fluctuations in average temperature and average precipitation, both of which are expected to increase slightly over time, based on current trends. These trending increases in temperature and precipitation could potentially alter the presence of microorganisms and parasites in surface water; however, insufficient information exists to reliably quantify any specific changes in these parameters, and there is no evidence to suggest that the operation of a nuclear generating facility at the Humboldt site would cause or contribute to those changes, or that there would be any significant change in the presence of etiological agents or the incidence of water-borne diseases.

Summary

The impacts of the construction and operation of a new nuclear unit at the Humboldt site on nonradiological health are expected to be similar to the impacts evaluated for the BBNPP site. While there are past, present, and future activities in the geographic area of interest that could affect nonradiological health in ways similar to the construction and operation of a new unit and associated facilities at the Humboldt site, those impacts are expected to be localized and managed through adherence to existing regulatory requirements. Therefore, the cumulative impacts of the construction and operation of a nuclear generating unit and associated facilities at the Humboldt site on nonradiological health would be SMALL.

9.3.2.3.12 Radiological Impacts of Normal Operations

The analysis of radiological health impacts to members of the public and site workers for the Humboldt site includes construction-related activities for the new 1,600 MWe nuclear unit and its associated structures and facilities, as well as routine operation of the plant once construction is complete. The analysis also considers other past, present, and reasonably foreseeable future actions that impact radiological health, including other federal and non-federal projects, and those projects listed in Table 9.3-23 within the geographic area of interest. As described in Section 9.3.2.3.1, Land Use, the Humboldt site is located in the northwestern portion of the existing Humboldt Industrial Park; currently, there are no nuclear facilities on or adjacent to the site. The geographic area of interest is the area within a 50 mi (80.5 km) radius of the Humboldt site. Existing nuclear generating facilities potentially affecting radiological health within this area are the Peach Bottom Atomic Power Station (Units 2 and 3, 82 mi [132 km] south), Three Mile Island Nuclear Generating Station (Unit 1, 64 mi [103 km] southwest), Limerick Generating Station (Units 1 and 2, 55 mi [88.5 km] south-southeast), Salem Nuclear Power Plant (Units 1 and 2, 105 mi [169 km] south), SSES (Units 1 and 2, 12 mi [19.3 km] north-northwest) and the Hope Creek Nuclear Generation Station (Unit 1, 104.7 mi [168.5 km] southeast). There are also likely to be hospitals and industrial facilities within 50 mi (80.5 km) of the Humboldt site that use radioactive materials.

The radiological impacts of constructing and operating a nuclear unit at the Humboldt site would include doses from direct radiation, and liquid and gaseous radioactive effluents. These pathways would result in low doses to people and biota offsite that would be well below regulatory limits. These impacts are expected to be similar to those estimated for the BBNPP site as described in Section 5.4, Radiological Impacts of Normal Operations.

The radiological impacts of the other operating nuclear power plants listed above also include doses from direct radiation and liquid and gaseous radioactive effluents. These pathways result in low doses to people and biota offsite that are well below regulatory limits as demonstrated by the required ongoing REMP conducted around these plants. These pathways are expected to result in low doses to people and biota offsite that would be well below regulatory limits. Doses attributable to direct radiation and radioactive effluents from hospitals and industrial facilities that use radioactive materials would represent an insignificant contribution to the cumulative impact around the Humboldt site. This conclusion is based on data from REMPs conducted around currently operating nuclear power plants, which consistently demonstrate that radiological levels at offsite locations are well below acceptable limits at all offsite locations, as required by each facility's operating license. It is concluded that the cumulative radiological impacts from constructing and operating a proposed nuclear unit, and other existing and planned projects and actions in the geographic area of interest around the Humboldt site would be SMALL.

9.3.2.3.13 Postulated Accidents

The analysis of postulated accidents includes accidental radiological releases during operation of a nuclear unit at the Humboldt site. The analysis also considers other past, present, and reasonably foreseeable future actions that impact radiological health from postulated accidents, including other federal and non-federal projects, and those projects listed in Table 9.3-23 within the geographic area of interest. As described in Section 9.3.2.3.1, Land Use, the Humboldt site is located in the northwestern portion of the existing Humboldt Industrial Park, whose tenants include light industry, food manufacturing, and warehouses. There are currently no nuclear facilities on the site. The geographic area of interest considers all existing and proposed nuclear power plants that have the potential to increase the probability-weighted consequences (i.e., risks) from a severe accident at any location within 50 mi (80.5 km) of the Humboldt site. Existing facilities potentially affecting radiological accident risk within this geographic area of interest include the existing Peach Bottom Atomic Power Station (Units 2 and 3, 82 mi [132 km] south), Three Mile Island Nuclear Generating Station (Unit 1, 64 mi [103 km] southwest), Limerick Generating Station (Units 1 and 2, 55 mi [88.5 km] south-southeast), Salem Nuclear Power Plant (Units 1 and 2, 105 mi [169 km] south), SSES (Units 1 and 2, 12 mi [19.3 km] north-northwest) and the Hope Creek Nuclear Generation Station (Unit 1, 104.7 mi [168.5 km] southeast). No other reactors have been proposed within the geographic area of interest or within the region that would affect accident risk in the geographic area of interest.

The environmental consequences of DBAs at the Humboldt site are expected to be minimal and similar to those that have been predicted for the U.S. EPR that would be built at the BBNPP site as described in Section 7.1, Design Basis Accidents. DBAs have been specifically addressed for the BBNPP site to demonstrate that the reactor design is robust enough to meet all applicable NRC safety criteria. It is also noted that the U.S. EPR design is independent of site conditions and the meteorology of the Humboldt and BBNPP sites are considered to be generally similar. Because the meteorology, population distribution, and land use for the Humboldt site are all expected to be similar to the proposed BBNPP site, risks from a severe accident for a U.S. EPR reactor located at the Humboldt site are expected to be similar to those analyzed for the proposed BBNPP site and described in Section 7.2, Severe Accidents. Although there are no new reactors currently planned within the geographic area of interest, any applications for new reactors would need to demonstrate that the risks would be well below NRC's regulatory requirements for safety. Based on this assessment, the cumulative risks of severe accidents at any location within 50 mi (80.5 km) of the Humboldt site would be SMALL.

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 9.3-8 provides a location map showing a 6-mi (9.7-km) radius surrounding the Seedco site. Figure 9.3-29 provides an aerial photograph of the Seedco site and the immediate vicinity. Also shown on Figure 9.3-29 are the FEMA 100- and 500-year floodplains (FEMA, 2008) and mapped NWI wetlands (USFWS, 2009a). There is no designated prime farmland (USDA, 2009) at the Seedco site or immediately surrounding the site (within the boundary of Figure 9.3-29).

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 approximately 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 extend northeast from the site, where it would cross Quaker Run, for approximately 2.8 miles and then turn northwest for approximately 6.5 miles until it crosses a tributary of Shamokin Creek. The pipeline then runs generally north ending at the Main Branch of the Susquehanna River, approximately 4.3 mi upstream of Danville. 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.

Cumulative Impacts

The assessment of land use impacts during construction and operation of the proposed new unit at the Seedco site also considered other past, present, and reasonably foreseeable future actions that could impact land use in the region, including federal and non-federal projects listed in Table 9.3-23. This cumulative impact analysis focuses on past land use in the area that has contributed to land use impacts and land use impacts from present and future land-disturbing construction and operations activities. For the purpose of evaluating the potential for cumulative land use impacts in the region, including the impacts attributable to a new unit at the Seedco site, the geographic area of interest for the Seedco site was assumed to be the area within approximately 15 mi (24 km) of the site. This geographic area of interest was selected to include the primary communities that would be affected by the proposed project if it were located at the Seedco site. This area includes the southeastern portion of Northumberland County, southern Columbia County, a western portion of Schuylkill County, a southern portion of Montour County, and northwestern Dauphin County. Key land use issues as presented in county land use and growth management profiles include the need to update land use plans and ordinances, the preservation of farmland and open spaces, shifting of populations from urban to suburban or rural communities, and the improvement of and impacts from transportation infrastructure (PDCED, 2005).

Cumulative land use impacts in the geographic area of interest have resulted from past coal mining activities and associated acid mine drainage (AMD). Shamokin Creek, the main water body draining the Seedco site, has been impacted by AMD. Ongoing and proposed Abandoned Mine Lands (AML) surface mine reclamation projects and AMD reclamation activities within the geographic area of interest identified in Table 9.3-23 will continue to contribute to cumulative land use impacts in the area. However, these AML and AMD projects are intended to reduce the land and water impacts from past mining activities in the area.

Other existing projects that have contributed and may continue to contribute to cumulative land use impacts in the geographic area of interest include existing energy production facilities that have been in operation for a number of years, such as the Mt. Carmel Cogeneration plant (47.3 MW, coal-fired, Northumberland County), Wheelabrator Frackville Energy power plant (48 MW, waste coal fired, Schuylkill County), John B. Rich Memorial Power Station (80 MW, waste coal, Schuylkill County), Locust Ridge Wind Farm (26 MW, Schuylkill County), Cherokee Pharmaceutical Plant (steam generation for pharmaceutical production, Northumberland County), and several landfill methane to electricity projects (PADEP, 2010b). Proposed energy facilities, including the Intelliwatt Renewable Energy facility (13 MW, biomass, Northumberland County), the Future Fuels LLC (270 MW, IGCC, Northumberland County), and a second phase of the Locust Ridge Wind Farm (102 MW, Schuylkill County) may also contribute to cumulative impacts within the geographic area of interest. Construction of proposed industrial facilities, including the Chesapeake Gardens manufacturing plant (The News Item, 2010c) and Amazon warehouse (All Business, 2008; Site Selection Magazine, 2008; Trade & Industry Development, 2010), will contribute to cumulative impacts in the geographic area of interest.

Existing and proposed local and regional roadway and rail infrastructure projects have contributed and will continue to contribute to cumulative land use impacts in the geographic area of interest. Proposed water and wastewater infrastructure improvement projects, such as the MCMA sewage pump station project for the Seedco Industrial park (The News Item, 2010b), will also contribute to cumulative land use impacts in the geographic area of interest. Current and proposed watershed improvement and restoration projects and flood control projects, such as the Buch's Hollow Stabilization Project (Commonwealth of Pennsylvania, 2008a) and Bloomsburg Area Flood Damage Reduction Project (a flood protection project for the town of Bloomsburg which is currently in the design phase [Senator Arlen Specter, 2010a; Senator Arlen Specter, 2010b; Senator Robert P. Casey, 2010a; USEPA, 2010a]), if constructed, may also contribute to cumulative land use impacts in the geographic area of interest.

Existing and future urbanization have contributed and will continue to contribute to decreases in forested areas and undeveloped lands in the geographic area of interest. GCC may also contribute to cumulative impacts in the geographic area of interest including a projected reduction in hardwood tree species, habitat for resident and migratory birds, agricultural crop yields, and livestock productivity (Union of Concerned Scientists, 2008).

Construction of the proposed new unit at the Seedco site will contribute to cumulative land use impacts in the geographic area of interest through loss of forested land and significant cut-andfill activities. However, a portion of the site has already been impacted from past mining activities and contains AML.

Based on the review and analysis of impacts on land use of the proposed new unit at the Seedco site, as well as the projected cumulative impacts from past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the site, the cumulative land use impacts have been evaluated and determined to be MODERATE to LARGE. However, the incremental contribution from construction of the proposed new unit at the Seedco site would be SMALL.

Land use impacts associated with the transmission corridors are discussed separately in Section 9.3.2.4.10.

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.

Cumulative Impacts

The assessment of air quality impacts during construction and operation of the proposed new unit at the Seedco site also considered other past, present, and reasonably foreseeable future actions that could impact air quality in the region, including other federal and non-federal projects listed in Table 9.3-23. For the purpose of evaluating the potential for cumulative air quality impacts in the region, including the impacts attributable to a new unit at the Seedco site, the primary geographic area of interest was assumed to be the area within approximately 12.5 mi (20.2 km) of the site, which includes the southeastern portion of Northumberland County, southern Columbia County, and a northwestern portion of Schuylkill County. Because of the inherently low air emissions that will be associated with the construction and operation of the new unit, it is expected that the emissions would not be noticed, nor would they destabilize air quality within this relatively small area. It is noted that the air quality attainment status for Northumberland County, as designated by USEPA, reflects the effects of past and present emissions from all existing pollutant sources in the region. Northumberland County and the counties that surround it are in attainment of all National Ambient Air Quality Standards (USEPA, 2011f).

Taking into account the existing and proposed projects listed and described in Table 9.3-23, only two industrial facilities with the potential for significant air emissions were identified within 5 mi (8.1 km) of the Seedco Site. The existing Mt. Carmel Cogeneration facility (47.3 MW, coalfired, Northumberland County) is located approximately 3.5 mi (5.6 km) from the Seedco Site. The proposed Intelliwatt Renewable Energy facility (13 MW, biomass, Northumberland County) would be located within 1 mi (0.62 km) from the Seedco Site. There are no other existing or proposed industrial facilities within 5 mi (8.1 km) of the Seedco site that would generate emissions substantial enough to result in a noticeable impact or that would destabilize air quality in the region. Within 12.5 mi (20.2 km) of the Seedco site, no additional existing or proposed major industrial facilities were identified.

There will be a cumulative impact of emissions from the construction and operation of the proposed new unit at the Seedco site and the emissions from the two existing and proposed facilities as described above. However, the inherently low emissions from the new unit will not be noticeable, nor will they have a destabilizing effect on existing ambient air quality during either construction or operation when added to the existing county and regional emissions inventory.

The impacts of greenhouse gas emissions are not sensitive to the location of the source of emissions; rather, they are believed to contribute to global emissions, which in turn have the potential to influence climate change. While national and worldwide cumulative impacts of greenhouse gas emissions are thought to occur (primarily associated with the combustion of fossil fuels), those impacts are currently considered to be noticeable but not necessarily destabilizing. The emissions of greenhouse gases from the proposed new nuclear generating unit and nuclear plants in general (primarily consisting of CO2 and lesser amounts of some precursor emissions), will be very small compared to regional emissions. It is expected that the cumulative impacts of all greenhouse gases (regionally, nationally, or globally) would continue to be noticeable but not necessarily destabilizing, with or without the addition of greenhouse gas emissions from the proposed new unit at the Seedco site.

Based on the review and analysis of the air emissions from the proposed new unit at the Seedco site, as well as the projected cumulative impacts from other past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the Seedco site, the impact on ambient air quality would be SMALL for criteria pollutants, and SMALL to MODERATE for greenhouse gas emissions. However, the incremental contribution to the impacts on air quality resources due to the construction and operation of the new unit at the Seedco site would be insignificant for both criteria pollutants and greenhouse gas emissions.

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. The segment of the river in which the Seedco site water intake/discharge would be be located 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 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 (1906 to 2010) for the river at the nearest USGS gage (01540500 on the Susquehanna River at Danville, Pennsylvania, 200 ft [61 m] upstream from Mill Street Bridge on State Highway 54 and 0.8 mi [1.3 km] upstream from Mahoning Creek) is approximately 659 MGD (2,495 mld) (USGS, 2010). 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.

The intake and discharge structures for the Seedco Site would also probably be similar in configuration to the Bell Bend design. They would be located upstream of the discharge of Shamokin Creek at a site that would avoid local wetlands and allow the least intrusive construction methodology. The preferred installation methodology would be to utilize cofferdams and excavation at this site. However, the use of dredging and or blasting cannot be ruled out in the absence of a specific location and appropriate site data.

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) wide, 14.3-mi (23.0-km) long ROW for the water pipelines would extend northeast from the site for approximately 2.8 miles, where it would cross Quaker Run, and then turn northwest for approximately 6.5 miles until it crosses a tributary of Shamokin Creek. The pipeline then runs generally north ending at the Main Branch of the Susquehanna River, approximately 4.3 mi upstream of Danville. 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 approximately 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. 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.

Cumulative Impacts

For the cumulative analysis of impacts on surface water, the primary geographic area of interest for the Seedco site is the Middle Susquehanna River subbasin (Figure 2.3-1), which is upstream and downstream of the site location. This geographic area includes the site's withdrawal and discharge location, and is the primary area where the proposed new unit could contribute to a cumulative effect on surface waters. This geographic area of interest includes the Upper Susquehanna-Lackawanna watershed, HUC 02050107, and the Upper Susquehanna- Tunkhannock watershed, HUC 02050106. The Lower Susquehanna River subbasin was also considered for this analysis. However, estimated 7Q10 on the Susquehanna River at Danville near the proposed Seedco site is less than half (approximately 48 percent) of the estimated 7Q10 flow on the Susquehanna River at Sunbury and thus consumptive use impacts would be minor in the lower watershed (USGS, 2009g and USGS, 2010). Regulatory and permitting requirements would provide mitigation for the consumptive use. For water quality impacts, the area of interest also includes downstream waters as strategies to protect the Chesapeake Bay could impact the permits that would be required for the proposed facility.

The Seedco site is located in the Lower Susquehanna River subbasin, Lower Susquehanna-Penns watershed, HUC 02050301. This is a secondary area of interest and could be impacted by construction of the facility.

There are several key actions that have current and reasonably foreseeable potential future impacts to water use/supply and water quality in the geographic area of interest. These actions include the operation of upstream reservoirs and the operation of power generation facilities, including the SSES facility, Hunlock Power Station, Archbald Power Station, Mt. Carmel Cogeneration Facility, Viking Energy of Northumberland County, and Williams Generation Plant, and the Cherokee Plant (a steam generation facility for a pharmaceutical production facility). Mining is also an essential activity within the Middle Susquehanna River subbasin and the Lower Susquehanna-Penns watershed, and primary impacts are related to AMD and reclamation activities. Agriculture and land development activities can also impact water quality. Two planned fossil fuel power plants located within the Susquehanna River Basin (SRBC, 2008a) are actions that may have impacts. In addition, impacts may occur from other municipal and industrial activities in the Middle Susquehanna River subbasin including water supply and wastewater treatment and disposal. Natural gas well development is another action that has current and reasonably foreseeable future relevance to the Susquehanna River Basin and has been included in this cumulative analysis. The impact of other projects listed in Table 9.3-23 were considered in this analysis, but would have little or no impact on water use or water quality.

For the cumulative analysis of impacts on groundwater, the geographic area of interest is the extent of the groundwater aquifers in the vicinity of the proposed Seedco site, the glacial overburden aquifer and the shale bedrock aquifer.

Water Use

The surface water use impacts from construction and operation of a proposed new unit at the Seedco site would be primarily attributed to the demands that would occur under normal operation; minimal impacts would occur from construction of the new unit. Construction impacts would be minimal since the water requirements for construction are limited to smaller uses such as hydrostatic testing and dust control. Uses above minimum thresholds would require permits.

The consumptive water use of the proposed new unit at the Seedco site would be approximately 28 MGD [106 mld], which would be the maximum consumptive use. This value represents approximately 4 percent of the 7Q10 flow at the Danville USGS stream gage which has an estimated 7Q10 of 659 MGD [2,495 mld] (USGS, 2010). This low flow value reflects the cumulative consumptive use of current users upstream of the Seedco site's withdrawal.

There is a potential for climate change to have an impact on water availability in the Susquehanna River Basin, and the SRBC has considered this in its Comprehensive Plan for Water Resources of the Susquehanna River Basin (SRBC, 2008b). The impacts from climate change would be similar for all of the alternative sites and would not distinguish between alternatives.

Increases in consumptive use due to population growth, municipal demands, industry, agriculture, and power generating facilities, including new facilities, within the Middle Susquehanna River subbasin are anticipated in the future. A cumulative analysis of consumptive use in the Middle Susquehanna River subbasin was completed as part of the SRBC Mitigation Plan (SRBC, 2008b). The Mitigation Plan identified a total of 225.2 MGD [852.5 mld] of total consumptive use in the Middle Susquehanna River subbasin in 2025, and 54 MGD [204 mld] of that volume would be from new power generating facilities; the proposed Seedco site would require 51.9 percent of the consumptive use volume from power generating facilities (SRBC, 2008b).

The objective of the SRBC's Mitigation Plan was to quantify the existing and future consumptive uses within the Susquehanna River Basin, identify future consumptive use mitigation requirements, and identify future strategies to eliminate the impact of consumptive water use during droughts. The proposed site and three Alternative Sites occur within the Susquehanna River Basin and will be required to adhere to the use regulations and planning of the SRBC's Mitigation Plan. The application of the SRBC's regulations, planning, and measures to mitigate consumptive use will minimize the cumulative impact of past, present, and reasonably foreseeable future water use within the Susquehanna River Basin.

Given the identified level of existing and future consumptive uses within the Middle Susquehanna River subbasin, past, present, and future projects in the primary area of interest could result in a noticeable cumulative impact on surface water use during low flow periods if mitigation for those consumptive uses does not occur. Mitigation for the proposed Seedco site would be required under SRBC regulations. The operation of the proposed new unit at the

Seedco site would result in a minimal contribution to the cumulative impact of consumptive surface water use during low flow periods.

The cumulative impact on surface water use in the Susquehanna River and the drainages within the Middle Susquehanna River subbasin would be SMALL to MODERATE. If the SRBC Mitigation Plan is implemented successfully and individual projects mitigate consumptive use as required in the SRBC's regulations, there is potential to minimize the impact of consumptive use during low flow periods to the point of returning flows to natural low flow conditions. Cumulative impacts on water use would then be SMALL. The impact of the proposed new unit at the Seedco site on surface water consumptive use would be SMALL.

The effect on groundwater resources would be temporary and limited to dewatering activities during construction. Groundwater use would not be required during operation. As discussed in the SRBC's Groundwater Management Plan (SRBC, 2005), the Seedco site does not fall within a PSA where there may be groundwater availability issues. Due to the availability of groundwater from the glacial overburden aquifer and shale bedrock aquifers, and the negligible effect of groundwater use associated with development of the Seedco site, impact to nearby groundwater resources would be SMALL.

Water Quality

A PADEP issued NPDES permit would be required to operate a nuclear power plant at the Seedco site and would ensure that the discharges complied with the Clean Water Act. Point and non-point pollution sources have historically impacted the water quality of the drainages of the Middle Susquehanna River subbasin upstream and downstream of the site's withdrawal and discharge location, as well as in the Lower Susquehanna-Penns watershed. Currently, a number of the surface water bodies that drain to the Susquehanna River, within the Middle Susquehanna River Basin, are listed as impaired by the PADEP due to their inability to support the State-identified use designations. Approximately 260 streams within the Middle Susquehanna River subbasin are on the Pennsylvania 303(d) list for water quality impairments primarily related to siltation, pH levels, and the presence of metals (PADEP, 2010a). In addition, there are a total of 265 streams within the Lower Susquehanna-Penns watershed on the 303(d) list for the same primary impairments as streams within the Middle Susquehanna River subbasin. The section of the Susquehanna River from which water withdrawals to support the Seedco site would occur is listed as impaired, and a TMDL for metals was developed in 2009 (PADEP, 2009; PADEP, 2010a). A TMDL will be required for all surface waters that cannot be returned to a supporting use designation. A TMDL to reduce nutrient and sediment loading to the Chesapeake Bay is under development (USEPA, 2010f).

Because the surface water quality in the vicinity of the Seedco site is already impaired from past and current actions, the cumulative impact on surface water quality from other past, present, and reasonably foreseeable future projects, and potential effects of climate change, would be SMALL to MODERATE. The principal contributors to this cumulative impact characterization are other point and nonpoint pollution sources in the Middle and Lower Susquehanna River subbasins. Past, present, and reasonably foreseeable future projects will be required to adhere to existing and future water quality regulations, including those to reduce nutrient and sediment loadings to the Chesapeake Bay. As outlined in the preceding paragraph, the Seedco site will be issued NPDES discharge limits to be met through operational controls and monitoring, including thermal impacts. Under state and federal regulations, a permit would not be issued that individually or cumulatively resulted in further degradation to water quality. Construction of the plant would occur in the Lower Susquehanna River Basin and would not impact the Middle Susquehanna River Basin.

Therefore, the contribution from construction and operation of the proposed new unit at the Seedco site to cumulative surface water quality impacts to the Middle Susquehanna River Basin would be SMALL. Construction practices and stormwater runoff from the site could impact the Lower Susquehanna River basin. Because stormwater and construction practices would be followed and containment would be provided for chemicals stored onsite, cumulative impacts from construction and operation of the proposed new unit at the Seedco site on the cumulative surface water quality impacts to Lower Susquehanna River basin would be SMALL.

AMD and agriculture have impacted groundwater quality in portions of the Susquehanna River Basin (SRBC, 2005). During construction and operation of the Seedco site, proper practices to avoid spills and provide containment in chemical storage areas minimize any impacts to groundwater quality. Appropriate stormwater management and treatment would be implemented in accordance with any permitting requirements. If any spills did occur, there would be dilution and attenuation of the spill.

Given the existing impacts to groundwater quality from past and current actions, the cumulative impacts to groundwater quality are SMALL to MODERATE. Because proper construction and operation procedures would be followed to minimize the potential for and to contain any spills, the contribution from construction and operation of a proposed new unit at the Seedco site to cumulative groundwater quality impacts 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.

The proposed Seedco site would be in Northumberland County and its associated conceptual transmission corridor would be in Northumberland and Columbia Counties. The conceptual water makeup and blowdown lines would be within Northumberland and Montour Counties, with the intake/discharge structures on the Susquehanna River in Montour County. Table 9.3-5 (PNHP, 2009d; PNHP, 2009i; PNHP, 2009k; PNHP, 2011c) 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 at the Seedco site.

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.

As stated previously, the conceptual transmission line that would serve the Seedco site would be within Northumberland and Columbia Counties. The conceptual water lines would be within Northumberland and Montour Counties with the intake/discharge location on the Susquehanna River in Montour County. Table 9.3-18 lists state and federally- protected species and other species of ecological importance that may occur in Northumberland County, identifies their habitat requirements, and identifies whether they could occur along the conceptual transmission and water lines that would serve the Seedco site. Table 9.3-17 provides this information for Columbia County and identifies those species that may occur along the conceptual transmission lines for the Seedco site. Table 9.3-16 provides this information for Montour County and identifies those species that may occur along the conceptual water lines for the Seedco site. Review of habitat information identified 18 protected species with potential to occur along the conceptual transmission line and 17 protected species with potential to occur along the conceptual water lines for the Seedco Site.

Construction of conceptual 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 the species identified in Table 9.3-16, Table 9.3-17, and Table 9.3-18 that could occur along the conceptual utility corridors for the Seedco site. As 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 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.

Cumulative Impacts

Construction and operational impacts of the proposed new unit at the Seedco site and the associated offsite water and electrical transmission lines could contribute to the effect of other past, present, and reasonably foreseeable future activities within the region. Because of the proximity of the Seedco site to the proposed Montour site and location within the Susquehanna River basin, the same geographic area and terrestrial resources were used in considering impacts to terrestrial ecology. The projects listed in with potential for interaction and subsequent cumulative impacts to terrestrial ecology are considered the relevant projects for the Seedco site alternative evaluation.

For the cumulative analysis of potential impacts to terrestrial resources, the geographic area of interest include projects within 50 miles of the Seedco site that also are within the Anthracite Upland and Susquehanna Lowlands Sections of the Ridge and Valley Physiographic Province (PA Geologic Survey, 2000). Projects within 50 miles of the Seedco site but outside these physiographic areas and projects more than 50 miles from the Seedco site and within these physiographic areas would be unlikely to have impacts that could interact with impacts from construction and operation of the Seedco facility. The geographic area of interest is expected to encompass the ecologically relevant landscape features and species. The geographic area of interest consists of primarily agricultural croplands, pasture, forests, and some mining. The Seedco site is within the Anthracite Upland Section of the Ridge and Valley Province (PA Geologic Survey, 2010c) and consists of an open level area that was previously mined for coal and a wooded hill with sub-mesic hardwood forest.

Cumulative impacts to terrestrial ecology in the geographic area of interest from past activities have resulted in incremental habitat degradation, fragmentation, and loss. These effects can be exacerbated as additional habitat areas are further fragmented, disrupting the movement and migration of species that use terrestrial and wetland systems. The cumulative effects of these past and present actions on fragmentation and habitat degradation on the geographic area of interest are MODERATE. However, the effect of the proposed development of the proposed new unit at the Seedco site and the associated offsite water and electrical transmission lines on cumulative impacts to terrestrial ecology associated with past, present, and other reasonably foreseeable actions is SMALL, because of the efficacy of public policy and regulations protecting environmental resources and because of the beneficial effects from implementation of reclamation and mitigation projects throughout the geographic area of interest.

Development of the Seedco site would result in removal of forest from much of the hill and leveling of most of the area. However, the site is within a well-developed area where habitats are already fragmented. Transmission and water lines associated with the proposed new unit at the Seedco site would be co-located with existing disturbed corridors to the extent practicable. The new lines would cross undeveloped areas, but would do so adjacent to existing transportation or utility corridors, which would minimize the fragmentation effects. The incremental effect on habitat fragmentation of constructing and operating the proposed new unit at the Seedco site and the associated offsite water and electrical transmission lines would be SMALL relative to the cumulative impacts from other past, present, and reasonably foreseeable actions.

Within the region of geographic interest, the cumulative impacts from past, present, and reasonably foreseeable future projects to threatened, endangered, or sensitive species is estimated to be MODERATE, as a result of habitat loss and degradation. As discussed above, the contribution of the proposed new unit at the Seedco site and the off-site water and electrical transmission lines would be expected to have SMALL contributions to fragmentation and habitat degradation. As discussed in Section 9.3.2.4.4, there are few terrestrial protected species that have potential to occur on the Seedco site or along the off-site water and electrical transmission lines. Because of the low number of potential threatened, endangered, or sensitive species and the low level of fragmentation and habitat degradation that would result from development of the proposed new unit at the Seedco site and the off-site water and electrical transmission lines, any impacts to threatened, endangered, or sensitive species would be SMALL.

The effect of developing the proposed new unit at the Seedco site and the associated offsite water and electrical transmission lines on common and important bat species experiencing population loss from WNS would be similar to that described for the Montour site. However, because the Seedco site would have longer water and transmission lines and would remove a potential flight corridor from the Seedco site, there would be a greater potential for summer mortality or reduced reproduction due to a greater potential for loss of foraging and reproductive habitat associated with more extensive land clearing. In turn, this could make the bat populations more susceptible to collapse as a result of winter death from WNS. The impact to common and important bat species from WNS has been severe, with up to 90 percent winter mortality in populations. However, WNS is a recent occurrence and the contribution of past and present projects to the impacts of WNS in unknown. Future projects that reduce summer or winter habitat have the potential to interact with WNS to produce cumulative impacts to bat populations. Any contribution of the proposed new unit at the Seedco site and the associated offsite water and electrical transmission lines to cumulative impacts to common or important bat species from summer mortality would be expected to be SMALL to MODERATE, depending on hibernation locations of bats using the project area.

The potential for local bird species, migratory birds, and migrating raptors to collide with tall structures and transmission lines would be similar to that described for the Montour site. However, because the Seedco facility would have longer transmission lines, there would be a greater potential for mortality and greater potential for interaction effects with other sources of bird mortality, as the longer transmission lines would present a greater collision hazard. Cumulative impacts to bird species associated with past and present projects is estimated as SMALL to MODERATE, varying among species due to species-specific habitat needs. However, because stationary transmission lines pose a lesser collision threat to birds than the moving blades of wind turbines and multiple wind power generation projects are proposed for the geographic area of interest, any incremental contribution of the proposed new unit at the Seedco site and the associated offsite electrical transmission lines to cumulative impacts to local bird species, migratory birds, and migrating raptors from collisions would be expected to 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 BBNPP Intake Structure. Table 9.3-12, Table 9.3-13, and Table 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 3,790 lf (1,155 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 approximate14.3-mi (23.0-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 9.4 mi (15.1 km) of new transmission corridor would need to be constructed and an additional 14.8 mi (23.8 km) of transmission corridor would need to be expanded to connect to the necessary 500-kV transmission systems (ER Section 9.3.2.4.10). The water pipeline will not cross any wetlands and may cross 430.1 lf (131.1 m) of streams, including Quaker Run, a tributary of Shamokin Creek and Little Roaring Creek (Table 9.3-12 and Table 9.3-14). New transmission line ROW may cross 4.5 ac (1.8 ha) of wetlands and 2,040 lf (621.7 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.

As stated previously, the proposed Seedco site would be in Northumberland County and its associated conceptual transmission corridor would be in Northumberland and Columbia Counties. The conceptual water makeup and blowdown lines would be within Northumberland and Montour Counties, with the intake/discharge structures on the Susquehanna River in Montour County. There are no federally protected aquatic species known to occur in Northumberland County, Pennsylvania. Table 9.3-5 identifies two state-protected, rare 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 are 17 aquatic and wetland plants tracked by the PNHP (PNHP, 2011c) among the species listed inTable 9.3-18 that have been recorded from Northumberland County. However, the Seedco site does not provide suitable aquatic or wetland habitat for any of these protected species. Therefore, no impacts to wetland or aquatic plant species would result from construction and operation of a new unit at 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.

The conceptual transmission line that would serve the Seedco site would be within Northumberland and Columbia Counties. The conceptual water lines would be within Northumberland and Montour Counties with the intake/discharge location on the Susquehanna River in Montour County. Table 9.3-18 lists state and federally- protected species and other species of ecological importance that may occur in Northumberland County, identifies their habitat requirements, and identifies whether they could occur along the conceptual transmission and water lines that would serve the Seedco site. Table 9.3-17 provides this information for Columbia County and identifies those species that may occur along the conceptual transmission lines for the Seedco site. Table 9.3-16 provides this information for Montour County and identifies those species that may occur along the conceptual water lines for the Seedco site. Review of habitat information identified 21 protected species that utilize aquatic habitats with potential to occur along the conceptual transmission line and 19 protected species that utilize aquatic habitats with potential to occur along the conceptual water lines for the Seedco Site.

Golden club (*Orontium aquaticum*) is an aquatic species that could occur in streams on the conceptual Seedco water line (Table 9.3-18). This species is now known to be much more common in Pennsylvania and has been recommended for removal from the state list (Morris Arboretum, 2010). This species would persist in the seedbank and would be expected to recolonize any areas after disturbance was complete. Additionally, clearing along streams containing golden club would result in improved habitat conditions from greater light availability and should result in increased growth of the species, should it occur along the route.

Construction of conceptual water pipelines, intake and discharge structures, 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 and structures, 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 the species identified in Table 9.3-16, Table 9.3-17, and Table 9.3-18 that could occur along the conceptual utility corridors and their endpoints for the Seedco site. As 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.

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 3,790 lf (1,155 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 conceptual 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 moderate (approximately 6,588 lf [2,008 m] of stream and approximately 5.4 ac [2.2 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.

Cumulative Impacts

Cumulative impacts to aquatic and wetland resources may result from past, present, and future actions that cause loss of habitat, alter the physical or chemical integrity of waters within aquatic and wetland habitats, alter the physical structure of aquatic or wetland habitats, or alter populations of aquatic or wetland flora and fauna. The impacts of construction and operation of the proposed new unit at the Seedco site and the associated offsite water and electrical transmission lines could contribute to the effect of other past, present, and reasonably foreseeable future activities within the region. As discussed for other alternative sites, all of the projects listed in Table 9.3-23 have the potential to directly or indirectly affect aquatic or wetland flora or fauna. Accordingly, they have the potential to contribute to cumulative impacts in the region.

For the cumulative analysis of potential impacts to wetland resources, the geographic area of interest is the same area defined for terrestrial resources defined in Section 9.3.2.4.4. The impacts of actions occurring outside this area would be unlikely to interact with or contribute to the impacts resulting from development of the Seedco site and associated water and electrical transmission lines.

For the cumulative analysis of potential impacts to aquatic resources, the geographic area of interest is limited to the area where impacts from development of the Seedco site would be likely to interact with impacts of other past, present, and future projects with regard to aquatic resources. The geographic area of interest includes the northeastern part of the Ridge and Valley Physiographic Province and includes the portion of the Anthracite Valley Section west of the City of Wilkes-Barre, the Susquehanna Lowlands Section, and that portion of the Anthracite Upland Section in the Susquehanna River Basin extending from the Shamokin Creek watershed northeast to the divide with the Delaware River Basin. Cumulative impacts to aquatic resources within the Susquehanna River would include potential cumulative impacts to the West Branch Susquehanna River from the Lycoming County Line downstream to its confluence with the North Branch Susquehanna River at Sunbury, the North Branch Susquehanna River from Wilkes-Barre downstream to its confluence with the West Branch Susquehanna River at Sunbury, and on the Susquehanna River from Sunbury downstream to the confluence of the Susquehanna River with the Juniata River. Cumulative impacts to aquatic resources would not be expected to extend into the Blue Mountain Section or the Appalachian Mountain Section of the Ridge and Valley Physiographic Province or to extend into other physiographic provinces.

The combined effects of past and present projects have resulted in substantial degradation of aquatic and wetland resources in the geographic area of interest as a result of incremental habitat degradation, habitat alteration, and habitat loss. This degradation can be exacerbated by the effects of future projects. Primary causes of impacts to aquatic ecology have been loss of riparian habitat, nutrient inputs from agricultural operations, siltation and sedimentation from land clearing and agriculture, and construction of mill, canal, and hydropower dams. The cumulative effect of these past and present actions is MODERATE to LARGE, depending on the degree of development within a given watershed. However, the potential for the impacts of future projects, including the construction of the proposed new unit at the Seedco site, to further contribute to incremental impacts to aquatic and wetland resources, including recreationally important fish species or ecologically important aquatic species, that have resulted from these activities is SMALL. This is because of the efficacy of public policy and regulations protecting environmental resources and the implementation of reclamation and mitigation projects, particularly low head dam removal and mine reclamation, throughout the geographic area of interest.

The greatest potential for increased interaction of impacts from current and future projects with the impacts from development of the Seedco site, including its associated water and transmission corridors, is through increased thermal and chemical changes to waters within aquatic habitats of the Susquehanna River from operation of the new unit. The impacts of past and current projects on the aquatic resources of the Susquehanna River have resulted in degradation of its habitats. These impacts can be exacerbated if there are further chemical or thermal changes. Impacts from chemical and thermal loading to the Susquehanna River from discharge of cooling blowdown water would be the same as described for the Humboldt site and would not distinguish the Seedco site from the other alternative sites. Impacts from chemical and thermal loading to the Susquehanna River from discharge of cooling blowdown water from the Seedco site would diluted by the inflow from Shamokin Creek, Peens Creek, Hallowing Run, and the West Branch Susquehanna River. The permitted wastewater discharge from Sunbury would further dilute the chemical and thermal loading from the proposed new unit at the Seedco site and minimize the potential for contribution to cumulative impacts. The cumulative effect to aquatic resources of past, present, and future projects contributing chemical and thermal loading to the river is expected to be MODERATE. However, the contribution of the proposed new unit at the Humboldt site to cumulative impacts from thermal and chemical loading would be SMALL. Operation of the water and transmission lines would not be expected to contribute to cumulative impacts to aquatic resources beyond that associated with discharges of cooling and blowdown water to the Susquehanna River.

The potential for impacts from development of the Seedco site to further contribute to cumulative impacts to aquatic resources in the immediate vicinity of the proposed site would be limited. Onsite post-construction stormwater systems would minimize the potential for increased sediment and turbidity resulting from construction activities to reach nearby streams. Any contribution to cumulative impacts on aquatic ecology from construction of the proposed new unit at the Seedco site would be SMALL.

Construction of the water corridor for the Seedco site would have a smaller potential to contribute to cumulative impacts to aquatic resources than that described for the Montour site. Although the water lines would be slightly longer than those for the Montour site, a smaller stream length, approximately 430.1 lf (131.1 m) or approximately 13 percent of the length would be affected. Streams in the new corridors would experience riparian clearing and may subsequently experience water temperature increases from the greater exposure to sunlight. These streams will be maintained in as well-shaded a state as practicable to minimize the warming effect of direct sunlight. Increased turbidity from soil disturbance during construction would not be expected to contribute to cumulative impacts to aquatic resources because these impacts would be temporary and end once construction was complete. Because the water lines would be collocated with existing lines to the extent possible, the contribution of impacts from construction of the conceptual water lines for the Seedco site to contribute to cumulative impacts to aquatic resources would be expected to be SMALL.

New and upgraded transmission lines would be constructed to serve the Seedco site and would impact 2,040 lf (621.7 m) of stream. As a result, these transmission lines could contribute to cumulative impacts to aquatic resources as a result of riparian clearing, which may cause stream water temperature to increase from the greater exposure to sunlight. These streams will be maintained in as well-shaded a state as practicable to minimize the warming effect of direct sunlight. The transmission lines would span streams and support infrastructure would be placed outside of waters to the extent practicable, which would avoid or minimize disturbance to instream habitats. Therefore, little to no contribution to cumulative impacts to aquatic resources from instream habitat degradation would be expected from construction of the transmission lines. Because the transmission lines would be collocated with existing lines to the extent possible, the incremental impact would be minimized and the resulting stream and wetland impacts would be similar to those for the Montour site. The contribution of impacts from construction of the conceptual transmission lines for the Seedco site to contribute to cumulative impacts to aquatic resources would be expected to be SMALL.

Because the water and transmission lines would cross different waters, no interaction of effects from construction of the utility corridors would be expected. Operation of the water and transmission lines would not be expected to contribute to cumulative impacts to aquatic resources beyond the previously discussed discharges of cooling and blowdown water to the Susquehanna River.

Aquatic and Wetland Species

The cumulative effect to protected aquatic species throughout the geographic area of interest from past, present, and foreseeable future projects is expected to be SMALL to MODERATE due to the level of historical disturbance to aquatic and wetland communities and because of efforts to avoid and mitigate for potential effects.

There is no habitat to support federal or state threatened or endangered aquatic species on the Seedco site, and the 0.7 ac (0.3 ha) of wetland habitats that would be affected by site development are unlikely to support federal or state threatened or endangered wetland species. No impacts to these species are expected from construction of the proposed new unit at the Seedco site. Because there would be no impacts to these species from construction of the proposed new unit, the impacts of construction of the Seedco site would not further contribute to cumulative impacts to threatened or endangered aquatic or wetland species.

Impacts from operation of the Seedco site would have the potential to interact with other past, present, and future projects and contribute to cumulative impacts to federal or state protected aquatic species through the discharge of cooling and blowdown water to the Susquehanna River. The potential for a contribution to cumulative impacts from chemical and thermal loading to the Susquehanna River from discharge of cooling blowdown water would be the same as described for the Montour site and would not distinguish between the two sites. This contribution to cumulative impacts would be SMALL. Operation of the proposed new unit at the Seedco site would not affect wetland resources and there would be no potential for wetland impacts from operations to interact with other past, present, and future projects to contribute to cumulative impacts to federal or state threatened or endangered wetland species.

Federal or state threatened or endangered aquatic species could occur along the transmission and water lines that would serve the Seedco site. Because aquatic habitats that may harbor threatened or endangered aquatic species would be avoided through route selection to the extent practicable and because of the SMALL impacts expected to general aquatic resources discussed above, the potential for impacts from construction of the water and transmission lines to make incremental contributions to cumulative impacts to these protected species would be SMALL.

Operation of the water and transmission lines would not be expected to contribute to cumulative impacts to federal or state threatened or endangered aquatic species beyond the previously discussed discharges of cooling and blowdown water to the Susquehanna River. Construction of the Seedco site would result in loss of approximately 0.7 ac (0.3. ha) of wetlands, which would be mitigated as directed by requirements of the Clean Water Act Section 404 permit required to develop the site. With implementation of the required mitigation, any contribution of impacts from construction of the Seedco site to cumulative impacts to wetland resources, including threatened and endangered species, would be SMALL.

Wetlands

Construction of the transmission lines that would serve the Seedco site would impact 4.5 ac (1.8 ha) of wetlands, which would be mitigated as directed by requirements of the Clean Water Act Section 404 permit required for the work. With implementation of the required mitigation, any contribution of impacts from new and upgraded/expanded transmission lines that would serve the Seedco site to cumulative impacts to wetland resources, including threatened and endangered species, would be SMALL.

Construction of the water lines that would serve the Seedco site would not impact wetlands. Because there would be no impacts to wetlands from construction, the impacts of construction of the water lines to support the Seedco site would not further contribute to cumulative impacts to wetlands.

The cumulative impact to wetlands from past, present, and foreseeable future projects, including the Seedco site and associated transmission and water lines, is expected to be MODERATE, however, because of the magnitude of wetland losses in the past.

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 370 parks located within a 50-mi (80-km) radius of the Seedco site, which includes 69 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, 1 state forest, 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, there were a total of 901,714 housing units available within a 50-mile (80-km) radius of the Seedco site (USCB, 2000f), with a total of 125,072 housing units vacant or not occupied. A total of 4,329 housing units 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.

Cumulative Impacts

In addition to impacts from construction and operation of the proposed new unit at the Seedco site, projected cumulative impacts from other past, present, and reasonably foreseeable future projects that may not be a part of general growth in the region were also considered. A geographic area of interest within a 50-mile (80-km) radius of the Seedco site was reviewed for projects that may have a potential impact to cumulative socioeconomic impacts. Within this radius, the projects reviewed included: Intelliwatt Renewable Energy, LLC 13-MW biomass energy facility; Future Fuels, LLC IGCC clean coal technology facility; a 2.6-MW hydroelectric facility; MCMA sewage pump station; system improvements by the Hazelton City Water Authority; the Pocono Township Sewer Project; and Chesapeake Gardens manufacturing facility. The following summarizes the socioeconomic review of each of these potential future projects.

The Intelliwatt Renewable Energy, LLC 13-MW biomass energy facility is anticipated to be completed in 2011. The facility is proposed to be located in Northumberland County in the Coal Township SEEDCO Industrial Park, which is less than 5 mi (8 km) from the Seedco site. In addition to jobs created during construction of the facility, at least 32 employees would be employed at the beginning of operations and the number of employees could double by the third year (The News Item, 2010a). The biomass facility would have a different construction schedule than BBNPP. Therefore, construction of the biomass facility is not anticipated to impact the available workforce if the proposed new unit were to be built at the Seedco site. Based on the number of employees hired by the biomass facility, cumulative impacts to public services, education and housing would not be expected to occur. Due to the distance of the Intelliwatt Renewable Energy facility from the Seedco site, cumulative aesthetic impacts could occur.

The Future Fuels, LLC 270-MW IGCC clean coal technology facility is being considered in Northumberland County located less than 5 mi (8 km) from the Seedco site. The current status or anticipated construction dates for this proposed facility is currently unknown (The News Item, 2010b). If both the IGCC facility and the proposed new unit at the Seedco site were to have a peak construction workforce occur simultaneously, impacts to the available construction workforce, public services, education, and housing could occur. Due to the distance of the IGCC facility from the Seedco site, cumulative aesthetic impacts during operation could also occur.

Construction of a 2.6-MW hydroelectric project is being proposed in Carbon County, Pennsylvania, which is located approximately 45 to 50 mi (72 to 80 km) east of the Seedco site. The proposed project would be located on the downstream side of the Beltzville Dam next to an existing stilling basin. A license was issued by the FERC in September 2008. Paragraph 63 of the Order Issuing License states that Article 301 of the license terms requires the licensee to start project construction within 2 years of the issuance date of this license and complete construction within 5 years from the issuance date (FERC, 2008a). The hydroelectric facility would have a different construction schedule than BBNPP. Therefore, construction of the hydroelectric facility is not anticipated to impact the available workforce if the proposed new unit were to be built at the Seedco site. Cumulative impacts to public services, education, and housing would also not be expected to occur. Due to the distance of the hydroelectric project from the Seedco site, cumulative aesthetic impacts would also not be expected to occur.

MCMA anticipates construction of a $1.8 M sewage pump station less than 5 mi (8 km) from the Seedco site. Timing for construction of the facility is currently not known. The project would result in a beneficial increase in sewage capacity for the area (The News Item, 2010c). Assuming the sewage pump station will not require a large workforce during construction or operation, the sewage pump station is not anticipated to impact the available workforce for the Seedco site during construction or operation. Cumulative impacts to public services, education, housing, and aesthetics would also not be expected to occur.

Hazelton City Water Authority received a $2.8M grant to replace more than 1 mile of deteriorated water distribution mains, construct a new 88,000 gallon water storage tank, and construct new water treatment facilities. These improvements are expected to eliminate leaks and water loss while improving facility efficiency (Office of the Governor, 2009). The location of these planned improvements is approximately 30 to 35 mi (48 to 56 km) northeast of the Seedco site. The project would result in an improvement to the existing water treatment system. Due to the distance of this project from the Seedco site, this project is not expected to impact the available workforce for the Seedco site during construction or operation. Cumulative impacts to public services, education, housing, and aesthetics would also not be anticipated to occur.

Congressman Kanjorski requested funding for the Pocono Township Sewer Project, which would be used to construct and install sewer lines and pumping stations in Pocono and Hamilton Townships. The project would be located approximately 10 to 15 mi (16 to 24 km) from the Seedco site. The increase in sewer capacity is being proposed to meet the expanding needs for residential and industrial use (Congressman Paul E. Kanjorski, 2010a). The project would result in an improvement to the existing sewer treatment system. Assuming these improvements would not require a large workforce during construction or operation, this project is not expected to impact the available workforce for the Seedco site during construction or operation. Cumulative impacts to education, housing, and aesthetics would also not be expected to occur.

Chesapeake Gardens, a 25,000 square-foot plant for manufacturing of soup, sauce, gravy and frozen casseroles, is anticipated to be built in Northumberland County, Coal Township. This facility would be located approximately 10 to 15 mi (16 to 24 km) west of the Seedco site and is anticipated to create 30 to 50 jobs within the first 18 months of being operational. The facility may move to the area sometime in 2011 or early 2012 (The News Item, 2010c). Due to the schedule of this project and the size of the anticipated workforce, the impact to the available workforce, public services, education, and housing would not be expected to occur. Cumulative aesthetic impacts would also not occur.

The remaining projects identified in Table 9.3-23 are either already operational or part of the general growth in the region. The projects within the geographic area of interest would be consistent with applicable county plans and policies. Based on the review and analysis of the impacts from construction and operation of the proposed new unit at the Seedco site, as well as the projected cumulative impacts from other past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the site, cumulative socioeconomic impacts from the projects are expected to be manageable, particularly over time.

Under some circumstances, building the proposed new unit at the Seedco site could make a temporary, detectible, adverse cumulative effects associated with some socioeconomic issues. Those impacts could include SMALL to MODERATE impacts including available workforce and local infrastructures and public services (transportation, recreation, housing, police, fire and medical services, and schools). The beneficial cumulative effects on regional economies and tax revenues would be beneficial and SMALL to LARGE due to annual taxes and revenue generated by the new workers contributing to the local economy and the productivity of the region. Building the proposed new unit at the Seedco site in addition to other past, present and reasonably foreseeable projects would have MODERATE cumulative impacts on aesthetics. Construction and operation of the proposed new unit at the Seedco site would be a significant contributor to these incremental impacts.

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.

Cumulative Impacts

The assessment of transportation impacts during construction and operation of the proposed new unit at the Seedco site also considered other past, present, and reasonably foreseeable future actions within a 50-mi (80-km) radius of the Seedco site. These projects include federal and non-federal projects and are listed in Table 9.3-23. The existing and planned projects that could potentially add to the impact on transportation from the Seedco site include four energyrelated facilities, one of which is currently operational.

The operational Mount Carmel Cogeneration plant, a waste coal-fired power plant, is located less than 3 miles from the Seedco site. The second plant, an integrated gasification combined cycle (IGCC) plant, was awarded its permits in 2010 and construction should be completed in 2011. It is located near Tower City approximately 14 mi (22 km) from the Seedco site. The company that owns this plant, Future Fuels, LLC, could locate a second IGCC facility within the Seedco Industrial Park (The News Item, 2010d). The fourth facility, the Intelliwatt Renewable Energy Bio-Mass project, has received state funding and would also be located in the Seedco Industrial Park (Keystone Energy Technology Enterprise Center, Inc. [KETEC], 2010; Senator Arlen Specter, 2010b). Operational traffic to and from the Mount Carmel plant during construction activities at the Seedco site would add to the impact in the area but would be temporary. If the second ICGG Future Fuels plant and the Intelliwatt facility were also built within the Seedco Industrial Park area, particularly if the construction of an NPP at the Seedco site occurred simultaneously, the impact on transportation in the area would be significant. This would be especially the case during construction. If the two Future Fuels IGCC plants interacted with one another (inter-plant deliveries or worker exchange), this would also add to the transportation issues. However, these construction impacts would be temporary. There would also be cumulative impacts to transportation during operation due to increased worker and delivery traffic.

Based on the review and analysis of impacts on transportation of the proposed new unit at the Seedco site, as well as the projected cumulative impacts from other past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the Seedco site, the cumulative impacts on transportation would be MODERATE to LARGE during construction and SMALL to MODERATE during operation. However, the incremental contribution from construction and operation of the proposed new unit at the Humboldt site on the cumulative impacts would be SMALL.

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.

Cumulative Impacts

Cultural resources, by definition, are non-renewable. Therefore, the impact of their destruction is cumulative. The assessment of historic, cultural, and archaeological resource impacts from construction, preconstruction and operation of the proposed new unit at the Seedco site considered other past, present, and reasonably foreseeable future projects that could affect the resources in the region. Table 9.3-23 identifies other past, present, and reasonably foreseeable future projects and other actions considered in the cumulative analysis of the Seedco site.

Projects within the geographic area of interest may have a potential cumulative impact to cultural resources if ground disturbing activities occur, or if new above-ground structures visually impact the area. For cultural resources, the geographic area of interest is based on the characteristics of the specific resource. For archaeological resources, the geographic area of interest is limited to the area where ground disturbing activities would occur. For historic buildings and structures, impacts can be physical and visual and the geographic area of interest is 5 mi (8.1 km) or less. The geographic area of interest for the conceptual transmission and water lines serving the facility is defined as 1 mi (1.6 km), 0.5 mi (0.8 km) on either side, from the center line of the corridor extending the entire length of the corridor. These corridors would cross both developed and undeveloped areas. Location of these corridors is adjacent to existing transportation or utility corridors where possible, which would minimize any potential cumulative visual impacts to historic, cultural, or archaeological resources. Based on the existing conditions and the past, present, and reasonably foreseeable future projects, the cumulative impacts from preconstruction, construction, and operation of the proposed new unit at the Seedco site and from other projects would be SMALL. Similarly, the incremental contribution to local and regional impacts on cultural resources due to the construction and operation of a new unit at the Seedco site and related utilities would be insignificant.

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. Figure 9.3-30 through Figure 9.3-33 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 9.3-34 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.

Cumulative Impacts

In addition to the impacts from construction and operations, the cumulative impacts analysis also considered other past, present, and reasonably foreseeable future projects that could cause environmental justice impacts on minority and low-income populations. For this cumulative impacts analysis, a geographic area of interest within the region was selected that included Northumberland, Columbia, and Schuylkill counties within Pennsylvania.

While there are minority and low-income populations within the geographic area of interest of the Seedco site, the numbers of census block groups meeting these criteria were a small percentage of the total census block groups within the geographic area of interest. Based on the location and types of past, present, and reasonably foreseeable future projects identified in Table 9.3-23, it does not appear that the projects likely have or will contribute to environmental justice impacts to the geographic area of interest.

Based on the review and analysis of the impacts from construction and operation of the proposed new unit at the Seedco site, as well as the projected cumulative impacts from other past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the site, there would be no disproportionate and adverse cumulative impacts to minority and low-income populations in the above areas, and the environmental justice impacts would be SMALL. Construction and operation of the proposed new unit at the Seedco site would not contribute additional environmental justice cumulative impacts.

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 9.4 mi (15.1 km), where 14.8 mi (23.8 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 MODERATE.

Cumulative Impacts

The assessment of impacts associated with transmission corridors during construction and operation of the proposed new unit at the Seedco site also considered other past, present, and reasonably foreseeable future actions that could contribute to cumulative impacts associated with transmission corridors in the region, including federal and non-federal projects listed in Table 9.3-23. For the purpose of evaluating the potential for cumulative impacts in the region associated with transmission corridors, including the impacts attributable to a new unit at the Seedco site, the primary geographic area of interest was assumed to be the area within approximately 15 mi (24 km) of the site, consistent with the geographic area of interest for analysis of land use impacts. Cumulative impacts of the transmission corridors on terrestrial ecology; aquatic ecology; and historic, cultural, and archeological resources from construction and operation of the proposed new unit at the Seedco site are described in Sections 9.3.2.4.4, 9.3.2.4.5, and 9.3.2.4.8, respectively. This section focuses on land use impacts associated with the construction and operation of transmission corridors associated with the proposed new unit at the site. Cumulative impacts on land use from construction and operation of a proposed new unit at the Seedco site are described in Section 9.3.2.4.1.

Land use impacts associated with construction and operation of approximately 9.4 mi (15.1 km) of new 500-kV transmission corridor and upgrade/expansion of approximately 14.8 mi (23.8 km) of existing 230-kV transmission corridor for the proposed new unit at the Seedco site would add to those associated with over 80 mi (128.7km) of existing 230-kV transmission lines within the geographic area of interest. The transmission corridors pass through land that is primarily considered agricultural or forest land. The areas are mostly remote, with low population densities. The longer lines cross numerous state and U.S. highways. Impact of these transmission corridors on land usage is minimal; farmlands that have transmission corridors passing through them generally continue to be used as farmland (PPL, 2006). Upgrades to or expansion of an existing transmission corridor would experience only minimal change. However, transmission corridors passing through previously undisturbed forest land would result in forest fragmentation.

As stated previously, operational activities within the transmission corridors may include visual inspection and appropriate vegetation maintenance of transmission line ROWs. Impacts associated with operational activities are expected to be minimal because the initial forest/ vegetation clearing/trimming would have occurred during construction activities and operational activities would only maintain and promote previously established vegetation status.

There are no known future energy-related projects that could contribute to cumulative transmission corridor impacts within the geographic area of interest.

Based on the review and analysis of the impacts from the proposed new unit at the Seedco site, as well as the projected cumulative impacts from other past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the Seedco site, the cumulative impacts on land use of the transmission corridors would be MODERATE and the incremental contribution from construction and operation of the transmission corridors associated with the proposed new unit at the Seedco site would be expected to be MODERATE.

9.3.2.4.11 Nonradiological Health Impacts

The analysis of nonradiological health impacts to members of the public and site workers for the Seedco site includes construction-related activities for the proposed new 1,600 MWe nuclear unit and its associated structures and facilities, as well as routine operation of the plant when it is complete. The analysis also considers other past, present, and reasonably foreseeable future actions that could impact nonradiological health, including other federal and non-federal projects, and those projects listed in Table 9.3-23 and shown in Figure 9.3-35 within the geographic area of interest. The construction-related activities that have the potential to impact the health of members of the public and workers at the site include exposure to dust and vehicle exhaust, occupational injuries, noise, and the transport of construction materials and personnel to and from the site. The operation-related activities that have the potential to impact the health of members of the public and workers at the site includes exposure to etiological agents such as noise, EMFs, and impacts from the transport of workers to and from the site. For the analysis of nonradiological health impacts at the Seedco site, the geographic area of interest is considered to include projects within a 5 mi (8.1 km) radius of the site center based on the localized nature of the impacts. For impacts associated with transmission lines and other utility corridors (i.e., water and wastewater), the geographic area of interest would typically be limited to corridor rights of way and the areas immediately adjacent to them.

Construction Impacts

Nonradiological health impacts to construction workers and members of the public attributable to the construction of a new nuclear unit at the Seedco site would be similar to those evaluated in Section 4.7, Nonradiological Health Impacts, for the BBNPP site. The impacts include noise, vehicle exhaust, dust, occupational injuries, and transportation accidents, injuries, and fatalities. Applicable federal and state regulations on air quality and noise would be complied with during the site preparation and construction phase. The incidence of construction worker accidents would not be expected to differ from the incidence of accidents estimated for the BBNPP site.

The Seedco site is a brownfield site that is located in the Seedco Industrial Park, east/southeast of the community of Ranshaw and the City of Shamokin in Northumberland County, Pennsylvania. Construction impacts on the surrounding populations are expected to be minimal and typical of other large construction projects. Access routes to the site for construction workers would include I-81, which is approximately 9 mi (14.5 km) southeast of the site, and I-80, which can be accessed by 2-lane roads, including State Highway 61 that runs parallel to the site approximately 0.25 mi (0.4 km) from the northern boundary. As described in ER Section 4.4.1.5, Transportation Routes, for the BBNPP site, local 2-lane roads may become more congested during peak construction-related activities and mitigation may be necessary to ease congestion, thereby improving traffic flow and reducing nonradiological health impacts (e.g., traffic accidents, injuries, and fatalities) during the construction period.

The Seedco site is in the existing Seedco Industrial Park, whose current tenants consist primarily of light industry and food manufacturing. No past or current actions in the geographic areas of interest were identified that would be expected to significantly impact the public or workers. The largest projects or facilities within 5 mi (8.1 mi) of the Seedco site (Table 9.3-23) include the 13 MWe Intelliwatt Renewable Energy, LLC biomass-fueled generating facility, the 47 MWe waste coal-fired Mt. Carmel Cogeneration, LLC facility, the Future Fuels, LLC IGCC facility, and the Chesapeake Gardens food manufacturing facility. The development of the Seedco site would result in additional traffic and air emissions in the area, but the increase above existing levels is not expected to be substantial, except during peak construction periods. Proposed future actions would also include general transmission line development and/or upgrading in the region, and future urbanization associated with population growth, both of which would occur throughout the designated geographical areas of interest. These actions would be expected to result in nonradiological health impacts similar to those discussed above for the construction of a nuclear unit and associated facilities at the Seedco site.

Operational Impacts

Nonradiological health impacts to site workers and members of the public attributable to the operation of a nuclear unit at the Seedco site would be similar to those evaluated in Section 5.8, Socioeconomic Impacts, for the BBNPP site. Occupational health impacts to workers (e.g., falls, electric shock or exposure to other hazards) at the Seedco site would be expected to be the same as those evaluated for workers at the new unit at the BBNPP site. Based on the configuration of the proposed new unit at the Seedco site (closed-cycle, wet cooling system with mechanical draft cooling towers), etiological agents would not likely increase the incidence of water-borne diseases in the vicinity of the site. Noise and EMF exposure would be monitored and controlled in accordance with applicable OSHA regulations. Effects of EMF on human health would be controlled and minimized by conformance with NESC criteria. Nonradiological impacts of traffic associated with the operations workforce can be expected to be less than the impacts during construction. Mitigation measures taken during construction to improve traffic flow would also be expected to minimize traffic impacts during operation of a new unit. Mitigation measures used during the operational phase would likely be similar to those described in Section 5.10, Measures and Controls to Limit Adverse Impacts During Operation, for the BBNPP site.

Past and present actions in the geographic area of interest (i.e., the 13 MWe Intelliwatt Renewable Energy, LLC biomass-fueled generating facility, the 47 MWe waste coal-fired Mt. Carmel Cogeneration, LLC facility, the Future Fuels, LLC IGCC facility, and the Chesapeake Gardens food manufacturing facility) and existing transmission lines represent the primary and most significant potential sources of nonradiological health impacts from operations to the public and workers. Proposed future actions that would impact nonradiological health in a similar way to operation activities at the Seedco site would include regional transmission line expansions and upgrades, and future urbanization due to population growth, both of which are likely to occur within the geographical areas of interest.

The potential exists for future climate changes that could have an impact on human health. Projected changes in the climate for the region are currently based on observed cycles and fluctuations in average temperature and average precipitation, both of which are expected to increase slightly over time, based on current trends. These trending increases in temperature and precipitation could potentially alter the presence of microorganisms and parasites in surface water; however, insufficient information exists to reliably quantify any specific changes in these parameters, and there is no evidence to suggest that the operation of a nuclear generating facility at the Seedco site would cause or contribute to those changes, or that there would be any significant change in the presence of etiological agents or the incidence of water-borne diseases.

Summary

The impacts of the construction and operation of a new nuclear unit at the Seedco site on nonradiological health are expected to be similar to the impacts evaluated for the BBNPP site. While there are past, present, and future activities in the geographic area of interest that could affect nonradiological health in ways similar to the construction and operation of a new unit and associated facilities at the Seedco site, those impacts are expected to be localized and managed through adherence to existing regulatory requirements. Therefore, the cumulative impacts of the construction and operation of a nuclear generating unit and associated facilities at the Seedco site on nonradiological health would be SMALL.

9.3.2.4.12 Radiological Impacts of Normal Operations

The analysis of radiological health impacts to members of the public and site workers for the Seedco site includes construction-related activities for the new 1,600 MWe nuclear unit and its associated structures and facilities, as well as routine operation of the plant once construction is complete. The analysis also considers other past, present, and reasonably foreseeable future actions that impact radiological health, including other federal and non-federal projects, and those projects listed in Table 9.3-23 within the geographic area of interest. As described in Section 9.3.2.4.1, Land Use, the Seedco site is located in the Seedco Industrial Park; currently, there are no nuclear facilities on or adjacent to the site. The geographic area of interest is the area within a 50 mi (80.5 km) radius of the Seedco site. Existing nuclear generating facilities potentially affecting radiological health within this area are the Peach Bottom Atomic Power Station (Units 2 and 3, 82 mi [132 km] south), Three Mile Island Nuclear Generating Station (Unit 1, 64 mi [103 km] southwest), Limerick Generating Station (Units 1 and 2, 55 mi [88.5 km] south-southeast), Salem Nuclear Power Plant (Units 1 and 2, 105 mi [169 km] south), SSES (Units 1 and 2, 12 mi [19.3 km] north-northwest) and the Hope Creek Nuclear Generation Station (Unit 1, 104.7 mi [168.5 km] southeast). There are also likely to be hospitals and industrial facilities within 50 mi (80.5 km) of the Seedco site that use radioactive materials.

The radiological impacts of constructing and operating a nuclear unit at the Seedco site would include doses from direct radiation, and liquid and gaseous radioactive effluents. These pathways would result in low doses to people and biota offsite that would be well below regulatory limits. These impacts are expected to be similar to those estimated for the BBNPP site as described in Section 5.4, Radiological Impacts of Normal Operations.

The radiological impacts of the other operating nuclear power plants listed above also include doses from direct radiation and liquid and gaseous radioactive effluents. These pathways result in low doses to people and biota offsite that are well below regulatory limits as demonstrated by the required ongoing REMP conducted around these plants. These pathways are expected to result in low doses to people and biota offsite that would be well below regulatory limits. Doses attributable to direct radiation and radioactive effluents from hospitals and industrial facilities that use radioactive materials would represent an insignificant contribution to the cumulative impact around the Seedco site. This conclusion is based on data from REMPs conducted around currently operating nuclear power plants, which consistently demonstrate that radiological levels at offsite locations are well below acceptable limits at all offsite locations, as required by each facility's operating license. It is concluded that the cumulative radiological impacts from constructing and operating a proposed nuclear unit and other existing and planned projects and actions in the geographic area of interest around the Seedco site would be SMALL.

9.3.2.4.13 Postulated Accidents

The analysis of postulated accidents includes accidental radiological releases during operation of a nuclear unit at the Seedco site. The analysis also considers other past, present, and reasonably foreseeable future actions that impact radiological health from postulated accidents, including other federal and non-federal projects, and those projects listed in Table 9.3-23 within the geographic area of interest. As described in Section 9.3.2.4.1, Land Use, the Seedco site is located in the existing Seedco Industrial Park, whose tenants include light industry and food manufacturing. There are currently no nuclear facilities on the site. The geographic area of interest considers all existing and proposed nuclear power plants that have the potential to increase the probability-weighted consequences (i.e., risks) from a severe accident at any location within 50 mi (80.5 km) of the Seedco site. Existing facilities potentially affecting radiological accident risk within this geographic area of interest include the existing Peach Bottom Atomic Power Station (Units 2 and 3, 82 mi [132 km] south), Three Mile Island Nuclear Generating Station (Unit 1, 64 mi [103 km] southwest), Limerick Generating Station (Units 1 and 2, 55 mi [88.5 km] south-southeast), Salem Nuclear Power Plant (Units 1 and 2, 105 mi [169 km] south), SSES (Units 1 and 2, 12 mi [19.3 km] north-northwest) and the Hope Creek Nuclear Generation Station (Unit 1, 104.7 mi [168.5 km] southeast). No other reactors have been proposed within the geographic area of interest or within the region that would affect accident risk in the geographic area of interest.

The environmental consequences of DBAs at the Seedco site are expected to be minimal and similar to those that have been predicted for the U.S. EPR that would be built at the BBNPP site as described in Section 7.1, Design Basis Accidents. DBAs have been specifically addressed for the BBNPP site to demonstrate that the reactor design is robust enough to meet all applicable NRC safety criteria. It is also noted that the U.S. EPR design is independent of site conditions and the meteorology of the Seedco and BBNPP sites are considered to be generally similar. Because the meteorology, population distribution, and land use for the Seedco site are all expected to be similar to the proposed BBNPP site, risks from a severe accident for a U.S. EPR reactor located at the Seedco site are expected to be similar to those analyzed for the proposed BBNPP site and described in Section 7.2, Severe Accidents. Although there are no new reactors currently planned within the geographic area of interest, any applications for new reactors would need to demonstrate that the risks would be well below NRC's regulatory requirements for safety. Based on this assessment, the cumulative risks of severe accidents at any location within 50 mi [80.5 km] of the Seedco site would be SMALL.

9.3.2.5 Martins Creek (Alternative Site 4)

The Martins Creek site is a Greenfield site located in a rural area on the east side of the Delaware River, approximately 2.5 mi (4 km) south of the town of Belvidere, Warren County, New Jersey. The site is located directly east, approximately 0.5 mi (0.8 km) across the Delaware River from the existing PPL Martins Creek Power Plant located in Northampton County, Pennsylvania. Figure 9.3-36 provides a location map showing a 6-mi (9.7-km) radius surrounding the Martins Creek site. Figure 9.3-37 provides an aerial photograph of the Martins Creek site and the immediate vicinity. Also shown on Figure 9.3-37 are the FEMA 100- and 500-year floodplains (FEMA, 2008), mapped NWI wetlands (USFWS, 2009a), and designated prime farmland (USDA, 2009). There is no designated prime farmland at the Martins Creek site.

9.3.2.5.1 Land Use

Land use in the area surrounding the Martins Creek site includes a mix of industrial land, agricultural fields, and residential subdivisions to the north, primarily undeveloped forest land to the east and south, agricultural land to the southwest, and the Delaware River along with the existing PPL owned oil/gas industrial facility to the west. The Martins Creek site is located in White Township, Warren County, New Jersey, which has an estimated population of approximately 4,882 people (USCB, 2010). The largest community within 10 mi (16 km) of the Martins Creek site is the city of Phillipsburg, New Jersey, approximately 9 mi (15 km) to the southwest. 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 Martins Creek site consists of approximately 500 ac (202 ha) of agricultural lands with some limited areas of forest land. The site does not currently have any development such as paved roads or buildings on it but an existing 115-kV transmission line crosses the property from the southwest to the northeast. There is a privately-owned, public-use airport in the Mansfield Township in Warren County, the Hackettstown Airport that is within approximately 12 mi (19 km) of the site and less than 1 mi (1.6 km) from the conceptual transmission line corridor. There is an apartment complex and a large residential neighborhood located less than 1.0 (1.6 km) to the north and northeast of the northern border of the site. An Anchor Concrete Products facility is located adjacent to the southwest of the site. There are several quarries in the vicinity of the site to the north, west, and south. The site is part of the Industrial Zone as defined by the Warren County Strategic Growth Plan (Warren County, 2005).

A review of the NJDEP i-MapNJ online mapping system did not identify any known contaminated areas in the vicinity of the site (NJDEP, 2011e). The topography of the site is generally level with the exception of the riverfront on the western boundary and the eastern/southern wooded boundary. The site topography indicates a relief across the site of approximately 160 ft (49 m). However the contour differences occur at the boundaries of the site, thus the area used for the construction of the primary buildings remains generally level. Therefore, the cut and fill requirements for construction would be minimal (USGS, 2011d).

Although nuclear power plant structures would occupy only a portion of the approximately 420-ac (170-ha) site necessary to accommodate an EPR nuclear plant, the construction process could result in impacts on the entire approximately 420-ac (170-ha) area from activities 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. The nearest dedicated land (federal, state, or tribal) is the Buckhorn Wildlife Management Area, a portion of which is adjacent to the eastern boundary of the Martins Creek site (NJDEP, 2011f).

New cooling water intake and discharge structures would need to be constructed from the Martins Creek site to the Delaware River that borders the proposed site. At the reconnaissance-level of this evaluation, engineering design of the water pipelines to the river has not been performed but the lines are expected to be contained primarily onsite. However, it would be necessary to acquire a small amount of riverfront land sufficient for an intake, discharge, major pumping station, and ancillary structures. There is a standing rail line between the site and the Delaware River; construction of the intake/discharge system as well as the subsequent pipeline must take this into consideration.

Based on the low population density of the site and location adjacent to the Delaware River, the overall land use impacts from construction and operation of the proposed new unit at the Martins Creek site are anticipated to be SMALL.

Cumulative Impacts

The assessment of land use impacts during construction and operation of the proposed new unit at the Martins Creek site also considered other past, present, and reasonably foreseeable future actions that could impact land use in the region, including federal and non-federal projects listed in Table 9.3-23. This cumulative impact analysis focuses on past land use in the area that has contributed to land use impacts and land use impacts from present and future land-disturbing construction and operations activities. For the purpose of evaluating the potential for cumulative land use impacts in the region, including the impacts attributable to a new unit at the Martins Creek site, the primary geographic area of interest was assumed to be the area within approximately 15 mi (24 km) of the site. This geographic area of interest was selected to include the primary communities that would be affected by the proposed project if it were located at the Martins Creek site. This area includes the majority of Warren County, western Morris County, and northern Hunterdon County in New Jersey and eastern Northampton County, and southern Monroe County in Pennsylvania. Key land use issues in the NJ counties include transportation congestion, protection of rural landscapes and water quality, promotion of economic strengths, improvement of infrastructure while minimizing costs of services, and preservation of public and private lands (Warren County, 2005; Morris County, 2007; Hunterdon County, 2007). Key land use issues, as presented in county land use and growth management profiles in Pennsylvania, include increase in transportation needs, the influx of residents from New York City with more people commuting to NJ for employment, the need for increased use of industrial and business parks, and the loss of rural landscapes (PDCED, 2005).

Existing energy projects that have been in operation for a number of years have been the primary contributor to and may continue to contribute to cumulative land use impacts in the geographic area of interest, including the PPL Martins Creek Power Plant (1,690 MW, natural gas and oil-fired, Northampton County, PA), Lower Mount Bethel Energy Plant (623 MW natural gas-fired, Northampton County, PA), Portland Generating Station (570 MW, coal-, natural gas-, oil-fired plant, Northampton County, PA), and Spruce Run and Round Valley Hydroelectric Project (7 kW hydroelectric, Hunterdon County, NJ). In addition, the proposed Yards Creek Pumped Storage Project (140 MW hydroelectric, Warren County, NJ) and two proposed solar farm projects in Warren County, NJ (Lehigh Valley Live, 2010; WFMZ News, 2011), will contribute to cumulative land use impacts in the geographic area of interest.

Existing and proposed local and regional roadway and rail projects have contributed and will continue to contribute to cumulative land use impacts in the geographic area of interest. Proposed water infrastructure improvement projects (Governor Tom Corbett, 2011b) will also contribute to cumulative land use impacts in geographic area of interest.

Existing and future urbanization have contributed and will continue to contribute to decreases in forested areas, agricultural land, and undeveloped lands in the geographic area of interest. GCC from greenhouse gas emissions from power plants may also contribute to cumulative impacts in the geographic area of interest including extreme heat, drought, and floods that can reduce crop yields, jeopardize fresh water supplies, lead to significant habitat loss for wildlife (NJDEP, 2011d).

Construction and operation of the proposed new unit at the Martins Creek site will contribute to land use impacts in the geographic area of interest through conversion and loss of undeveloped, agricultural land.

Based on the review and analysis of impacts on land use of the proposed new unit at the Martins Creek site, as well as the projected cumulative impacts from past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the site, the cumulative land use impacts are MODERATE. However, the incremental contribution from construction of the proposed new unit at the Martins Creek site on cumulative land use impacts would be significant due to the conversion and loss of agricultural land.

Land use impacts associated with the transmission corridors are discussed separately in Section 9.3.2.5.10.

9.3.2.5.2 Air Quality

Warren County is currently designated as nonattainment for ozone (8-hour standard) and nonattainment for the primary and secondary standards for SO2 (USEPA, 2011f). All other criteria pollutants are presently in attainment of the National Ambient Air Quality Standards. There is one PSD Class I area in New Jersey (Brigantine Class I Area) that is located over 100 miles from the site (NPS, 2009) and is not expected to be impacted by the proposed facility.

Air emissions during construction are expected to be consistent with other large construction projects, with emissions being generated by construction activities on the site. The quantity and nature of these emissions will depend on the time of day, atmospheric conditions (wind, humidity, rainfall), and the intensity of the construction activity. Fugitive dust emissions will be primarily restricted to the site area, and will be limited through the implementation of BMPs for construction activities and a fugitive dust control plan. Site activities will be monitored and specific measures, including site watering where necessary, will be conducted to limit dust generation. There will also be a small amount of combustion-related emissions (NOx, VOC, CO, PM10, PM2.5, and SO2) associated with the operation of onsite diesel powered and gasoline powered construction equipment. However, the magnitude of these emissions would be small, and there is not expected to be a significant or discernible impact on local or regional air quality as a result of the construction activities. Air quality impacts on the surrounding area attributable to the construction of the proposed facility at the Martins Creek site in Warren County would be SMALL and temporary.

Any air emissions that will occur as a result of the operation of the proposed new facility are expected to be low enough that they will not cause or contribute to a significant change in local or regional air quality levels at any location, nor will they contribute to a degradation of ozone or SO2 levels at any location. While the ozone and SO2 non attainment status of Warren County will be a consideration for the siting of the facility, it is not expected to be a significant issue in terms of the ability to obtain the necessary air quality permits to construct and operate the facility. The anticipated air emissions from the facility will be almost entirely attributable to the periodic testing of standby diesel-powered generators and fire pump engines, which can be expected to have very low annual fuel usage and associated air emissions. There will also be cooling towers on the site that will generate a small amount of particulate matter emissions. It is anticipated that the air quality impacts associated with operation of the proposed facility at the Martins Creek site in Warren County would be SMALL.

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

Cumulative Impacts

The assessment of air quality impacts during construction and operation of the proposed new unit at the Martins Creek site also considered other past, present, and reasonably foreseeable future actions that could impact air quality in the region, including other federal and non-federal projects listed in Table 9.3-23. For the purpose of evaluating the potential for cumulative air quality impacts in the region, including the impacts attributable to a new unit at the Martins Creek site, the primary geographic area of interest was assumed to be the area within approximately 12.5 mi (20.2 km) of the site, which includes southwestern Warren County, New Jersey, northeastern Northampton County, Pennsylvania, a southeastern portion of Monroe County, Pennsylvania, a northwestern portion of Hunterdon County, New Jersey, and the southwest tip of Morris County, New Jersey. Because of the inherently low air emissions that will be associated with the construction and operation of the new unit, it is expected that the emissions would not be noticed nor would they destabilize air quality within this relatively small area. It is noted that the air quality attainment status for Warren County, as designated by USEPA, reflects the effects of past and present emissions from all existing pollutant sources in the region.

Taking into account the existing and proposed projects listed and described in Table 9.3-23, it is noted that the largest industrial facilities within 5 mi (8.1 km) of the Martins Creek site are the existing Martins Creek Power Plant (1,690 MW, oil/natural gas-fired facility, Northampton County, Pennsylvania) located approximately 0.5 mi (0.8 km) to the northwest and the Lower Mount Bethel Energy Plant (623 MW natural gas-fired facility, Northampton County, Pennsylvania) located approximately 0.8 mi (1.3 km) to the northwest. There are no other existing or proposed industrial facilities within 5 mi (8.1 km) of the Martins Creek site that would generate emissions substantial enough to result in a noticeable impact or that would destabilize air quality in the region. Within 12.5 mi (20.2 km) of the Martins Creek site, major facilities include the existing Portland Generating Station (570 MW coal/natural gas/oil) located approximately 8.5 mi (13.7 km) to the north. There are no other major existing or proposed industrial facilities within 12.5 mi (20.2 km) of the Martins Creek site that would generate noticeable ambient air quality impacts in the region surrounding the Martins Creek site. Since the above described facilities are currently operational, their emissions are already included in the baseline air quality for the region that has been used to classify the attainment status of the area. There will be a cumulative impact of emissions from the construction and operation of the new unit at the Martins Creek site and the emissions from the existing facilities as described above. However, the inherently low emissions from the new unit will not be noticeable, nor will they have a destabilizing effect on existing ambient air quality during either construction or operation when added to the existing county and regional emissions inventory.

The impacts of greenhouse gas emissions are not sensitive to the location of the source of emissions; rather, they are believed to contribute to global emissions, which in turn have the potential to influence climate change. While national and worldwide cumulative impacts of greenhouse gas emissions are thought to occur (primarily associated with the combustion of fossil fuels), those impacts are currently considered to be noticeable but not necessarily destabilizing. The emissions of greenhouse gases from the proposed new nuclear generating unit and nuclear plants in general (primarily consisting of CO2 and lesser amounts of some precursor emissions), will be very small compared to regional emissions. It is expected that the cumulative impacts of all greenhouse gases (regionally, nationally, or globally) would continue to be noticeable but not necessarily destabilizing, with or without the addition of greenhouse gas emissions from the proposed new unit at the Martins Creek site.

Based on the review and analysis of the air emissions from the proposed new unit at the Martins Creek site, as well as the projected cumulative impacts from other past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the Martins Creek site, the impact on ambient air quality would be SMALL for criteria pollutants, and SMALL to MODERATE for greenhouse gas emissions. However, the incremental contribution to the local and regional impacts on air quality resources due to the construction and operation of the new unit at the Martins Creek site would be insignificant for both criteria pollutants and greenhouse gas emissions.

9.3.2.5.3 Water

The Martins Creek site lies immediately to the east of the Delaware River, the main water body in the Delaware River Basin. This segment of the Delaware River is considered freshwater surface water. The Water Use Protected designation for the main stem of the Delaware River is warm water fishery, water supply, and recreation with no special quality designation (Delaware River Basin Commission [DRBC], 2011b).

Impacts on hydrology and consumptive water use would be primarily associated with water withdrawal from the Delaware 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 Martins Creek site is estimated to be 50 MGD (189 mld).

The main source of cooling water for the Martins Creek site would be the Delaware River. The 7Q10 for the period of record for the river at the nearest USGS gage (01146500 on the left bank at Belvidere, 800 ft [244 m] downstream from Pequest River, 1,200 ft [366 m] southeast of Riverton, PA, and at river mile 197.7) is approximately 704 MGD (2,667 mld) (USGS, 2011c). Therefore, the water availability in the Delaware River at low flow exceeds the total water withdrawal at the site by approximately 20 times. Therefore, operational impacts on surface water use would be SMALL.

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. However, proper permits for construction would be obtained, and requirements in the permits would be followed. These requirements would minimize impacts to surface waters. Thus, construction impacts to surface water use would likely be SMALL.

Appropriate permits would be obtained for the use of groundwater for construction activities; groundwater impacts from construction would be limited to dewatering. The required quantity of water is anticipated to be similar to the quantity described for the BBNPP in Section 4.2.2. Construction impacts on groundwater resources would be SMALL.

To obtain water from the Delaware 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) wide ROW for the water pipelines would extend west across the site for less than 1 mile (1.6 km) to the adjacent Delaware River. Onshore support infrastructures for the intake and discharge would be within the proposed site. 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 the onsite and offsite impacts on water bodies and wetlands.

The Martins Creek site is less than 0.1 mi (0.2 km) 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 UHS. A detailed analysis would be required to determine the design of such an impoundment based on 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 and may include clay liners or other measures, as appropriate, to avoid interface with the groundwater table. Based on 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. By designing the reservoir to avoid interface with the groundwater table, the impacts of constructing the reservoir and operating the new unit on groundwater resources would be SMALL.

Construction-related surface and ground water quality 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 surface water and groundwater quality impacts would be SMALL.

Continuing to practice proper stormwater practices, providing containment at chemical storage sites, and following any permit requirements will minimize operational impacts to groundwater quality. Operational impacts to ground water quality would be SMALL.

Water discharges from the Martins Creek site to the Delaware 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 Martins Creek 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 quality impacts from operation activities would be SMALL.

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

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

Cumulative Impacts

For the cumulative analysis of impacts on surface water, the geographic area of interest for the Martins Creek site is the Central Delaware River subbasin upstream and downstream of the site location. This area includes the withdrawal and discharge location, and is the primary area where the proposed new unit could contribute to a cumulative effect on surface waters. This area extends to Trenton where the river becomes tidally influenced. If the cumulative impacts to surface water use are minimized in the freshwater area, downstream impacts to the tidally influenced area should also be minimized. The 7Q10 flow at the proposed site is approximately 62 percent of the 7Q10 at Trenton (USGS, 2011c and USGS 2011e). The regulatory and permitting requirements also provide mitigation for the consumptive use. CEQ guidance recommends applying natural ecological boundaries, which could include a tidal boundary, when evaluating cumulative impacts. This geographic area also includes all downstream projects listed in Table 9.3-23. This geographic area of interest includes the Middle Delaware - Musconetcong watershed, HUC 02040105; the Middle Delaware-Mongaup-Brodhead watershed, HUC 02040104; and the Lehigh watershed, HUC 02040106. The Middle Delaware watersheds are divided between the States of Pennsylvania and New Jersey, while the Lehigh watershed is solely within the Commonwealth of Pennsylvania.

There are several key actions that have current and reasonably foreseeable potential future impacts to water use/supply and water quality in the geographic area of interest. These actions include the operation of reservoirs, including the F.E. Walter Reservoir, Beltzville Reservoir, Penn Forest Reservoir, Wild Creek Reservoir, Nockamixon Reservoir, and Merrill Creek Reservoir, as well as the operation of power generation facilities, including the Mercer, Northampton and Portland Generation Stations, Martins Creek Power Station, Panther Creek Energy Facility, Kline Cogeneration Facility, Lower Mount Bethel Energy Plant, and Beltsville Hydroelectric Project. Mining is also an essential activity within the Central Delaware River subbasin and primary impacts are related to AMD and reclamation activities. Other key actions are municipal and industrial activities in the Central Delaware River subbasin including water supply and wastewater treatment and disposal. Natural gas well development is another action that has present and reasonably foreseeable future relevance to the Delaware River Basin and has been included in this cumulative analysis.

A key action related to basin-wide water availability is the major diversions of water from the river basin to meet water supply needs in New York City and New Jersey. The New York City water supply diversion occurs upstream of the area of interest, while the New Jersey water supply diversion occurs at the downstream section of the area of interest. A consideration of these diversions has been included in the cumulative impact analysis due to their magnitude. The impact of other projects listed in Table 9.3-23 are considered in this analysis or would have little or no impact on water use or water quality.

For the cumulative analysis of impacts on groundwater, the geographic area of interest is the extent of the groundwater aquifers in the vicinity of the proposed Martins Creek site.

Water Use

Surface water use impacts from construction and operation of a proposed new unit at the Martins Creek site would be primarily attributed to the demands that would occur during normal operation and minimal impacts would occur from construction of the new unit. Construction impacts would be minimal since the water requirements for construction are limited to smaller uses such as hydrostatic testing and dust control. Uses above threshold minimums would require permits.

The consumptive water use of the proposed new unit at the Martins Creek site would be approximately 28 MGD [106 mld], which would be the maximum consumptive use. This value represents approximately 4 percent of the 7Q10 flow at the nearest USGS stream gage (01446500) near Belvidere, New Jersey, which is estimated to be 704MGD [2,667mld] (USGS, 2011c). This low flow value reflects the cumulative consumptive use of current users upstream of the Martins Creek site's withdrawal.

There is potential for climate change to have an impact on water availability in the Delaware River Basin. The impacts from climate change would be similar for all of the alternative sites and would not distinguish the alternatives.

Increases in consumptive use due to population growth, municipal demands, industry, agriculture and power generating facilities, including new facilities, within the Central Delaware River subbasin (DRBC, 2008) are anticipated in the future. A cumulative consumptive use analysis was presented in the Water Resources Plan for the Delaware River Basin (DRBC, 2004). According to the Water Resources Plan for the Delaware River Basin, major diversions from the basin and consumptive use have historically totaled approximately 1,030 MGD [3,899 mld] (DRBC, 2004). The two major diversions from the basin are 650 MGD [2,461 mld] to New York City and 90 MGD [341 mld] to the Delaware and Raritan Canal, which supplies water to New Jersey. These exports are limited to 800 MGD (3,028 mld) and 100 MGD [379 mld], respectively, and were established by a Supreme Court Decree in 1954. The total remaining consumptive use was approximately 290 MGD [1,098 mld], with the largest consumers being power generation, industry, and public water supply. As reported by the DRBC, trends show industrial use is decreasing, while power generation demand has increased and will continue to increase in the future. Public water supply demand has remained constant due to conservation efforts, despite a population increase of approximately 15 percent from 1990 to 2004 in the Central Delaware River subbasin (DRBC, 2004). Within the Central Delaware River Basin, Pike County and Monroe County, which comprise the most northern portion of the Central Delaware River subbasin, grew by approximately 63,000 people over the period of a decade and is identified to continue to be an area of growth in the future.

There are dams on several large tributaries to the Delaware River that were constructed to regulate flow to the river through releases, provide flood control, provide water supply, and augment low flows (DRBC, 2010a). The Merrill Creek Reservoir was constructed in 1989 as part of this dam network to store water that can be released to the Delaware River to compensate for needs associated with actual and projected demand for power generation. The reservoir has substantial capacity that is currently unused and available for future use to offset consumptive use within the basin (DRBC, 2004). Merrill Creek Reservoir can be used to help meet the DRBC's multi-objective flow management for the basin, its conservation and water efficiency objectives, and to meet instream flow targets as outlined in the FY2010-FY2015 Water Resources Program (DRBC, 2010a). Releases from the Merrill Creek Reservoir would minimize impacts to surface water availability within the basin.

Lake Wallenpaupack is a tributary impoundment owned by PPL, which is used to help meet the flow objectives in the Delaware River Basin during drought watch, drought warning, and drought conditions. DRBC passed a resolution to amend the Comprehensive Plan and the Water Code to permit the Commission to direct operation of the lake during drought operations. The resolution also grants PPL a credit of up to 10,000 acre feet to satisfy the Commission's consumptive use compensation requirement required by PPL's existing or future facilities. (DRBC, 2002) If additional mitigation were required, the DRBC has regulations, which require compensation for consumptive use. The proposed Martins Creek site would mitigate in accordance with those regulations, if needed (DRBC, 2010b).

Given the identified level of existing and future consumptive uses within the Central Delaware River subbasin, past, present, and future projects in the area of interest could result in a noticeable cumulative impact on surface water use during low flow periods without mitigation. Dams exist on the tributaries to mitigate the impacts. The operation of the proposed new unit at the Martins Creek site would result in a minimal contribution to the cumulative impact to the surface water use during low flow periods when compared to the magnitude of the existing consumptive uses and diversions.

The cumulative impact on surface water use in the Central Delaware River basin would be SMALL to MODERATE. If the DRBC implements the strategies identified in their Water Resources Program (DRBC, 2010a) and individual project mitigate consumptive use in accordance with DRBC regulations, then cumulative impacts from current and future consumptive uses on low flows would be SMALL. The operation of the proposed new unit at the Martins Creek site would result in a SMALL contribution to the cumulative impacts to surface water use during low flow periods.

The effect on groundwater resources at the Martins Creek site would be temporary and limited to dewatering activities during construction. Groundwater use would not be required during operation. The DRBC identifies groundwater protection areas where there may be groundwater availability issues (DRBC, 2011a). The Martins Creek site does not fall within a protected area. Due to the fact there is no identified stress on groundwater resources in the vicinity of the Martins Creek site and the negligible effect of groundwater use associated with construction and operation of the proposed new unit at the Martins Creek site, impact to nearby groundwater resources would be SMALL.

Water Quality

A NJDEP issued NPDES permit would be required to operate a nuclear power plant at the Martins Creek site and would ensure that the discharges complied with the Clean Water Act. Point and non-point pollution sources have historically impacted the water quality of the drainages of the Central Delaware River subbasin upstream and downstream of the site. Currently, a number of the surface water bodies that drain to the Delaware River, within the Central Delaware River Basin, are listed as impaired by the PADEP and NJDEP due to their inability to support the state-identified use designations. The NJDEP and PADEP report water quality impairments by HUC. For the Middle-Delaware-Musconetcong watershed, HUC 02040105, there are approximately 52 streams on the Pennsylvania 303(d) list for water quality impairments primarily related to siltation, nutrients, pathogens, and metals (PADEP, 2010a). Approximately 81 streams within the Middle Delaware-Musconetcong watershed are on the New Jersey 303(d) list for water quality impairments primarily related to fecal coliform, Escherichia coli (E. coli), total suspended solids (TSS), turbidity, dissolved oxygen (DO), arsenic, phosphorus, temperature, and metals (NJDEP, 2011b). For the Middle Delaware-Mongaup-Brodhead watershed, HUC 02040104, approximately 9 streams are on the Pennsylvania 303(d) list for water quality impairments primarily related to siltation, DO, TSS, toxicity, thermal modifications, and metals (PADEP, 2010a). Approximately 8 streams within the Middle Delaware-Musconetcong River watershed are on the New Jersey 303(d) list for water quality impairments primarily related to pH, E. coli, DO, temperature and mercury (NJDEP, 2011b). For the Lehigh watershed, HUC 02040106, approximately 50 streams are on the Pennsylvania 303(d) list for water quality impairments primarily related to siltation, mercury, and pathogens (PADEP, 2010a).

The section of the Delaware River, identified as Zone 1D by the DRBC, from which water withdrawals to support the Martins Creek site would occur, is listed as impaired with causes of impairment being chlordane, mercury, and poly-chlorinated biphenyls (PCB) in fish tissue, as well as dichlorodiphenyldichloroethane (DDD), dichlorodiphenyldichloroethylene (DDE), and dichlorodiphenyltrichloroethane (DDT) (NJDEP, 2011b). A TMDL will be required for all surface waters that cannot be returned to a supporting use designation. The Delaware Bay is also listed as impaired for similar causes, including dieldrin and total coliform. A TMDL to reduce total coliform to the Delaware Bay was completed in 2010 (NJDEP, 2011b).

Because the surface water quality in the vicinity of the Martins Creek site is already impaired from past and current actions, the cumulative impacts on surface water quality from other past, present, and reasonably foreseeable future projects, and potential effects of climate change, would be SMALL to MODERATE. The principal contributors to this cumulative impact characterization are other point and nonpoint pollution sources in the Central Delaware River subbasin. Past, present, and reasonably foreseeable future projects will be required to adhere to existing and future water quality regulations. As outlined in a preceding paragraph, the Martins Creek site will be issued NPDES discharge limits to be met through operational controls and monitoring, including thermal impacts. Under state and federal regulations, a permit would not be issued that individually or cumulative results in further degradation to water quality. In addition, a construction stormwater NPDES permit would be obtained, and proper construction practices would be followed to minimize impacts from erosion and sediment control, minimize the potential for a chemical spill, and provide containment in the event of a spill. Therefore, the contribution from construction and operation of the proposed new unit at the Martins Creek site to cumulative surface water quality impacts would be SMALL.

AMD and agriculture have impacted groundwater quality in portions of the Delaware River Basin (DRBC, 2011a). During construction and operation of the Martins Creek site, proper practices to avoid spills and provide containment in chemical storage areas would minimize any potential impacts to groundwater quality. Appropriate stormwater management and treatment would be implemented in accordance with any permitting requirements. If any spills did occur, there would be dilution and attenuation of the spill.

Given the existing impacts to groundwater quality from past and current actions, the cumulative impacts to groundwater quality are SMALL to MODERATE. Because proper construction and operations procedures would be followed to minimize the potential for and to contain any spills, the contribution from construction and operation of the proposed new unit at the Martins Creek site to cumulative groundwater quality impacts would be SMALL.

9.3.2.5.4 Terrestrial Ecology and Sensitive Species

Impacts on the terrestrial ecosystem associated with construction of the proposed facility could include those associated with noise, clearing, grading, and potential collisions by birds with new structures. Construction of the proposed facility would result in direct mortality to 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 activity, and species that are mobile are likely to preferentially use less disturbed habitats on adjacent or nearby lands. Because of the level of previous disturbance and the general lack of habitat on the site, impacts to terrestrial ecology from construction of the facility would be expected to be SMALL.

The federally-endangered Indiana bat is historically known to be present in Warren County. Fencerows and riparian areas along Buckhorn Creek may provide summer foraging habitat for this species on the Martins Creek site. However, the trees in fencerows on the site are generally unsuitable for summer roosting by the Indiana bat. If trees on the site are determined to be suitable for Indiana bat summer roosting, any clearing would be conducted between October 15 and March 15, when the bats would not be present. Any other use of the Martins Creek site by the Indiana bat would be incidental to foraging. Impacts to this species from clearing of potential foraging habitat and loss of a potential travel corridor along Buckhorn Creek would be SMALL. Should maternity roosts occur on the site, the impact from lost reproductive habitat would be MODERATE.

The eastern small-footed bat is a New Jersey Species of Concern that could occur at the Martins Creek site. Use of the site by the eastern small-footed bat would be incidental to foraging and it would likely avoid the area of construction disturbance. No impacts to this species would be expected from construction of the Martins Creek site.

The Martins Creek site is within an area considered core habitat by the states of New Jersey and Pennsylvania for the New Jersey endangered osprey (NJDEP, 2011; PNHP, 2011d) and by the state of New Jersey as core habitat for the federally threatened bog turtle (NJDEP, 2011). Development of the Martins Creek site would result in loss of functional habitat within this core area for these two species. Other suitable habitat exists in the region and most of the contiguous core areas for these species would not be impacted; therefore, the loss of core habitat from the Martins Creek site would result in SMALL impacts to these species.

No federally-protected plant species were identified as potentially occurring on the Martins Creek site (USFWS, 2010a). The New Jersey Endangered Plant Species List Act (New Jersey Statutes Annotated [N.J.S.A.] 13:1B-15.151 et seq.), as implemented through the New Jersey Administrative Code (N.J.A.C.) 7:5C-1.1 et seq. identifies those native plant species classified as threatened or endangered in New Jersey. There are 85 state-endangered plants and another 112 plant species of concern or sensitive plant species tracked by NJDEP that may occur in Warren County (Table 9.3-20; NJDEP, 2008a). Some of these 197 sensitive species could occur on the Martins Creek site or along the conceptual water and transmission lines in Warren County. Because the Martins Creek site has been used for agriculture for many years, resulting in a general lack of suitable habitat for protected species, impacts on protected plant species from development of the site would likely be SMALL.

The conceptual transmission line that would serve the Martins Creek site would be within Warren and Morris Counties, New Jersey. The conceptual water lines would be within Warren County, New Jersey, almost entirely within the Martins Creek site, with the intake/discharge location on the Delaware River, which forms the boundary between Warren County, New Jersey, and Northampton County, Pennsylvania. Table 9.3-20 lists state and federally-protected species that may occur in Warren County, identifies their habitat requirements, and identifies whether they could occur along the conceptual transmission and water lines that would serve the Martins Creek site. Table 9.3-21 provides this information for Morris County and identifies those species that may occur along the conceptual transmission lines for the Martins Creek site. Table 9.3-22 provides this information for Northampton County and identifies those species that may occur in the vicinity of the intake/discharge location for the Martins Creek site.

The terrestrial ecology impacts from construction of the water pipeline are expected to be SMALL because the pipeline would be confined to the site with the intake/outfall structures in the adjacent Delaware River. Any impacts, other than those already identified as resulting from site development, would be confined to a small area along the shore of the Delaware River.

The terrestrial ecology impacts from construction of the new/expanded transmission line corridors are anticipated to be MODERATE due to the commitment of land and construction impacts on ecological resources, including potentially sensitive habitats. The transmission corridor would be collocated with existing utility corridors to minimize the terrestrial ecology impacts. To lessen the impacts, wetland impacts will be mitigated, threatened and endangered species will be considered and protected, and BMPs will be used to minimize the potential for impacts to watercourses.

Construction of conceptual water pipeline, intake and discharge structures, 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 potentially would result in clearing through habitat types that could support the terrestrial species identified in Table 9.3-20, Table 9.3-21, and Table 9.3-22 that could occur along the conceptual utility corridors for the Martins Creek site.

The federally-endangered Indiana bat is historically known to be present in Warren County and Morris County and lands along the conceptual transmission line route may provide summer foraging habitat and summer roosting habitat for this species. Any clearing for the transmission line through potential Indiana bat habitat would be conducted between October 15 and March 15, when the bats would not be present. Any impacts to the species from clearing of potential foraging habitat would be SMALL because there other suitable foraging habitat is available nearby. Should maternity roosts occur along the route, the impact from lost reproductive habitat would be MODERATE.

The eastern small-footed bat, a New Jersey Species of Concern, could occur along the transmission line. Use of these areas by the bat would be incidental to foraging and the species would likely avoid the area of construction disturbance. Impacts to the eastern small-footed bat from loss of foraging habitat from construction of the transmission lines would be SMALL.

There are two federally protected plant species that may occur along the conceptual transmission line route in Morris County (USFWS, 2010a). The endangered small whorled pogonia is considered to have potential to occur in hardwood forests in Morris County (USFWS, 2010a), but is not identified as occurring in the county by NJDEP (NJDEP, 2008b). Clearing activities for the transmission lines could affect this species, although it is unlikely that it would be encountered. Impacts to small whorled pogonia from construction of transmission lines would be expected to be SMALL.

The threatened swamp pink grows in swamps and bogs and is historically known to be present in Morris County (NJDEP, 2008b; USFWS, 2010a). This species could be affected if the transmission lines cross swamps or bogs. The route selection process would avoid these sensitive habitats to the extent possible and it is unlikely that the transmission lines would cross areas where swamp pink grows. Therefore, no impacts to swamp pink are expected.

There are 174 state- or federal- threatened or endangered species listed in the municipalities and townships crossed by the conceptual transmission line. Of these 16 species are unlikely to occur due to lack of specific habitat requirements. Eighty-eight species (64 plants and 24 animals) may occur in terrestrial habitats along the route. Twenty-two of the potentially-occurring plant species typically grow in open habitats and would have little potential for impact from construction of transmission lines. The remaining 42 species occur in forested habitats and could be directly impacted by damage or loss from clearing activities or indirectly from long-term changes in light levels and dryness resulting from canopy loss. Most terrestrial animal species would be able to relocate and avoid the area of construction. Aquatic species would not be impacted. As 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 protected species from installation of powerlines to serve the proposed new unit at the Martins Creek site would be SMALL.

There are 144 state- or federal- threatened or endangered species listed in the municipalities and townships crossed by the conceptual water line and intake/discharge structure. Of these 103 species are unlikely to occur due to lack of specific habitat requirements. No terrestrial state- or federal- threatened or endangered species would occur at the conceptual intake/discharge structures, as these structures would be submerged in the Delaware River. Review of habitat information identified 29 terrestrial state- or federal- threatened or endangered species known from the municipalities and townships along the conceptual route of the conceptual water line or at the intake/discharge structure for the Martins Creek Site. Of these, eight are flying animals (*Accipiter cooperii, accipiter gentilis, Asio flammeus, Asio otus, Falco peregrinus, Haliaeetus leucocephalus, Pandion haliaetus*, and *Myotis sodalis*) whose use of the area would be incidental to foraging or as transients. No impacts to these eight species would be expected, as they would avoid the area during construction. Eight terrestrial state- or federal- threatened or endangered plant species and 14 terrestrial state- or federal animal species could occur along the conceptual water line. However, occurrence of any protected species along the conceptual water line would be unlikely due to the long-term historical and ongoing disturbance from agricultural practices along the conceptual lines. However, there will be flexibility in selecting the precise location where the water line would enter the river and for placement of the intake and outfall structures. It is unlikely that any of these species would occur at the location that would be selected. The remaining state-listed species that could occur are aquatic species and are discussed in Section 9.3.2.5.5. 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 to terrestrial state- or federal- threatened or endangered species from construction and operation of the Martins Creek water line would be SMALL.

Recreationally important terrestrial species potentially occurring within the vicinity of the Martins Creek site include the wild turkey, white-tailed deer, and ring-necked pheasant. Small mammals also are considered recreationally important because of the number of hunters participating and the number of animals harvested.

The ring-necked pheasant is an introduced species commonly found in the Midwest and Northeast. NJDFW stocks 55,000 pheasants annually from its Rockport Pheasant farm. Approximately 15,000 hunters participate in the pheasant program and it is estimated to generate $2.6 million in income to local businesses such as gas stations, motels, diners, taxidermists, and sporting goods stores (NJDFW, 2011e). The species typically occurs in farmlands and other early successional habitats (PAGC, 2004b), which are common at and in the vicinity of the Martins Creek site.

Habitat and population restoration efforts for the wild turkey were enacted in New Jersey in the 1970s, and the current population is estimated at 20,000 to 23,000, with an annual harvest of approximately 3,000 (NJDFW, 2011f).

Hunters spend more than $100 million annually, which benefits a wide variety of New Jersey businesses. Approximately 1.5 million recreation-days are devoted to hunting deer in New Jersey (NJDFW, 2011g).

Small mammals, including squirrels, rabbits, and woodchucks, are hunted recreationally throughout New Jersey and are likely to be present at or adjacent to the Martins Creek site. American woodcock and bobwhite quail are considered ecologically important game species by the NJDFW and suitable habitat for these species exists on the Martins Creek site. While these species are not hunted in the same numbers as other game species, they are target species for game management in the state (NJDFW, 2008b).

The recreationally and commercially important terrestrial wildlife species that could occur at the Martins Creek 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 riverside ice scour vegetation community is considered an important terrestrial ecological community in Pennsylvania (Fike, 1999). This community occurs along the western shore of the Delaware River near the Martins Creek site. Development of the Martins Creek site and construction and operation of the CWS Makeup Water Intake Structure would not affect this community type on the opposite shore of the river.

The State of New Jersey has implemented a Wildlife Action Plan (WAP) to guide management of species of fish and wildlife considered ecologically important. The New Jersey WAP provides guidance for management that is specific to regions and subregions of the state. The Martins Creek site and its associated CWIS would be within the Delaware and Musconetcong River Valleys subregion and the associated transmission line would be within this subregion and the Northern Highlands subregion (NJDFW, 2008a; 2008b; 2008c). Broad river valleys with fertile soils characterize this area of the Martins Creek site and its associated CWS Makeup Water Intake Structure, and agriculture is the dominant land use in this region (NJDFW, 2008b). Grassland habitat, including natural grasslands, croplands, pastures, old farm fields, and utility rights-of-ways are common, as are hedgerows and scrub-shrub habitats. Scattered forest fragments are interspersed throughout. The upland forest habitat includes riparian forest areas, deciduous hardwood forest, and conifer plantations. The Northern Highlands subregion is characterized by mountain ranges and valleys with contiguous forest cover of mixed oakhardwood forest and forested wetlands. There are areas of rocky outcroppings. Abandoned iron mines serve as hibernacula for bats and most grassland habitat in the region occurs in utility corridors and small agricultural fields (NJDFW, 2008c).

Because the Martins Creek site provides limited habitat value and because the transmission and water lines would be collocated with existing utility corridors to the extent possible, any impacts on ecologically important species from construction of transmission and water lines to serve the proposed new unit at the Martins Creek site would be SMALL.

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

Cumulative Impacts

Construction and operational impacts of the proposed new unit at the Martins Creek site and the associated offsite electrical transmission infrastructure could contribute to the effect of other past, present, and reasonably foreseeable future activities within the region. The geographic area of interest in which cumulative impacts to terrestrial ecology were considered was confined to that portion of a 50-mile (80-km) radius area around the site that is also within the Delaware River basin. Other projects within the designated radius, but outside the Delaware River Basin were considered to have no appreciable potential for effects and cumulative impacts to terrestrial ecology. Because the Delaware River is a physical barrier to movement of many terrestrial organisms, the potential for development of the Martins Creek site to result in cumulative impacts to areas in Pennsylvania that are both within a 50-mile radius and within the Delaware River Basin is less than for New Jersey lands within 50 miles of the site because discrete populations across the river may not be susceptible to incremental impacts from actions in New Jersey. The projects listed in Table 9.3-23 within this geographic area are considered the relevant projects to assess potential cumulative impacts associated with development of the Martins Creek site.

For the analysis of cumulative impacts to terrestrial resources, the geographic area of interest encompasses portions of New Jersey and Pennsylvania. Within New Jersey, the region used for analysis of cumulative impacts includes portions of four subregions within the Skylands Landscape Conservation Zone: Delaware and Musconetcong River Valleys subregion, Northern Highlands subregion, Upper Delaware River Valley and Kittatinny Ridge subregion, and the Kittatinny Valley subregion (NJDFW, 2008a). The Martins Creek site and its associated CWS Makeup Water Intake Structure would be within the Delaware and Musconetcong River Valleys subregion and the associated transmission line would be within this subregion and the Northern Highlands subregion (NJDFW, 2008a; 2008b; 2008c). The Martins Creek site primarily consists of agricultural lands, which are crossed by Buckhorn Creek near the eastern boundary of the site.

Within Pennsylvania, the geographic area of interest used for analysis of cumulative impacts includes portions of seven physiographic province sections in Pennsylvania within the Delaware River basin (portions of the Anthracite Upland Section, Glaciated Low Plateau Section, Glaciated Pocono Plateau Section, Blue Mountain Section, and Great Valley Section of the Ridge and Valley Province; a portion of the New England Province; and part of the Gettysburg- Newark Lowland Section of the Piedmont Province) (PA Geologic Survey, 2000). The geographic area of interest consists of primarily agricultural croplands, pasture, forests, and some mined land.

Cumulative impacts to terrestrial ecology in the geographic area of interest from past activities have resulted in incremental habitat degradation, fragmentation, and loss. These effects can be exacerbated as additional habitat areas are further fragmented. The cumulative effects of these past and present actions on fragmentation and habitat degradation on the geographic area of interest are MODERATE. However, the effect of the proposed development of the proposed new unit at the Martins Creek site and associated offsite water and electrical transmission lines on cumulative impacts to terrestrial ecology associated with past, present, and other reasonably foreseeable actions is SMALL because of the efficacy of public policy and regulations protecting environmental resources and the implementation of reclamation and mitigation projects in the geographic area of interest.

Development of the Martins Creek site would result in removal of a mostly wooded riparian corridor (Buckhorn Creek), which could disrupt movement patterns of terrestrial animals. However, because Buckhorn Creek parallels and is in proximity to the Delaware River, and because the wooded riparian corridor along Buckhorn Creek is discontinuous and includes multiple areas cleared of woody vegetation to the banks of the stream, any such impacts on the movement and migration of common animal species would likely be SMALL.

Transmission and water lines associated with the proposed new unit at the Martins Creek site would cross undeveloped areas, but would do so adjacent to existing transportation or utility corridors where possible, which would minimize the fragmentation effects. The incremental effect on habitat fragmentation of constructing and operating the proposed new unit at the Montour site with its associated offsite water and electrical transmission lines would be SMALL relative to the cumulative impacts from other past, present, and reasonably foreseeable actions.

The effect of developing the proposed new unit at the Martins Creek site and its associated offsite electrical transmission line corridors on common and important bat species experiencing population loss from WNS would be similar to that described for the Montour site. Because the Martins Creek site is located adjacent to the Delaware River, the water lines will be onsite and included in the impacts described for the Martins Creek site. The impact to common and important bat species from WNS has been severe, with up to 90 percent winter mortality in populations. However, WNS is a recent occurrence and the contribution of past and present projects to the impacts of WNS in unknown. Future projects that reduce summer or winter habitat have the potential to interact with WNS to produce cumulative impacts to bat populations. Any contribution of the proposed new unit at the Martins Creek site and associated offsite water and electrical transmission lines to cumulative impacts to common or important bat species from summer mortality would be expected to be SMALL to MODERATE, depending on hibernation locations of bats using the project area.

The potential for local bird species, migratory birds, and migrating raptors to collide with tall structures and transmission lines would be similar to that described for the Montour site. However, because the Martins Creek site would have longer transmission lines, there would be a greater potential for interaction as the longer transmission lines would present a greater collision hazard. Cumulative impacts to bird species associated with past and present projects is estimated as SMALL to MODERATE, varying among species due to species-specific habitat needs. Stationary transmission lines pose a lesser collision threat to birds than the moving blades of wind turbines and multiple wind power generation projects are proposed for the area of analysis. Therefore, any contribution of proposed new unit at the Martins Creek site and associated offsite electrical transmission lines to cumulative impacts to local bird species, migratory birds, and migrating raptors from collisions would be expected to be SMALL.

9.3.2.5.5 Aquatic Ecology and Sensitive Species

Construction-related impacts on the aquatic ecology at the Martins Creek site would 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 CWIS. Table 9.3-12, Table 9.3-13, and Table 9.3-14 provide a summary of wetlands and streams on Alternative Sites. Table 9.3-12 indicates that no wetlands occur on the Martins Creek site, but that there are wetlands in the general vicinity. Table 9.3-12 also indicates that there would be impacts on 3,254 lf (991.9 m) of streams on the Martins Creek site, including Buckhorn Creek, which flows through the western part of the Martins Creek site (ESRI, 2009b; USFWS, 2009a).

It is anticipated that, while much of the supporting structure will be located onshore, the 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 during construction of the CWIS will result in the temporary suspension and redeposition of the sediment, as well as the removal of those benthic organisms living in or on the removed sediment. It is anticipated that the 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 CWIS will avoid the area during active construction or will actively feed on suspended organisms during dredging operations, and are unlikely to be affected by the construction activities. Any impacts would be SMALL.

No construction effluents are anticipated from the CWIS construction area. BMPs will be used to minimize runoff volumes and impacts. The use of a cofferdam to facilitate construction of the inwater portions of the CWIS 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.

It is unlikely there would be long-term impacts on aquatic species or their habitats as a result of construction of the CWIS because the area of impact is limited to the immediate vicinity of the construction activities. The potential impacts will be localized, construction activities will be of short duration, and the recovery period is expected to be relatively short for disturbed benthic species within and near the dredged area. Therefore, the adverse aquatic ecology impacts associated with construction of the CWIS are anticipated to be SMALL.

Of the 105 listed aquatic and wetland plant species identified in Table 9.3-20 (FNA, 2011a; FNA, 2011b; Gleason and Cronquist, 1991; Landscope America, 2011; NJDFW; 2011a; NJDFW 2011b; NJDFW 2011c; NJDEP 2011a; Rhoads and Block, 2007, USFWS, 2010a), there are 9 wetland plant species and 1 aquatic plant species that would have potential to occur on the site: *Alisma trivale, Carex aquatilis, Carex crawfordii, Carex utriculata, Galium palustre, Hypericum prolificum, Scirpus microcarpus, Smilax tamnoides, Utricularia minor*, and *Veronica catenata*. Black spruce does not occur on the site, so *Arceuthobium pusillum* would not occur. The 10 wetland/aquatic plant species that could occur on the site would be limited to riparian or shoreline habitat along either Buckhorn Creek or the Delaware River. The Delaware River banks and riparian area would not be disturbed by site development, but the riparian area would be crossed by the water lines and the intake/outfall structures would be placed in the Delaware River. Because the 10 aquatic and wetland species that may occur in this area are limited to shallow water/bank habitats, the construction and operation of the CWIS would not affect these species. There will be flexibility in placement of the lines and the outfall structure, which will allow site design to minimize the potential to impact protected aquatic and wetland species. Construction activities could result in minor loss of individuals, but the species would remain in the seedbank and would be able to recolonize the area following construction. No additional impacts to aquatic and wetland plant species along the Delaware River would be expected from operation of the facility.

The land along Buckhorn Creek has been in agricultural production. Two segments, approximately 20 percent of the total length on the site, have been cleared all the way to the stream. The remainder of Buckhorn Creek on the site has a deciduous forested riparian strip extending approximately 35 feet to either side of the stream. *Utricularia minor*, the aquatic species, and three of the wetland species (*Veronica catenata, Carex aquatilis, Carex utriculata*) could occur in shallow backwater or slow moving areas along Buckhorn Creek. *Smilax tamnoides* could occur in the riparian forest along Buckhorn Creek. The other five species could occur along Buckhorn Creek at the water's edge. Site design may require relocation of Buckhorn Creek and elimination of its riparian area. However, because of the general level of disturbance and the long history of agriculture on the Martins Creek site, it is unlikely that any of these 10 species would occur along Buckhorn Creek on the Martins Creek Site. Any impacts to wetland or aquatic species resulting from construction and operation of a new unit at the Martins Creek site would be SMALL to MODERATE.

The federally threatened dwarf wedgemussel could occur in streams in Warren and Morris counties. Buckhorn Creek, on the Martins Creek site could support this species, but the level of historical and ongoing disturbance along the reach of the creek through the Martins Creek site makes it unlikely that it would occur onsite. Because of the minimal amount of potentially suitable habitat at the Martins Creek site and the level of previous disturbance, no impacts to the dwarf wedgemussel would be expected from construction of the Martins Creek site. This species would not occur along the conceptual water line because it would not cross any streams, but the dwarf wedgemussel could occur at the conceptual intake/discharge locations in the Delaware River. The specific locations for the water intake and the discharge can be adjusted to avoid or minimize potential construction impacts to the dwarf wedgemussel if it is found in the Delaware River adjacent to the Martins Creek site. No impacts to the dwarf wedgemussel would be expected from construction of the water line and any impacts from construction of the intake and discharge structures would be expected to be SMALL.

While the probability of the dwarf wedgemussel becoming entrained in the CWIS makeup water is 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. Therefore, impacts during operation are considered to be SMALL to MODERATE, depending upon whether populations that are historically known to be present in Warren County occur nearby and upstream of the intake location.

It is anticipated that aquatic ecology impacts in the Delaware River basin from operation of the proposed new unit at the Martins Creek site would be similar to those described for the Susquehanna River basin for the other Alternative Sites. Therefore, impacts on aquatic ecology from the operation of the proposed new unit at the Martins Creek site would be SMALL.

There are no wetlands on the Martins Creek site. Therefore, no impacts to wetlands resulting from construction and operation of the proposed new unit at the Martins Creek site would occur and impacts would be limited to only approximately 0.2 ac (0.08 ha) of shallow water wetlands within the channel of the Delaware River affected by the makeup and blowdown water pipeline.

The conceptual transmission line that would serve the Martins Creek site would be within Warren and Morris Counties, New Jersey. The conceptual water lines would be within Warren County, New Jersey, almost entirely within the Martins Creek site, with the intake/discharge location on the Delaware River, which forms the boundary between Warren County, New Jersey, and Northampton County, Pennsylvania. Table 9.3-20 lists state and federally-protected species that may occur in Warren County, identifies their habitat requirements, and identifies whether they could occur along the conceptual transmission and water lines that would serve the Martins Creek site. Table 9.3-21 provides this information for Morris County and identifies those species that may occur along the conceptual transmission lines for the Martins Creek site. Table 9.3-22 provides this information for Northampton County and identifies those species that may occur in the vicinity of the intake/discharge location for the Martins Creek site.

Construction of the conceptual water pipeline 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 potentially would result in clearing or excavation through habitat types that could support the species identified in Table 9.3-20, Table 9.3-21, and Table 9.3-22 that could occur along the conceptual utility corridors for the Martins Creek site.

Review of habitat information identified 158 state- or federal- threatened or endangered species with potential to occur along the conceptual transmission line. Of these, 59 species (36 plants and 23 animals) may occur in aquatic and wetland habitats along the route. Emergent wetland and open water habitats would not be affected by construction and operation of the transmission lines and no impacts to the species utilizing these habitats would be expected. Certain wetland types, including bogs and mature forested wetlands would be avoided to the extent possible through the route selection process. As 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 protected species from installation of transmission lines to serve the proposed new unit at the Martins Creek site would be SMALL to MODERATE, depending on the number of state or federal threatened or endangered species that would be encountered during construction.

No state- or federal- threatened or endangered aquatic or wetland species would occur along the conceptual water corridor for the Martins Creek Site because the conceptual route would not cross any waters. Review of habitat information identified eight aquatic state- or federal- threatened or endangered species known from Warren County, New Jersey, or from the Delaware River in the vicinity of the Martins Creek site that could occur at the conceptual intake/discharge structures. There are three protected aquatic plant species and five mussel species identified that could occur at the intake/discharge structures. Should any of these species be found in the Delaware River, there would likely be sufficient flexibility in design to avoid or minimize impacts through selection of the locations for structure placement. 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 there are a low number of potentially occurring protected species, the potential area of impact would be limited to the immediate area of the intake and discharge structures, and there will be flexibility in selecting the locations for these structures, any impacts to aquatic state- or federal- threatened or endangered species from construction and operation of the Martins Creek water lines or intake/discharge structures would be SMALL.

New Jersey has recreationally important fisheries, including rock bass, crappie, white and yellow perch, American shad, northern pike, muskellunge, chain pickerel, hybrid striped bass, smallmouth bass, largemouth bass, walleye, catfish (white, channel, and bullhead), carp, bowfin, and a variety suckers. In addition, lake, brook, rainbow, and brown trout occur naturally and are stocked to support fishing for these species (NJDFW, 2011d). Most of these species, with the exception of trout, could occur in the streams within or adjacent to the Martins Creek site or along the conceptual transmission line corridor. Species that prefer larger rivers and lakes, such as the black and white crappies, walleye, catfish, and suckers, could occur in the Delaware River.

The New Jersey WAP guides management of fish and wildlife species considered ecologically important. The New Jersey WAP provides guidance for management that is specific to regions and subregions of the state. The Martins Creek site and its associated water line would be within the Delaware and Musconetcong River Valleys subregion and the associated transmission line would be within this subregion and the Northern Highlands subregion (NJDFW, 2008a; 2008b; 2008c). The WAP identifies broadly defined wildlife habitat types occurring in New Jersey and the important species that typically occur in those habitats. The species that may occur in the habitat types found at and near the Martins Creek site include the game species identified above as well as the river otter, clubtail dragonfly, American brook lamprey, cutlips minnow, margined madtom, shield darter, slimy sculpin, tidewater mucket, yellow lampmussel, black duck, and wood duck. Aquatic habitat types present on and in the area of the Martins Creek site include the Delaware River and Buckhorn Creek onsite, and streams, rivers, lakes, and ponds along the conceptual transmission lines.

There would be impacts on 3,254 lf (991.9 m) of stream within the Martins Creek 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. Because the water lines would be constructed primarily within the proposed site, there would be no additional impacts from the water lines. There would be a potential for short term construction related impacts along the new/expanded conceptual transmission corridors. However, impacts along expanded powerlines would be minimal as there already are lines in place and the process of expanding these existing lines would be minimally intrusive and primarily cross over aquatic habitat. There would be a greater potential for impacts along the conceptual 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 moderate (approximately 5,685 lf [1,732.9 m] of stream and approximately 11.3 ac [4.6 ha] of wetlands combined between the Martins Creek site and the conceptual utility corridors), any impacts on recreationally important fish species or ecologically important aquatic species would be MODERATE.

A makeup and blowdown water pipeline of less than 1 mile (1.6 km) would need to be constructed to connect the Martin's Creek site to the Delaware River. The makeup and blowdown water system pipelines would cross the proposed site and would not result in new areas of disturbance beyond approximately 0.2 ac (0.08 ha) of shallow water wetlands within the channel of the Delaware River. It is anticipated that approximately 0.4 mi (0.6 km) of new transmission corridor and approximately 16.3 mi (26.2 km) of existing transmission corridor ROW would be upgraded and expanded to connect to an existing 500-kV transmission. The water pipeline would not affect any areas beyond the area disturbed for facility construction (Table 9.3-12 through Table 9.3-14). The new and expanded transmission line ROW may cross an additional 11.1 ac (4.5 ha) of wetlands and 2,431 lf (741.0 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.

Two invasive aquatic animals are historically known to be present in the Delaware River watershed—the zebra mussel and the flathead catfish (Pennsylvania State University-Erie, 2011; USGS, 2009d). Other invasive mollusks (quagga mussel and Asiatic clam) could invade the Delaware River in the future. The flathead catfish would not affect operation of the facility. The zebra mussel could foul water intake structures placed in the Delaware River. Appropriate BMPs would be used to manage this species and other invasive mussel species should they reach this reach of the Delaware River.

Cumulative Impacts

Cumulative impacts to aquatic and wetland resources may result from past present and future actions that cause loss of habitat, alter the physical or chemical integrity of waters within aquatic and wetland habitats, alter the physical structure of aquatic or wetland habitats, or alter populations of aquatic or wetland flora and fauna. The impacts of construction and operation of the proposed new unit at the Martins Creek site and the associated offsite electrical transmission lines could contribute to the effect of other past, present, and reasonably foreseeable future activities within the geographic area of interest. Because the water pipeline would be within the Martins Creek site, its construction and operation impacts would not be distinguishable from the construction and operation of the new unit at the site from the standpoint of cumulative impacts.

For the cumulative analysis of potential impacts to wetland resources, the geographic area of interest is the same area defined for terrestrial resources in Section 9.3.2.5.4. The impacts of actions occurring outside this area would be unlikely to interact with or contribute to the impacts resulting from development of the Martins Creek site and associated offsite transmission lines.

For the cumulative analysis of potential impacts to aquatic resources, the geographic area of interest is limited to the area where impacts from development of the Martins Creek site would be likely to interact with or add to the aquatic resource impacts of other past, present, and future projects. The geographic area of interest includes the Buckhorn Creek drainage and the Delaware River, from its confluence with Pallins Kill at Portland and extending downstream past the confluence with the Pequest River at Belvedere, and extending to the confluence with the Lehigh River at Easton, approximately 13 river miles (21 km) below the Martins Creek site. There is little potential for upstream cumulative impacts with waters in Pennsylvania. However, watersheds that would be crossed by the transmission lines in New Jersey would have the potential for cumulative impacts and include Pophandusing Brook, Oxford Brook, Pohatcong Creek, the Musconetcong River, South Branch Raritan River, Black River, and their tributaries. The projects listed in Table 9.3-23 and within these drainages would have potential to directly or indirectly affect aquatic or wetland flora and fauna and are considered to be projects with the potential to contribute to cumulative impacts.

The combined effects of past and present projects have resulted in substantial degradation of aquatic and wetland resources in the geographic area of interest as a result of incremental habitat degradation, habitat alteration, and habitat loss. This degradation can be exacerbated by the effects of future projects. Primary causes of impacts to aquatic ecology have been loss of riparian habitat, nutrient inputs from agricultural operations, siltation and sedimentation from land clearing and agriculture, and construction of mill, canal, and hydropower dams. The cumulative effect of these past and present actions is MODERATE to LARGE, depending on the degree of development within a given watershed. However, the potential for the impacts of future projects, including the construction of the proposed new unit at the Martins Creek site, to further contribute to incremental impacts to aquatic and wetland resources, including recreationally important fish species or ecologically important aquatic species, that have resulted from these activities is likely to be SMALL. This is because of the efficacy of public policy and regulations protecting environmental resources, including mitigation that would be required through the Clean Water Act permitting process and because of the implementation of reclamation and mitigation projects in the Pennsylvania portion of the geographic area of interest.

The greatest potential for increased interaction of impacts from current and future projects with the impacts from development of the Martins Creek site and its associated transmission lines is through increased thermal and chemical changes to waters within aquatic habitats of the Delaware River from operation of the facility. The impacts of past and current projects on the aquatic resources of the Delaware River have resulted in degradation of its habitats. These impacts can be exacerbated if there are further chemical or thermal changes. Impacts from chemical and thermal loading to the Delaware River from discharge of cooling blowdown water would be similar to those described for the Susquehanna River basin for the other Alternative Sites, and would not distinguish the Martins Creek site among the Alternative Sites. Discharge of cooling tower blowdown water would be authorized under an NPDES permit. Thermal and chemical loading to the Delaware River would be diluted by inflows from the Lehigh River, Buckhorn Creek, Martins Creek, Mud Run, Oughoughton Creek, and Lopatcong Creek. Permitted municipal discharges from Easton would further dilute the loading from the proposed new unit at the Martins Creek site. Therefore, any contribution of impacts from the construction and operation of a new unit at the Martins Creek site and its offsite discharge structure and electrical transmission lines to cumulative impacts as a result of thermal and chemical loading would be SMALL.

The potential for impacts from development of the Martins Creek site to further contribute to cumulative impacts to aquatic resources in the immediate vicinity of the proposed site would be limited. Onsite post-construction stormwater systems would minimize the potential for increased sediment and turbidity resulting from construction activities to reach nearby streams. Any contribution to cumulative impacts on aquatic ecology from construction of the proposed new unit at the Martins Creek site would be SMALL.

New/upgraded transmission lines for the site would be located with existing lines where practicable and would affect 2,431 lf (741 m) of stream. These impacts could contribute to cumulative impacts to aquatic resources as a result of riparian clearing, which may cause stream water temperature to increase from the greater exposure to sunlight. These streams will be maintained in as well-shaded a state as practicable to minimize the warming effect of direct sunlight. The transmission lines would span streams and support infrastructure would be placed outside of waters to the extent practicable, which would avoid or minimize impacts to instream habitats. Therefore, little to no contribution to cumulative impacts to aquatic resources from degradation of instream habitats would be expected from construction of the transmission lines. Because the transmission lines would be collocated with existing lines to the extent possible, the incremental impact would be minimized. The contribution of impacts from construction of the conceptual transmission lines for the proposed new unit at the Martins Creek site to contribute to cumulative impacts to aquatic resources would be expected to be SMALL. Operation of the transmission lines would not be expected to contribute to cumulative impacts to aquatic resources.

Aquatic and Wetland Species

No federal or state threatened or endangered aquatic or wetland species would be expected to occur on the Martins Creek site and no impacts to any protected species would be likely to occur. Because there would be no impacts to federal or state threatened or endangered aquatic or wetland species from construction of the site, the impacts of construction of the proposed new unit at the Martins Creek site would not further contribute to cumulative impacts to threatened or endangered aquatic or wetland species.

Impacts from operation of the proposed new unit at the Martins Creek site would have the potential to interact with other past, present, and future projects and contribute to cumulative impacts to federal or state protected aquatic species through the discharge of cooling and blowdown water to the Delaware River. The potential for a contribution to cumulative impacts from chemical and thermal loading to the Delaware River from discharge of cooling blowdown water would be comparable to the impacts to the Susquehanna River basin described for the other Alternative Sites because of the hydraulic similarity of the two rivers, and would not distinguish the Martins Creek site from among the alternatives. Because of the low number of potentially occurring protected species, the limited area of impact (the immediate area of the CWIS and the discharge structure) and flexibility in selecting the locations for these structures, any impacts to aquatic state- or federal-threatened or endangered species from construction and operation of the Martins Creek water line or intake/discharge structures would be SMALL. Operation of the Martins Creek facility would not affect wetland resources and there would be no potential for impacts from operation to interact with other past, present, and future projects to contribute to cumulative impacts to federal or state threatened or endangered wetland species. The cumulative effect of past, present, and future developed is expected to be SMALL to MODERATE, because of the effect of other development along the river corridor.

Fifty-nine federal or state threatened or endangered aquatic species could occur along the transmission lines that would serve the Martins Creek site. Even though aquatic habitats that may harbor threatened or endangered aquatic species would be avoided through route selection to the extent practicable, the number of potential species that may be affected by construction of the transmission lines makes it likely that the potential for impacts from construction of the transmission lines to make incremental contributions to cumulative impacts to these protected species would be SMALL to MODERATE. The cumulative effect to protected species throughout the geographic area of interest from past, present, and future projects is expected to be SMALL, because of efforts to avoid and mitigate for potential effects.

Operation of the transmission lines would not be expected to contribute to cumulative impacts to federal or state threatened or endangered aquatic species.

Wetlands

Construction of the proposed new unit at the Martins Creek site would result in loss of approximately 0.2 ac (0.08. ha) of wetlands from construction of the CWIS, which would be mitigated as directed by requirements of the Clean Water Act Section 404 permit that would be required to develop the site. With implementation of the required mitigation, any contribution of impacts from construction of the proposed new unit at the Martins Creek site to cumulative impacts to wetland resources, including threatened and endangered species, would be SMALL.

Construction of the transmission lines that would serve the Martins Creek site would impact 11.1 ac (4.5 ha) of wetlands, which would be mitigated as directed by requirements of the Clean Water Act Section 404 permit required for the work. With implementation of the required mitigation, any contribution of impacts from upgrades to transmission lines to serve the Martins Creek site to cumulative impacts to wetland resources, including threatened and endangered species, would be SMALL. Although future development is expected to be limited, the cumulative effect to wetlands of past, present, and future projects, including the Martins Creek site and associated transmission lines, is expected to be SMALL to MODERATE, because of the magnitude of wetland losses in the past.

9.3.2.5.6 Socioeconomics

Based on USCB data, Warren County, New Jersey had a population of approximately 109,737 people in 2007 (USCB, 2009a). The population density within a 20-mi (32-km) radius of the Martins Creek site in 2007 was 476 ppsm (ESRI, 2009b). The Warren County median household income in 1999 was $56,100 and $65,930 in 2007 (USCB, 1999; USCB, 2007b). The median residence value was $156,400 in 2000 (City Data, 2011) compared to $320,900 in 2007, while the median residence value for the entire state of New Jersey during 2007 was $372,300 (USCB, 2007c; USCB, 2007a).

Two hospitals, 21 fire stations, and 12 police stations are located within Warren County (FEMA, 2007). Warren County has an office of emergency management that provides emergency planning, mitigation, and resources for large disasters (Warren County Office of Emergency Management, 2009). New Jersey also has an office of emergency management with jurisdiction over Warren County (New Jersey Office of Emergency Management, 2009).

There are approximately 2,501 public and private elementary, middle, and high schools located within a 50-mi (80-km) radius of the Martins Creek site (FEMA, 2007).

There are approximately 383 public and private airports and heliports located within a 50-mi (80-km) radius of the Martins Creek site. Based on 2009 data, 22 airports and heliports are located in Warren County (USGS, 2009h).

There are approximately 915 parks located within a 50-mi (80-km) radius of the Martins Creek site, which include 7 national lands and parks, 30 state game lands, and 46 state parks and forests. There are also 678 local parks and preserves (of which 10 are nature reserves), 19 recreational areas, and 11 playgrounds. Approximately 99 fields, courts, stadiums, and other recreational structures (1 of which is a zoo) are also located within 50 miles of the Martins Creek site, and 24 other sites including nature centers and facilities, gardens, historic or cultural sites and arboretums (2 of which are amusement parks). Within Warren County there is the Warren County Trail State Park, Delaware Water Gap National Recreation Area, 19 state-run parks and areas, 6 county-run parks and areas, and 17 municipal parks. (NJDEP, 2011c; NJDEP, 2011f; NPS, 2011; USGS, 2009i; Warren County, 2011b)

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 are anticipated for the BBNPP site. A similar workforce is assumed to be needed for construction of the proposed new unit at the Martins Creek 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 (ER Tables 4.4-7 and 4.4-8). 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 Warren County had a population of 109,737 people in 2007, the population increase due to in-migration of construction workers and their families would represent an increase of between 1.6 and 2.7 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 Martins Creek 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 these areas were included in the analysis. According to May 2008 data, the construction workforce required for the project would be approximately 1 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 Martins Creek 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 Martins Creek site during its construction and operation. According to the data, a total of 298,008 housing units are vacant or not occupied within a 50-mi (80-km) radius of the Martins Creek site. A total of 2,497 housing units are vacant in Warren 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 Warren 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 Easton, Pennsylvania, which is approximately 7.4 mi (11.9 km) away (ESRI, 2009d).

Warren County's private drinking water supply comes primarily from the Northwest New Jersey Sole Source Aquifer. There are approximately 15,000 private wells and septic systems in the county. Approximately 40 percent of county households use septic systems. All drinking water in the county is from groundwater. Warren County has 25 large community PWSs that are regulated by the NJDEP. The Warren County Health Department (WCHD) oversees 249 public non-community water supply systems. One goal of the Warren County Strategic Growth Plan is to protect and enhance the quality and quantity of water in the county (Warren County, 2005; WCHD, 2007).

An increase in tax revenues in Warren County is expected from construction and operation of the proposed new unit at the Martins Creek site. Actual tax revenues for Warren County in fiscal year 2006 totaled $60.0 million (Warren County, 2006). While the actual increase in tax revenues from the proposed new unit is 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 cooling tower plume from the proposed nuclear power generating facility would likely be visible at a considerable distance; however, it would represent a limited alteration of the aesthetics in the area due to the existing Martins Creek Power Plant cooling towers located west of the proposed site, across the Delaware River.

Based on the above information, socioeconomic adverse and beneficial impacts associated with construction activities at the Martins Creek site 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 due to the limited alteration of 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.

Cumulative Impacts

In addition to impacts from construction and operation of the proposed new unit at the Martins Creek site, projected cumulative impacts from other past, present, and reasonably foreseeable future projects that may not be a part of general growth in the region were also considered. A geographic area of interest within a 50-mile (80-km) radius of the Martins Creek site was reviewed for projects that may have a potential impact to cumulative socioeconomic impacts. The review included a waste to energy project utilizing Perfect Catalytic Thermal Oxidation Technology; a 2.6-MW hydroelectric facility; 12-MW and 2-MW solar projects in White Township; the 1,000-MW Rockaway Pumped Storage Hydroelectric Project; system improvement by the Hazleton City Water Authority; the Pocono Township Sewer Project; and expansion of the Palgram manufacturing facility. The following summarizes the socioeconomic review of each of these potential future projects.

An appropriations request was submitted in Fiscal Year 2010 to supply funding to a waste to energy project utilizing Perfect Catalytic Thermal Oxidation Technology. This project would include research and development to demonstrate municipal waste combustion for electric generating purposes (Senator Arlen Specter, 2010a). This project would be 20 to 25 mi (32 to 40 km) southeast of the Martins Creek site. Due to the distance of this facility, the impact to the available workforce, public services, education, and housing would be minimal. In addition, cumulative aesthetic impacts would not be expected to occur.

Construction of a 2.6-MW hydroelectric project is being proposed in Carbon County, Pennsylvania, which is 25 to 30 mi (40 to 48 km) west of the Martins Creek site. The proposed project would be located on the downstream side of the Beltzville Dam next to an existing stilling basin. A license was issued by the FERC in September 2008. Paragraph 63 of the Order Issuing License states that Article 301 of the license terms requires the licensee to start project construction within 2 years of the issuance date of this license and complete construction within 5 years from the issuance date (FERC, 2008a).Therefore, the hydroelectric facility would have a different construction schedule than BBNPP, and construction of the hydroelectric facility is not anticipated to impact the available workforce if the proposed new unit were to be built at the Martins Creek site. Cumulative impacts to public services, education, and housing would not be expected to occur. Due to the distance of the hydroelectric project from the Martins Creek site, cumulative aesthetic impacts would also not be expected to occur.

Clean Jersey Solar, LLC plans to construct over 50,000 solar panels on a farm located in White Township. Representatives of the developer for the 12-MW system indicated that no new daily employees would be needed for the facility. Impacts to traffic would be minimal and there would be no demand for public services (Lehigh Valley Live, 2010). This facility would be located approximately 5 to 10 mi (8 to 16 km) northeast of the Martins Creek site. The current construction schedule or projected construction workforce for this solar project is unknown. If both the solar project and proposed new unit at the Martins Creek site were to have peak construction occur simultaneously, impacts to the available workforce, public services, education, and housing could occur. Cumulative aesthetic impacts are not expected to occur.

PPL anticipates construction of a 2-MW solar farm in White Township less than 5 mi (8 km) from the Martins Creek site. This project would include approximately 11,000 solar panels and is expected to be completed by the end of 2012. The solar project has a different construction schedule than BBNPP. Therefore, construction of the solar project is not anticipated to impact the available workforce if the facility were to be built at the Martins Creek site. Cumulative impacts to public services, education, housing, and aesthetics would not be expected to occur.

In May 2011, Reliable Storage 2, LLC filed an application with the FERC proposing a study of the feasibility of the Rockaway Pumped Storage Hydroelectric Project. This project would be built in four stages and would result in the generation of 1,000 MW of power (FERC, 2011d). The proposed project is located 35 to 40 mi (56 to 64 km) northeast of the Martins Creek site. Because this project is in the early stages of development and due to the distance from the Martins Creek site, it is not anticipated to impact the available workforce if the facility were to be built at the Martins Creek site. Cumulative impacts to public services, education, housing and aesthetics would also not be expected to occur.

Hazleton City Water Authority received a $2.8M grant to replace more than 1 mile of deteriorated water distribution mains, construct a new 88,000 gallon water storage tank, and construct new water treatment facilities. These improvements are expected to eliminate leaks and water loss while improving facility efficiency (Office of the Governor, 2009). The location of these planned improvements is located over 45 mi (72 km) northwest of the Martins Creek site. The project would result in an improvement to the existing water treatment system. Due to the distance of this project, it is not expected to impact the available workforce for the Martins Creek site during construction or operation. Cumulative impacts to public services, education, housing, and aesthetics are also not expected to occur.

Congressman Kanjorski requested funding for the Pocono Township Sewer Project, which would be used to construct and install sewer lines and pumping stations in Pocono and Hamilton Townships. The project would be located approximately 20 to 25 mi (32 to 40 km) northwest from the Martins Creek site. The increase in sewer capacity is being proposed to meet the expanding needs for residential and industrial use. (Congressman Paul E. Kanjorski, 2010a). The project would result in an improvement to the existing sewer treatment system. Assuming these improvements would not require a large workforce during construction or operation, this project is not expected to impact the available workforce for the Martins Creek site during construction or operation. Cumulative impacts to public services, education, housing, and aesthetics would also not be expected to occur.

Palgram, a manufacturer of a wide range of thermoplastic sheets, is anticipating installing a new line of production equipment approximately 5 to 10 mi (8 to 16 km) southeast of the Martins Creek site. This $3.6 M project will create at least 40 jobs within 3 years (Governor Tom Corbett, 2011c). The construction schedule and size of the needed construction workforce is unknown. If both this project and the proposed new unit at the Martins Creek site were to have peak construction occur simultaneously, impacts to the available workforce, public services, education, and housing could occur. Cumulative aesthetic impacts are not expected to occur.

The remaining projects identified in Table 9.3-23 are either already operational or part of the general growth in the region. The projects within the geographic area of interest would be consistent with applicable county plans and policies. Based on the review and analysis of the impacts from construction and operation of the proposed new unit at the Martins Creek site, as well as the projected cumulative impacts from other past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the site, cumulative socioeconomic impacts from the projects are expected to be manageable, particularly over time.

Under some circumstances, building the proposed new unit at the Martins Creek site could make a temporary, detectible, adverse cumulative effects associated with some socioeconomic issues. Those impacts could include SMALL to MODERATE impacts including available workforce and local infrastructures and public services (transportation, recreation, housing, police, fire and medical services, and schools). The beneficial cumulative effects on regional economies and tax revenues would be beneficial and SMALL to LARGE due to annual taxes and revenue generated by the new workers contributing to the local economy and the productivity of the region. Building the proposed new unit at the Martins Creek site in addition to other past, present, and reasonably foreseeable projects would have a SMALL cumulative impact on aesthetics. Construction and operation of the proposed new unit at the Martins Creek site would be a significant contributor to these incremental impacts.

9.3.2.5.7 Transportation

The Martins Creek site is located near three roads: South Foul Rift Road, which forms the northwestern border of the site; County Road 620/Phillipsburg-Belvidere Road, which forms a portion of the eastern border of the site; and Foul Rift Road, which forms a portion of the northern border of the site. Currently, the anticipated area of construction has a number of unimproved dirt roads, but would require that existing roads be upgraded and new roads be constructed to access the site for construction, large, and heavy equipment traffic that would be required for the construction of an EPR nuclear power plant.

The Martins Creek site is located 48 mi (77.2 km) from the nearest barge access. Thus, barge access is not possible at or within 5 mi (8 km) of the Martins Creek site (World Port Source, 2011). There is an existing Conrail Class I rail line at the Martins Creek site that runs along the northwestern edge of the site (ESRI, 2009a). Due to its proximity, a short rail spur would likely be constructed from the existing Conrail Class I rail line to the Martins Creek site. Planning for roadway upgrades and railroad construction would be made in the context of future decisions regarding the optimum methods for transporting large and heavy components to the Martins Creek 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, the conceptual location of the primary access road to the site would likely be contained entirely onsite and would extend from County Road 620/Phillipsburg-Belvidere Road in the southeast corner of the site. Therefore, no offsite impacts associated with construction of the access road are anticipated. There would be limited offsite construction impacts associated with construction of a rail spur to the site from the Conrail rail line located just outside the western border of the site.

There would be short-term traffic impacts on County Road 620/Phillipsburg-Belvidere Road, due to the transportation of construction materials and workers during construction, along with 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 flowing 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 Martins Creek site.

Cumulative Impacts

The assessment of transportation impacts during construction and operation of the proposed new unit at the Martins Creek site also considered other past, present, and reasonably foreseeable future actions within a 50-mi (80-km) radius of the site. These projects include federal and non-federal projects and are listed in Table 9.3-23. The existing and planned projects that could potentially add to the impact on transportation from the Martins Creek site include: the proposed PPL solar farm approximately 0.5 mi (0.8 km) to the southwest; the White Township solar farm approximately 6 mi (10 km) to the northeast; the Palram Facility Expansion project approximately 9 mi (15 km) to the southwest; and the Spruce Run & Round Valley Hydroelectric Project approximately 12 mi (19 km) to the southeast. Each of these projects could temporarily impact the traffic within the primary area of interest. There will be cumulative transportation impacts from the construction and operation of the new unit at the Martins Creek site, particularly during the construction phase. However, these construction impacts would be temporary. There would also be cumulative impacts to transportation during operation.

Based on the review and analysis of impacts on transportation of the proposed new unit at the Martins Creek site, as well as the projected cumulative impacts from other past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the Martins Creek site, the cumulative impacts on transportation would be MODERATE during construction and SMALL during operation. However, the incremental contribution from construction and operation of the proposed new unit at the Martins Creek site on cumulative transportation impacts would be SMALL.

9.3.2.5.8 Historic, Cultural, and Archaeological Resources

The Martins Creek site in Warren County, New Jersey, was an area occupied by Native Americans before the lands were purchased by the West Jersey Council of Proprietors in 1713 (Warren County, 2011a). The county itself was established in 1824 when it was subdivided from Sussex County and named for Dr. Joseph Warren, a Revolutionary War hero who died in the Battle of Bunker Hill. From its beginnings in 1713, the county has been primarily rural. The towns of Hackettstown, Phillipsburg, and Belvidere, plus the adjoining municipalities, form the main economic and population centers of the county. All three are located along the historic Morris Turnpike (Route 57), which is the main transportation corridor for the county, connecting the agricultural fields of the county with the major metropolitan areas of New York and Newark. Within the county, early industrial development included a mill in Calno in 1732 and the Oxford furnace in 1741 (Warren County, 2011a).

There are 39 NRHP listings including both districts and individual properties in Warren County. Of the 39, two properties are within 5 mi (8 km) of the Martins Creek site: the Van Nest-Hoff-Vannatta Farmstead (NRHP, 2011; Google Earth, 2011a); and the Belvidere Historic District (NRHP, 2011; Google Earth, 2011b). The Van Nest-Hoff-Vannatta Farmstead is 2.6 mi (4.2 km) and the Belvedere Historic District is 2.8 mi (4.5 km) from the Martin Creek site; therefore, direct impacts from construction and operation of the proposed new unit 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, 2008b; Google Earth, 2011c).

For the conceptual transmission line, a 1-mi (1.6-km) wide corridor centered on the proposed linear facilities, 0.5 mi (0.8 km) to either side of the center line, and extending the length of corridor, was reviewed for potential cultural resources. Five listed and 3 eligible resources were identified within the 1 mi (1.6 km) conceptual transmission line corridor. The conceptual water line corridor was not reviewed because it is located onsite. (GAI Consultants, Inc., 2011)

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 New Jersey Historic Preservation Office (NJHPO) and should any significant cultural resources be identified, appropriate mitigation measures would be developed prior to construction and operation activities.

Direct 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. Direct and indirect impacts to historic, cultural, and archaeological resources from construction and operation of transmission line are anticipated to be SMALL.

Cumulative Impacts

Cultural resources, by definition, are non-renewable. Therefore, the impact of their destruction is cumulative. The assessment of historic, cultural, and archaeological resource impacts construction, preconstruction, and operation, of the proposed Martins Creek site considered other past, present, and reasonably future foreseeable projects that could affect the resources in the region. Table 9.3-23 identifies other past, present, and reasonably foreseeable future projects and other actions considered in the cumulative impact analysis of the Martins Creek site.

Projects within the geographic area of interest may have a potential cumulative impact to cultural resources if ground disturbing activities occur, or if new above-ground structures visually impact the area. For cultural resources, the geographic area of interest is based on the characteristics of the specific resource. For archaeological resources, the geographic area of interest is limited to the area where ground disturbing activities would occur. For historic buildings and structures, impacts can be physical and visual and the geographic area of interest is 5 mi (8.1 km) or less. The geographic area of interest for the conceptual transmission and water lines serving the facility is defined as 1 mi (1.6 km), 0.5 mi (0.8 km) on either side, from the center line of the corridor extending the entire length of the corridor. These lines would cross both developed and undeveloped areas. Location of these corridors is adjacent to existing transportation or utility corridors were possible, which would minimize any potential cumulative visual impacts to historic, cultural, or archaeological resources.

Based on the existing conditions and the past, present, and reasonably foreseeable future projects, the cumulative impacts from preconstruction, construction, and operation of a proposed new unit at the Martins Creek site and from other projects would be SMALL. Similarly, the incremental contribution to local and regional impacts on cultural resources due to the construction and operation of a new unit at the Martins Creek site and related utilities would be insignificant.

9.3.2.5.9 Environmental Justice

The demographic characteristics surrounding the Martins Creek 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 Martins Creek site, there were 3,037 census block groups located in New Jersey, 59 census block groups in New York, and 1,781 census block groups in Pennsylvania (Table 9.3-24). Of these 4,877 census block groups, 930 were classified as having aggregate minority populations. A total of 639 census block groups were classified as Black (African American), 193 as some other race, 112 Asian, 5 as multi-racial, and 1 American Indian or Alaskan native minority populations. A majority of census block groups classified as Black (African American) were located within Essex County, New Jersey. A majority of the census block groups classified as some other race were located in Passaic County, New Jersey. The region of influence for the environmental justice evaluation includes Warren County, New Jersey and Northampton County, Pennsylvania.

Of the 82 census block groups in Warren County, none were classified as having an aggregate minority population. Of the 192 census block groups in Northampton County, eight were classified as having an aggregate minority population, of which 7 were classified as some other race. Figure 9.3-38 through Figure 9.3-44 present census block groups with minority populations located within a 50-mi (80-km) radius of the Martins Creek 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, a figure for Native Hawaiian or Other Pacific Islander has not been provided.

There were 41 census block groups classified as low income within the 50-mi (80-km) radius of the Martins Creek site, with the majority (22) located in Essex County. Warren County had no census block groups classified as low income, while Northampton County had two census block groups classified as low income. Figure 9.3-45 presents census block groups with low-income populations within the 50-mi (80-km) radius of the Martins Creek site that met the criteria stated in ER Section 9.3.2.2.9.

Based on the data presented in Table 9.3-24, the percent of minority and low-income populations within close proximity to the Martins Creek site is low. Any adverse human health and environmental consequences from construction and operation of the proposed new unit at the Martins Creek site would not be borne disproportionately by minority or low-income groups. Overall environmental justice impacts are anticipated to be SMALL.

Cumulative Impacts

In addition to the impacts from construction and operations, the cumulative impacts analysis also considered other past, present, and reasonably foreseeable future projects that could cause environmental justice impacts on minority and low-income populations. For this cumulative impacts analysis, a geographic area of interest within the region was selected that included Warren County, New Jersey and Northampton County, Pennsylvania.

While there are minority and low-income populations within the geographic area of interest of the Martins Creek site, the numbers of census block groups meeting these criteria were a small percentage of the total census block groups within the geographic area of interest. Based on the location and types of past, present, and reasonably foreseeable future projects identified in Table 9.3-23, it does not appear that the projects likely did or will contribute to environmental justice impacts to the geographic area of interest.

Based on the review and analysis of the impacts from construction and operation of the proposed new unit at the Martins Creek site, as well as the projected cumulative impacts from other past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the site, there would be no disproportionate and adverse cumulative impacts to minority and low-income populations in the above areas, and the environmental justice impacts would be SMALL. Construction and operation of the proposed new unit at the Martins Creek site would not contribute additional environmental justice cumulative impacts.

9.3.2.5.10 Transmission Corridors

The Martins Creek site is less than 1 mi (1.6 km) from the PPL Martins Creek Power Plant (across the Delaware River in Northampton County, Pennsylvania), which has a 230 kV switchyard and transmission lines. A 230 kV transmission line and transmission corridor ROW crosses through the center of the Martins Creek site in Warren County, New Jersey. The two nearest 500 kV substations to the Martins Creek site are approximately 23 mi (37 km) away in the vicinity of Spring Pond, Pennsylvania, and approximately 39 mi (62.8 km) away in the Branchburg, New Jersey area, respectively. Transmission system upgrades (that is, to 500-kV) had been planned and approved along the Branchburg circuit corridor (Branchburg to Roseland) in 2008. However, after additional FERC hearings, the PJM project was cancelled and reconfigured as a 230-kV transmission line solution (FERC, 2011e). A 500-kV circuit is proposed from Susquehanna to Roseland and planned for completion in 2015 (PJM, 2011). The location of the proposed 500-kV circuit would pass within approximately 20 mi (32.2 km) of the Martins Creek site (PJM, 2009).

Because there is no existing 500-kV transmission line or substation near the Martins Creek 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 northeast from the northeastern side of the site for approximately 2.8 mi (4.5 km) along an existing 115-kV transmission corridor ROW, which would be upgraded and expanded, and then turn east continuing along the same 115-kV transmission corridor ROW for another 10.7 mi (17.2 km) until it crosses a 230-kV transmission corridor ROW. The conceptual route of the transmission corridor would then travel slightly southeast along the 230-kV transmission corridor ROW, which would be upgraded and expanded, for approximately 2.8 mi (4.5 km), at which point approximately 0.4 mi (0.6 km) of new transmission corridor and a new substation would be constructed to connect to an existing 500-kV transmission line ROW. The new transmission lines would primarily pass through land that is forested and agricultural. The lines would also cross numerous roads and pass through some residential and developed areas.

Transmission system upgrades (circuits, towers, lines, and corridors) would be needed to connect the Martins Creek site to the nearest 500-kV line. 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 Martins Creek site are mostly rural and remote with low population densities. The new transmission lines would cross over numerous state and U.S. highways. The effect of these transmission 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 9.3.2.5.4 and 9.3.2.5.5, 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 and expanded transmission corridors, construction and operation transmission impacts are anticipated to be SMALL to MODERATE.

Cumulative Impacts

The assessment of impacts associated with transmission corridors during construction and operation of the proposed new unit at the Martins Creek site also considered other past, present, and reasonably foreseeable future actions that could contribute to cumulative impacts associated with transmission corridors in the region, including federal and non-federal projects listed in Table 9.3-23. For the purpose of evaluating the potential for cumulative impacts in the region associated with transmission corridors, including the impacts attributable to the proposed new unit at the Martins Creek site, the geographic area of interest was assumed to be the area within approximately 15 mi (24 km) of the site, consistent with the geographic area of interest for analysis of land use impacts. Cumulative impacts of the transmission corridors on terrestrial ecology; aquatic ecology; and historic, cultural, and archeological resources from construction and operation of the proposed new unit at the Martins Creek site are described in Sections 9.3.2.5.4, 9.3.2.5.5, and 9.3.2.5.8, respectively. This section focuses on land use impacts associated with the construction and operation of transmission corridors associated with the proposed new unit at the site. Cumulative impacts on land use from construction and operation of a proposed new unit at the Martins Creek site are described in Section 9.3.2.5.1.

Land use impacts associated with construction and operation of approximately 0.4 mi (0.6 km) of new 500-kV transmission corridor and upgrade/expansion of approximately 16.3 mi (26.2 km) of existing 115- and 230-kV transmission corridor for the proposed new unit at the Martins Creek site would add to those associated with over 250 mi (402.3 km) of existing 115- and 230- kV transmission lines within the geographic area of interest. The transmission corridors pass through land that is primarily considered agricultural or forest land. The areas are mostly remote, with low population densities. The longer lines cross numerous state and U.S. highways. The impact of these transmission corridors on land usage is minimal; farmlands that have transmission corridors passing through them generally continue to be used as farmland (PPL, 2006). Upgrades to or expansion of an existing transmission corridor would experience only minimal change. However, transmission corridors passing through previously undisturbed forest land would result in forest fragmentation.

As stated previously, operational activities within the transmission corridors may include visual inspection and appropriate vegetation maintenance of transmission line ROWs. Impacts associated with operational activities are expected to be minimal because the initial forest/vegetation clearing/trimming would have occurred during construction activities and operational activities would only maintain and promote previously established vegetation status.

There are several energy development projects, including a hydroelectric (FERC, 2011a) and two solar power projects (Lehigh Valley Live, 2010; WFMZ News, 2011) that could contribute to cumulative impacts within the geographic area of interest. Development of these energy projects may require extension of the existing power transmission grid. Therefore, it is reasonable to assume that there could be upgrades and extensions to the existing electrical power transmission grid to support these types of power development projects in the geographic area of interest. The magnitude of impacts from these transmission line extensions would be dependent on the extent of new lines required to meet the needs of the new and existing energy development facilities in the geographic area of interest. In some cases, these proposed lines could either transect or be located within the proposed transmission corridor.

Cumulative impacts from future construction and operation of transmission lines originating from the hydroelectric and solar facilities could include viewshed degradation and disruption to land uses, vegetation, and avian wildlife. Should the construction of future transmission lines occur concurrent with the proposed new unit construction schedule and within the geographic area of interest, short-term cumulative impacts could occur associated with noise, dust, and general construction activity.

Based on the review and analysis of the impacts from the proposed new unit at the Martins Creek site, as well as the projected cumulative impacts from other past, present, and reasonably foreseeable future projects in the geographic area of interest surrounding the Martins Creek site, the cumulative impacts on land use of the transmission corridors would be MODERATE. However, the incremental contribution to the cumulative impacts on land use from the transmission corridors associated with the proposed new unit at the Martins Creek site would be SMALL.

9.3.2.5.11 Nonradiological Health Impacts

The analysis of nonradiological health impacts to members of the public and site workers for the Martins Creek site includes construction-related activities for the proposed new 1,600 MWe nuclear unit and its associated structures and facilities, as well as routine operation of the plant when it is complete. The analysis also considers other past, present, and reasonably foreseeable future actions that could impact nonradiological health, including other federal and non-federal projects, and those projects listed in Table 9.3-23 and shown in Figure 9.3-35 within the geographic area of interest. The construction-related activities that have the potential to impact the health of members of the public and workers at the site include exposure to dust and vehicle exhaust, occupational injuries, noise, and the transport of construction materials and personnel to and from the site. The operation-related activities that have the potential to impact the health of members of the public and workers at the site includes exposure to etiological agents such as noise, EMFs, and impacts from the transport of workers to and from the site. For the analysis of nonradiological health impacts at the Martins Creek site, the geographic area of interest is considered to include projects within a 5 mi (8.1 km) radius of the site center based on the localized nature of the impacts. For impacts associated with transmission lines and other utility corridors (i.e., water and wastewater), the geographic area of interest would typically be limited to corridor rights of way and the areas immediately adjacent to them.

Construction Impacts

Nonradiological health impacts to construction workers and members of the public attributable to the construction of a new nuclear unit at the Martins Creek site would be similar to those evaluated in Section 4.7, Nonradiological Health Impacts, for the BBNPP site. The impacts include noise, vehicle exhaust, dust, occupational injuries, and transportation accidents, injuries, and fatalities. Applicable federal and state regulations on air quality and noise would be complied with during the site preparation and construction phase. The incidence of construction worker accidents would not be expected to differ from the incidence of accidents estimated for the BBNPP site.

The Martins Creek site is located in a rural agricultural area in New Jersey and construction impacts on the surrounding populations are expected to be minimal and typical of other large construction projects. Access routes to the site for construction workers would include I-80, which is approximately 9.2 mi (14.8 km) north of the site and I-78, which is approximately 9.1 mi (14.6 km) south-southwest of the site. Local 2-lane roads would be used to provide access to and from I-80 and I-78 to the site. As described in ER Section 4.4.1.5, Transportation Routes, for the BBNPP site, local 2-lane roads may become more congested during peak construction-related activities and mitigation may be necessary to ease congestion, thereby improving traffic flow and reducing nonradiological health impacts (e.g., traffic accidents, injuries, and fatalities) during the construction period.

No past or current actions in the geographic area of interest were identified that would be expected to significantly impact the public or workers. The only existing major industrial facilities within 5 mi (8.1 km) of the Martins Creek site are the PPL Martins Creek Power Plant (0.5 mi [0.8 km] northwest, 1,690 MWe gas/oil fired generation, 110 full-time employees) and the PPL Lower Mount Bethel Energy Plant (0.75 mi [1.2 km] northwest, 623 MWe natural gas combined cycle generation, 23 full-time employees). Both of these facilities are located on the opposite bank of the Delaware River in Pennsylvania. The development of the Martins Creek site would result in additional traffic and air emissions in the area, with more notable increases in traffic and air emissions during peak construction periods. Proposed future actions would also include general transmission line development and/or upgrading in the region, and future urbanization associated with population growth, both of which would occur throughout the designated geographical areas of interest. These actions would be expected to result in nonradiological health impacts similar to those discussed above for the construction of a nuclear unit and associated facilities at the Martins Creek site.

Operational Impacts

Nonradiological health impacts to site workers and members of the public attributable to the operation of a nuclear unit at the Martins Creek site would be similar to those evaluated in Section 5.8, Socioeconomic Impacts, for the BBNPP site. Occupational health impacts to workers (e.g., falls, electric shock or exposure to other hazards) at the Martins Creek site would be expected to be the same as those evaluated for workers at the new unit at the BBNPP site. Based on the configuration of the proposed new unit at the Martins Creek site (closed-cycle, wet cooling system with mechanical draft cooling towers), etiological agents would not likely increase the incidence of water-borne diseases in the vicinity of the site. Noise and EMF exposure would be monitored and controlled in accordance with applicable OSHA regulations. Effects of EMF on human health would be controlled and minimized by conformance with NESC criteria. Nonradiological impacts of traffic associated with the operations workforce can be expected to be less than the impacts during construction. Mitigation measures taken during construction to improve traffic flow would also be expected to minimize traffic impacts during operation of a new unit. Mitigation measures used during the operational phase would likely be similar to those described in Section 5.10, Measures and Controls to Limit Adverse Impacts During Operation, for the BBNPP site.

Past and present actions in the geographic area of interest associated with existing industrial facilities (i.e., PPL's 1,690 MWe Martins Creek Power Plant and PPL's 623 MWe Lower Mount

Bethel Energy Plant) and existing transmission lines represent the only significant potential sources of nonradiological health impacts from operations to the public and workers. Proposed future actions that would impact nonradiological health in a similar way to operation activities at the Martins Creek site would include regional transmission line expansions and upgrades, and future urbanization due to population growth, both of which are likely to occur within the geographical area of interest.

The potential exists for future climate changes that could have an impact on human health. Projected changes in the climate for the region are currently based on observed cycles and fluctuations in average temperature and average precipitation, both of which are expected to increase slightly over time, based on current trends. These trending increases in temperature and precipitation could potentially alter the presence of microorganisms and parasites in surface water; however, insufficient information exists to reliably quantify any specific changes in these parameters, and there is no evidence to suggest that the operation of a nuclear generating facility at the Martins Creek site would cause or contribute to those changes, or that there would be any significant change in the presence of etiological agents or the incidence of water-borne diseases.

Summary

The impacts of the construction and operation of a new nuclear unit at the Martins Creek site on nonradiological health are expected to be similar to the impacts evaluated for the BBNPP site. While there are past, present, and future activities in the geographic area of interest that could affect nonradiological health in ways similar to the construction and operation of a new unit and associated facilities at the Martins Creek site, those impacts are expected to be localized and managed through adherence to existing regulatory requirements. Therefore, the cumulative impacts of the construction and operation of a nuclear generating unit and associated facilities at the Martins Creek site on nonradiological health would be SMALL.

9.3.2.5.12 Radiological Impacts of Normal Operations

The analysis of radiological health impacts to members of the public and site workers for the Martins Creek site includes construction-related activities for the new 1,600 MWe nuclear unit and its associated structures and facilities, as well as routine operation of the plant once construction is complete. The analysis also considers other past, present, and reasonably foreseeable future actions that impact radiological health, including other federal and non-federal projects, and those projects listed in Table 9.3-23 within the geographic area of interest. As described in Section 9.3.2.5.1, Land Use, the Martins Creek site is located directly across the Delaware River from PPL's 1,690 MWe Martins Creek Power Plant and PPL's 623 MWe Lower Mount Bethel Energy Plant; currently, there are no nuclear facilities on or adjacent to the site. The geographic area of interest is the area within a 50 mi (80.5 km) radius of the Martins Creek site. Existing nuclear generating facilities potentially affecting radiological health within this area are the Limerick Generating Station (Units 1 and 2, 47 mi [75.6 km] southwest), SSES (Units 1 and 2, 58 mi [93.3 km] west northwest), Peach Bottom Atomic Power Station (Units 2 and 3, 48 mi [77.2 km] southwest), Three Mile Island Nuclear Generating Station (Unit 1, 96 mi [154.5 km] west southwest), Salem Nuclear Power Plant (Units 1 and 2, 94 mi [151.3 km] south southwest), the Hope Creek Nuclear Generation Station (Unit 1, 94 mi [151.3 km] south southwest), Oyster Creek Generating Station (Unit 1, 83 mi [133.6 km] southeast), and the Indian Creek Nuclear Generating Station (Units 2 and 3, 68 mi [109.4 km] northeast). There are also likely to be hospitals and industrial facilities within 50 mi (80.5 km) of the Martins Creek site that use radioactive materials.

The radiological impacts of constructing and operating a nuclear unit at the Martins Creek site would include doses from direct radiation, and liquid and gaseous radioactive effluents. These pathways would result in low doses to people and biota offsite that would be well below regulatory limits. These impacts are expected to be similar to those estimated for the BBNPP site as described in Section 5.4, Radiological Impacts of Normal Operations.

The radiological impacts of the other operating nuclear power plants listed above also include doses from direct radiation and liquid and gaseous radioactive effluents. These pathways result in low doses to people and biota offsite that are well below regulatory limits as demonstrated by the required ongoing REMP conducted around these plants. These pathways are expected to result in low doses to people and biota offsite that would be well below regulatory limits. Doses attributable to direct radiation and radioactive effluents from hospitals and industrial facilities that use radioactive materials would represent an insignificant contribution to the cumulative impact around the Martins Creek site. This conclusion is based on data from REMPs conducted around currently operating nuclear power plants, which consistently demonstrate that radiological levels at offsite locations are well below acceptable limits at all offsite locations, as required by each facility's operating license. It is concluded that the cumulative radiological impacts from constructing and operating a proposed nuclear unit and other existing and planned projects and actions in the geographic area of interest around the Martins Creek site would be SMALL.

9.3.2.5.13 Postulated Accidents

The analysis of postulated accidents includes accidental radiological releases during operation of a nuclear unit at the Martins Creek site. The analysis also considers other past, present, and reasonably foreseeable future actions that impact radiological health from postulated accidents, including other federal and non-federal projects, and those projects listed in Table 9.3-23 within the geographic area of interest. As described in Section 9.3.2.5.1, Land Use, the Martins Creek site is located approximately 0.5 mi (0.81 km) east southeast of PPL's 1,690 MWe Martins Creek Power Plant and approximately 0.75 mi (1.2 km) south of PPL's existing 623 MWe Lower Mount Bethel Energy Plant. There are currently no nuclear facilities on the site. The geographic area of interest considers all existing and proposed nuclear power plants that have the potential to increase the probability-weighted consequences (i.e., risks) from a severe accident at any location within 50 mi (80.5 km) of the Martins Creek site. Existing facilities potentially affecting radiological accident risk within this geographic area of interest include the existing Limerick Generating Station (Units 1 and 2, 47 mi [75.4 km] southwest), SSES (Units 1 and 2, 58 mi [93.3 km] west northwest), Peach Bottom Atomic Power Station (Units 2 and 3, 48 mi [77.2 km] southwest), Three Mile Island Nuclear Generating Station (Unit 1, 96 mi [154.5 km] west southwest), Salem Nuclear Power Plant (Units 1 and 2, 94 mi [151.3 km] south southwest), the Hope Creek Nuclear Generation Station (Unit 1, 94 mi [151.3 km] south southwest), Oyster Creek Generating Station (Unit 1, 83 mi [133.6 km] southeast), and the Indian Creek Nuclear Generating Station (Units 2 and 3, 68 mi [109.4 km] northeast). No other reactors have been proposed within the geographic area of interest or within the region that would affect accident risk in the geographic area of interest.

The environmental consequences of DBAs at the Martins Creek site are expected to be minimal and similar to those that have been predicted for the U.S. EPR that would be built at the BBNPP site as described in Section 7.1, Design Basis Accidents. DBAs have been specifically addressed for the BBNPP site to demonstrate that the reactor design is robust enough to meet all applicable NRC safety criteria. It is also noted that the U.S. EPR design is independent of site conditions and the meteorology of the Martins Creek and BBNPP sites are considered to be generally similar. Because the meteorology, population distribution, and land use for the

Martins Creek site are all expected to be similar to the proposed BBNPP site, risks from a severe accident for a U.S. EPR reactor located at the Martins Creek site are expected to be similar to those analyzed for the proposed BBNPP site and described in Section 7.2, Severe Accidents. Although there are no new reactors currently planned within the geographic area of interest, any applications for new reactors would need to demonstrate that the risks would be well below NRC's regulatory requirements for safety. Based on this assessment, the cumulative risks of severe accidents at any location within 50 mi (80.5 km) of the Martins Creek site would be SMALL.

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, 2011). 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 contains suitable nesting habitat for he endangered Indiana bat. However, use of the site by Indiana bat maternity colonies has not been observed or documented. The *Alternative Sites* also contain forested areas that could provide suitable maternity colony habitat for the Indiana bat. Because all sites may contain suitable nesting habitat for the indiana bat, and because this habitat can be removed while bats are hibernating and not present on the site, the impacts on spawning or nesting areas at the BBNPP site 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.

9.3.4 References

All Business, 2008. "Amazon distribution center will bring more than 1,100 jobs to Hazleton", A D&B Company. By Nicholas Sohr the Citizens' Voice, Wilkes-Barre, PA, Publication: The Citizens Voice (Wilkes-Barre, Pennsylvania), Tuesday, May 20, 2008; Website: http://www.allbusiness.com/labor-employment/labor-sector-performance/12167953-1.html, Date accessed: September 17, 2010.

ARRA, 2010. The Recovery Act in Pennsylvania; Website: http://www.recovery.pa.gov/portal/server.pt/community/recovery_pa_gov/5994, Date accessed: September 17, 2010.

Brou, Vernon A. Jr., 2009. Epiglaea apiata (Grote, 1874) (Lepidoptera: Noctuidae) in Louisiana, Published in The Southern Lepidopterists Society News, Vol. 31, No. 2, available at website: http://www.lsuinsects.org/people/vernonbrou/index.html.

Bucks County Planning Commission, 2010. 2010 Annual Report of Review Activity, Bucks County, PA. Website: http://www.buckscounty.org/government/departments/CommunityServices/PlanningCommission /index.aspx, Date accessed: July 7, 2011.

BugGuide.Net, 2010a. *Species Lestes eurinus - Amber-winged Spreadwing*, Website: http://bugguide.net/node/view/18355, date accessed July 16, 2010.

BugGuide.Net, 2010b. *Species Libellula auripennis - Golden-winged Skimmer*, Website: http://bugguide.net/node/view/3825, date accessed: July 16, 2010.

Butterflies and Moths of North America (BAMONA), 2010. Website: http://www.butterfliesandmoths.org/, date accessed: July 16, 2010.

Butterflies and Skippers of North America, 2010. Baltimore (Euphydryas phaeton), Website: http://www.nearctica.com/butter/plate16/Ephaeton.htm, date accessed: July 16, 2010.

CFR, 2005. "Non Seismic Siting Criteria," Code of Federal Regulations, Title 10, Part 100.21, 2005 Edition.

CFR, 2007. "Environmental Effect of Renewing the Operating License of a Nuclear Power Plant," Code of Federal Regulations, Title 10 Part 51, Appendix B to Subpart A, 2007 Edition.

City Data, 2009. City Data.com, Montour County, Pennsylvania Detailed Profile, Website: http://www.city data.com/county/Montour_County PA.html, Date accessed: October 7, 2009.

City Data, 2011. Warren County, New Jersey, Website: http://www.citydata. com/county/ Warren_County-NJ.html, Date accessed: October 5, 2011.

City of Sunbury, 2005. City of Sunbury Riverfront Master Site Plan, Prepared for: The City of Sunbury Community and Redevelopment Authority, Northumberland County, Pennsylvania, December 2005.

City of Trenton, 2011. City of Trenton, NJ, News & Announcements, “City of Trenton Awarded $1 Million in Successful Brownfields Grants Applications”, Release Date: June 9, 2011; Website: http://www.trentonnj.org/Cit-e-Access/news/index.cfm?NID=22571&TID=55&jump2=0, Date accessed: July 11, 2011.

Coal Township, 2009. Zoning of Seedco Industrial Park Site, Personal Communication with Charles Donaldson/CH2M HILL from Susan Burns of Coal Township on July 24, 2009.

Columbia County, 2009. History of Columbia County, Website: http://www.columbiapa.org/ history/index.php, Date accessed: October 10, 2009.

Commonwealth of Pennsylvania, 2008a. “Growing Greener 2: Cumulative Report 2006-2007- 2008”, 2008 Growing Greener Agency Reports, Cumulative Report (DEP, DCNR, Agriculture & DCED); Website: http://www.growinggreener2.com/default.aspx?id=548, Date accessed: September 15, 2010.

Commonwealth of Pennsylvania, 2008b. “Governor Rendell Says New Amazon Facility To Create More Than 1,000 Jobs In Luzerne County”, Press Release from Office of Governor; Website: http://www.portal.state.pa.us/portal/server.pt/gateway/ PTARGS_0_2_851939_0_0_18/Governor %20Rendell%20Says%20New%20Amazon %20Facility%20To%20Create%20More%20Than% 201%20000%20Jobs%20In%20Luzerne %20County.pdf, Date accessed: September 16, 2010.

Conant R. and J.T. Collins, 1998. Peterson Field Guides: Reptiles and Amphibians of Eastern/ Central North America. Note: Copyright protected. Electronic version not available for printing. Reference available for purchase.

Congressman Christopher P. Carney, 2010. “Proudly Serving the People of the 10th District of Pennsylvania” Requested Appropriations for Fiscal Year 2010; Website: http:// carney.house.gov/requestedappropriationsfy2010.shtml, Date accessed: September 17, 2010.

Congressman Frank Pallone, Jr., 2011. “Pallone Touts Solar Panel Energy Savings, Job Creation”, April 19, 2011, News Release; Website: http://www.house.gov/list/press/ nj06_pallone/041911SolarPanelEventEdison.html, Date accessed: July 12, 2011.

Congressman Paul E Kanjorski, 2010a. “Proudly Serving the People of the 11th District of Pennsylvania” Fiscal Year 2011 Appropriations and Project Requests, Website; http:// kanjorski.house.gov/index.php?option=com_content&task=view&id=1720&Itemid=129, Date accessed: August 13, 2010.

Congressman Paul E Kanjorski, 2010b. “Proudly Serving the People of the 11th District of Pennsylvania” Fiscal Year 2010 Surface Transportation Project Requests, Website; http:// kanjorski.house.gov/index.php?option=com_content&task=view&id=1532, Date accessed: September 17, 2010.

Cornell Laboratory of Ornithology. 2009. All About Birds: Wilson's Snipe Life History. Website: http://www.allaboutbirds.org/guide/Wilsons_Snipe/lifehistory, Date accessed: October 12, 2009.

Delaware Geographic Data Committee, 1998. Delaware State Parks, Delaware Division of Parks and Recreation, Geospatial Data from the Delaware Geographic Data Committee, Website: http://stateplanning.delaware.gov/dgdc/, Date accessed: July 28, 2009.

DNERC, 2008. Certified Brownfield Sites in Delaware, State of Delaware Department of Natural Resources Environmental Control, August 11, 2008, Website: http://www.dnrec.state.de.us/dnrec2000/Divisions/AWM/sirb/Brownfield/pdf/certified_brownfields.pdf, Date accessed: August 2008.

DOL, 2008. Bureau of Labor Statistics, Occupational Employment Statistics - May 2008 Metropolitan and Nonmetropolitan Area Estimates, Website: http://www.bls.gov/oes/current/county_links.htm, Date accessed: July 1 and 23, 2009.

DRBC, 2002. Delaware River Basin Commission Resolution No. 2002-33, A Resolution to amend the Comprehensive Plan and the Water Code relating to the operation of Lake Wallenpaupack during drought watch, drought warning and drought conditions.

DRBC, 2004. Water Resources Plan for the Delaware River, September 2004.

DRBC, 2008. Delaware River State of the Basin Report 2008, December 2008.

DRBC, 2010a. Delaware River Basin Commission Water Resources Program FY 2010-2015, July 14, 2010.

DRBC, 2010b. Delaware River Basin Water Code, With Amendments through December 8, 2010, 18 CFR Part 410, Website: http://www.state.nj.us/drbc/regula.htm, Date accessed: September 19, 2011.

DRBC, 2011. Delaware River Basin Commission, Southeastern Pennsylvania Ground Water Protected Area, Website: http://www.state.nj.us/drbc/pagwpa.htm, Date accessed: November 8, 2011.

Edmunds, W. E., 2002. Coal in Pennsylvania (2nd ed.): Pennsylvania Geological Survey, 4th series, Educational Series 7, 28 p.

EDR, 2008a. Environmental Data Resources Incorporated, Montour Site Inquiry Number 2290046.18S, August 12, 2008.

EDR, 2008b. EDR NEPACheck®, Martins Creek, Foul Rift Road, Foul Rift, NJ 07823, Inquiry Number: 2290046.27s, Environmental Data Resources Inc., August 12, 2008.

EIA, 2008a. State Energy Profiles – Delaware, U.S. Department of Energy, Energy Information Administration, Website: http://tonto.eia.doe.gov/state/state_energy_profiles.cfm?sid=DE, Date accessed: September 12, 2008.

EIA, 2008b. State Energy Profiles – Maryland, U.S. Department of Energy, Energy Information Administration, Website: http://tonto.eia.doe.gov/state/state_energy_profiles.cfm?sid=MD, Date accessed: September 12, 2008.

EIA, 2008c. State Energy Profiles – New Jersey, U.S. Department of Energy, Energy Information Administration, Website: http://tonto.eia.doe.gov/state/state_energy_profiles.cfm?sid=NJ, Date accessed: September 12, 2008.

EIA, 2008d. State Energy Profiles – Pennsylvania, U.S. Department of Energy, Energy Information Administration, Website: http://tonto.eia.doe.gov/state/state_energy_profiles.cfm?sid=PA, Date accessed: September 12, 2008.

El Paso Corporation, 2010. "Tennessee Gas Pipeline Project Summary." Website: http://www.elpaso.com/tgp300lineproject/, Date accessed: June 30, 2011.

Environmental News Network (ENN), 2011. Global and Pollution Prevention News: "EPA Rules Pennsylvania Plant Must Lower Emissions into New Jersey Air", David A Gabel, April 1, 2011; Website: http://www.enn.com/pollution/article/42541, Date accessed: August 11, 2011.

EPRI, 2002. Siting Guide: Site Selection and Evaluation Criteria for an Early Site Permit Application, Final Report, Electric Power Research Institute, March 2002.

eSolar Energy News, 2011. "Solar Panels Rising at Avidan Management's Edison, New Jersey Property, February 14, 2011, Website: http://www.esolarenergynews.com/2011/02/solar-panelsrising- at-avidan.html, Date accessed: July 12, 2011.

ESRI, 2005. HydroMetadata. Website http://www.esri.com/metadata/esriprof80.html.

ESRI, 2009a. Railroads (layer), Metadata, 2005 Edition, Website: http://www.esri.com/metadata/esriprof80.html.

ESRI, 2009b. U.S. Census Tracts, Metadata, 2008 Edition, Website: http://www.esri.com/data/data maps/index.html.

ESRI, 2009c. Counties (Layer), Metadata, 2005 Edition, Website: http://www.esri.com/metadata/esriprof80.html.

ESRI, 2009d. U.S. Populated Place Areas (Layer), Metadata, 2008 Edition, Website: http://www.esri.com/data/data maps/index.html.

Exelon Corporation, 2010. Three Mile Island; Website: http://www.exeloncorp.com/PowerPlants/threemileisland/Pages/profile.aspx, Date accessed: September 17, 2010.

Exelon Corporation, 2011a. Limerick Generating Station; Website: http://www.exeloncorp.com/powerplants/limerick/Pages/profile.aspx, Date accessed: June 29, 2011.

Exelon Corporation, 2011b. Limerick Generating Station, Fact Sheet; Website: http://www.exeloncorp.com/PowerPlants/limerick/Pages/profile.aspx, Date accessed: June 29, 2011.

FEMA, 2007. HAZUS-MH MR3 (v1.3), September 2007, DVD available at Website: http://www.fema.gov/plan/prevent/hazus.

FEMA, 2008. FEMA Map Service Center, Federal Emergency Management Agency, Website: http://msc.fema.gov/webapp/wcs/stores/servlet/FemaWelcomeView?storeId=10001&catalogId=10001&langId= 1, Date accessed: September 12, 2008.

FERC, 2006. Notice of Application and Soliciting Comments, Motions to Intervene, and Protests, PPL Holtwood, LLC, Project No. p-487-048, Filed July 7, 2006.

FERC, 2008a. Order Issuing Original License for Beltzville Hydroelectric Project, September 12, 2008; Website: http://www.ferc.gov/industries/hydropower/gen-info/licensing/issuedlicenses.asp, Date accessed: September 18, 2010.

FERC, 2008b. Order on Petition for Declaratory Order. Docket Nos. EL08-23-000, (123 FERC¶ 61,068). April 22, 2008.

FERC, 2009a. Notice of Intent to File License Application, Filing of Pre-Application Document, Commencement of Licensing Proceeding, and Scoping; Request for comments on the PAD and Scoping Document, and Identification of Issues and Associated Study Requests, York Haven Power Company, LLC, Project No. 1888-027, July 24, 2009; Website: http://www.ferc.gov/docsfiling/ dec-not/2009/jul.asp, Date accessed: September 18, 2010.

FERC, 2009b. Notice of Schedule for Environmental Review for the TEMAX and TIME III Projects, Texas Eastern Transmission, LP, Docket No. CP09-68-000, July 24, 2009; Website: http://www.ferc.gov/docs-filing/dec-not/2009/jul.asp, Date accessed: September 18, 2010.

FERC, 2010a. Order Issuing Certificate and Approving Abandonment, 131 FERC ¶ 61140, Tennessee Gas Pipeline Company, Docket No. CP09-444-000, Issued May 14, 2010.

FERC, 2010b. Order Issuing Preliminary Permit and Granting Priority to File License Application, 132 FERC ¶ 62072, New Jersey Water Supply Authority, Project No. 13399-000, July 28, 2010.

FERC, 2011a. Notice of Application Accepted for Filing, Soliciting Motions to Intervene and Protests, Ready for Environmental Analysis, and Soliciting Comments, Recommendations, Preliminary Terms and Conditions, and Preliminary Fishway Prescriptions, Jersey Central Power and Light and PSEG Fossil LLC, Project No. 2309-019, February 18, 2011.

FERC, 2011b. Order Issuing Preliminary Permit and Granting Priority to File License Application, 134 FERC ¶ 62,157, Renew Hydro, LLC, Project No. 13815-000, February 18, 2011.

FERC, 2011c. Order Issuing Certificate and Approving Abandonment Columbia Gas Transmission, LLC, Docket No. CP10-492-000, Issued March 17, 2011.

FERC, 2011d. Notice of Preliminary Permit Application Accepted for Filing and Soliciting Comments, Motions to Intervene, and Competing Applications, Reliable Storage 2, LLC, Project No. 14114-000, May 17, 2011.

FERC, 2011e. Order Addressing Status of Project and Dismissing as Moot the Request for Rehearing, Docket No. ER10-159-001, (137 FERC¶ 61,010), October 4, 2011.

Fike, J., 1999. Terrestrial and Palustrine Plant Communities of Pennsylvania, Pennsylvania Natural Diversity Inventory, June.

Flora of North America @efloras. org (FNA), 2011a. Flora of North America, Cypripedium parviflorum var. makasin, Website: http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=242102235, Date accessed: July 8, 2011.

Flora of North America @efloras. org (FNA), 2011b. Flora of North America, Smilax tamnoides, Website: http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=242101943, Date accessed: July 11, 2011.

Fraser, Jeffery, 2007. "Wind Catchers," Article in Role Models: Making a Difference Through Mentoring, The Magazine of the Heinz Endowment, Annual Report Issue, Spring 2007 Volume 7, Number 2, 14-21 pp.

GAI Consultants, Inc., 2011. Bell Bend Nuclear Power Plant (BBNPP), Luzerne County, PA, Updated Alternative Sites Preliminary Background Research, C090846.00.008, September 9, 2011.

GenOn Energy, 2010. Portland Generating Station; Website: http://www.genon.com/company/stations/portland.aspx, Date accessed: June 29, 2011.

Gilberton Power Company, 2010. John B. Rich Memorial Power Station; Website: http://www.culm2energy.com/home.html, Date accessed: September 17, 2010.

Gleason, H.A. and A.C. Cronquist, 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada, Second Edition. The New York Botanical Garden. 910 pp. Note: Copyright protected. Electronic version not available for printing. Reference available for purchase.

Google Earth, 2009. National Register of Historic Places, Listed Properties in Google Earth, Northeast Region, Website: http://nrhp.focus.nps.gov/natreg/docs/Download.html, Date accessed: July 26, 2009.

Google Earth, 2011a. Van Nest-Hoff-Vannatta Farmstead, National Park Service, U.S. Department of the Interior, National Register of Historic Places, Listed Properties in Google Earth, Northeast Region, Website: http://nrhp.focus.nps.gov/natreg/docs/Download.html, Date accessed: October 4, 2011.

Google Earth, 2011b. Belvidere Historic District, National Park Service, U.S. Department of the Interior, National Register of Historic Places, Listed Properties in Google Earth, Northeast Region, Website: http://nrhp.focus.nps.gov/natreg/docs/Download.html, Date accessed: October 4, 2011.

Google Earth, 2011c. Warren County, National Park Service, U.S. Department of the Interior, Historic District, National Register of Historic Places, Listed Properties in Google Earth, Northeast Region, Website: http://nrhp.focus.nps.gov/natreg/docs/Download.html, Date accessed: October 27, 2011.

Governor Tom Corbett, 2011a. "Governor Corbett Announces Distribution of Red Light Enforcement Grants for Transportation Projects" Press Release, Pennsylvania Office of the Governor, April 26, 2011.

Governor Tom Corbett, 2011b. "Governor Corbett Announces $134 Million Investment in Water Infrastructure Projects in 21 Counties", Press Release, Pennsylvania Office of the Governor, April 20, 2011.

Governor Tom Corbett, 2011c. "Governor Corbett: Palram to Expand Facility, Create 40 Jobs in Lehigh Valley", Press Release, Pennsylvania Office of the Governor, June 16, 2011.

Governors Center for Local Government Services, 2010. "e-Library" Electronic location of the most current Pennsylvania County Planning Offices/Departments information and documents on record; Website: http://www.elibrary.state.pa.us/disclaimer.asp, Date accessed: September 18, 2010.

GovMonitor Newsletter, 2010. "Pennsylvania Receives $13.8 Million for Airport Upgrades." Public Sector News and Information, March 23, 2010; Website: http://www.thegovmonitor.com/world_news/united_states/pennsylvania-receives-13-8-millionfor-airport-upgrades-26617.html, Date accessed: August 5, 2010.

Greater Hazleton Can Do, 2009. Humboldt Industrial Park Brochure, Website: http://www.hazletoncando.com/downloads/HIP_BROCHURE.pdf, Date accessed: July 26, 2009.

Hazle Township, 2005. Zoning Department, Zoning Map, 2005, Communication with CH2M HILL via facsimile from Hazle Township on July 24, 2009.

Honeywell, 2011. "Honeywell And Montgomery County Correctional Reduce Energy Costs And Enhance Safety ", Press Releases, Honeywell, March 3, 2011; Website: http://honeywell.com/News/Pages/3-3-11-Honeywell-And-Montgomery-CountyCorrectionalReduceEnergyCostsAndEnhanceSafety.aspx, Date accessed: August 11, 2011.

Hunterdon County, 2007. Hunterdon County Planning Board, 2007 Hunterdon County Growth Management Plan, Website: http://www.co.hunterdon.nj.us/planning/smartgrowth.htm, Date accessed: October 28, 2011.

IEEE Spectrum, 2009. "Energy/Renewables, Feature: Toward a Renewables-Friendly Grid" Article by Susan Arterian-Chang in July 2009 Inside Spectrum, 2pp; Website: http://spectrum.ieee.org/energy/renewables/toward-a-renewablesfriendly-grid/2, Date accessed: August 5, 2010.

InsectsofWestVirginia.net, 2010. *West Virginia Broad-winged Damselflies, Family Calopterygidae*, Website http://www.insectsofwestvirginia.net/d/calopterygidae.html, Date accessed: August 10, 2010.

KETEC, 2010. "IntelliWatt receives $5M state loan; could be final piece to make Mount Carmel Twp. project reality", article by Justin Strawser, posted on January 30, 2010 by Katie Jaeger; Website: http://www.ketec.us/2010/01/30/intelliwatt-receives-5m-state-loan-could-be-final-pieceto-make-mount-carmel-twp-project-reality/, Date accessed: September 17, 2010.

Kindred Trails, 2004. Pennsylvania History: A Historical Overview, 2004, Kindred Trails, Inc, Website: http://www.kindredtrails.com, Date accessed: March 5, 2008.

Lackawanna-LuzernePlans.com, 2011. Lackawanna and Luzerne Counties Comprehensive Plan, Long Range Transportation Plan and Hazard Mitigation Plan, Maps, Website: http://www.lackawanna-luzerneplans.com/MapsDocs.aspx, Date accessed: November 9, 2011.

Landscope America, 2011. New Jersey, Conservation Overview, Website: http://www.landscope.org/new-Jersey/overview/, Date accessed: July 11, 2011.

Lehigh County Department of Community and Economic Development (LCDCED), 2010. Fourth Program Year Annual Plan (FY 2010) Lehigh County, Pennsylvania; Website: http://www.lehighcounty.org/Portals/0/PDF/econDev/2010%20%20Annual%20Plan%20FINALALIZED%207-30-10.pdf, Date accessed: July 7, 2011.

Lehigh Valley Live, 2010. "White Township approves plans for solar farm amid objections from residents", Wayne County, New Jersey News, The Express-Times, Bill Wichert, September 16, 2010; Website: http://www.lehighvalleylive.com/warren-county/index.ssf?/base/news-3/12846099881207, Date accessed: June 27, 2011.

Lower Gwynedd-Ambler-Whitpain Patch, 2011. "Lower Gwynedd Supervisors Advertise Demolition of Siman Building", Leann Pettit, May 25, 2011; Website: http://ambler.patch.com/articles/lower-gwynedd-supervisors-advertise-demolition-of-simanbuilding, Date accessed: July 7, 2011.

Lower Passaic River Restoration Project (LPRRP), 2011. Home, Project News, Monday July 11, 2011; website: http://www.ourpassaic.org/, Date accessed: August 11, 2011.

Luzerne County, 2009a. History of Luzerne County, Website: http://www.luzernecounty.org/living/history_of_luzerne_county, Date accessed: October 10, 2009.

Luzerne County, 2009b. Luzerne County Living, Dupont Borough, Website: http://www.luzernecounty.org/living/municipalities/dupont_borough, Date accessed: October 14, 2009.

Lycoming County Board of Commissioners, 2006. The Comprehensive Plan for Lycoming County, PA, Phase II, Completed and Adopted by the Lycoming County Board of Commissioners, August 10, 2006.

Marcellus Shale Formation Information Site, 2008. The Marcellus Shale Formation Information Site; Website: http://www.marcellusshaleformation.com/, Date accessed: September 17, 2010.

Massachusetts Division of Fisheries and Wildlife (MDFW), 2008a New England Bluet (*Enallagma laterale*), Natural Heritage Endangered Species Program, August, Available from website: http://www.mass.gov/dfwele/dfw/nhesp/species_info/fact_sheets.htm.

Massachusetts Division of Fisheries and Wildlife (MDFW), 2008b Cobra Clubtail (*Gomphus vastus*), Natural Heritage Endangered Species Program. August, Available from website: http://www.mass.gov/dfwele/dfw/nhesp/species_info/fact_sheets.htm.

Massachusetts Division of Fisheries and Wildlife (MDFW), 2008c Barrens Buckmoth (*Hemileuca maia*), Natural Heritage Endangered Species Program, August, Available from website: http://www.mass.gov/dfwele/dfw/nhesp/species_info/fact_sheets.htm.

Massachusetts Division of Fisheries and Wildlife (MDFW), 2008d. Riffle Snaketail (*Ophiogomphus carolus*), Natural Heritage Endangered Species Program, August, Available from website: http://www.mass.gov/dfwele/dfw/nhesp/species_info/fact_sheets.htm.

Massachusetts Division of Fisheries and Wildlife (MDFW), 2008e. Incurvate Emerald (*Somatochlora incurvata*), Natural Heritage Endangered Species Program, August, Available from website: http://www.mass.gov/dfwele/dfw/nhesp/species_info/fact_sheets.htm.

MCPC, 2009. Montour County Planning Commission, Montour County Comprehensive Plan, April.

MDE, 2008. Maryland Brownfield, Voluntary Cleanup Program and State Remediation Sites, Maryland Department of the Environment, Website: http://www.mde.state.md.us/Programs/LandPrograms/ERRP_Brownfields/home/index.asp, Date accessed: June 18, 2008.

MDNR, 1999. Swpldn DNR Lands, Geospatial Data from the Maryland Department of Natural Resources, Website: www.msgic.state.md.us/techtool, Date accessed: May 20, 2009.

MDNR. 2009. Common Map Turtle (Graptemys geographica). Website: http://www.michigan.gov/dnr/0,1607,7 153 10370_12145_12201 60652 ,00.html, Date accessed: October 12, 2009.

Medaille College. 2009. Shorthead Gartersnake. Website: http://www.medaille.edu/vmacer/herps_snakes_shortheadgarter.htm, Date accessed: October 9, 2009.

Mercer County, 2011. "Carnegie Road bridge to be closed for reconstruction beginning July 1", Trenton, N.J., Information Center, Press Release; Website: http://nj.gov/counties/mercer/news/releases/approved/110701e.html, Date accessed: July 13, 2011.

MercerSpace, 2011. "Trenton Receives EPA grants to clean up brownfields properties", MercerSpace, Community News Staff, June 7, 2011; Website: http://www.mercerspace.com/article/93161- trenton+receives+epa+grants+clean+brownfields+properties, Date accessed: July 11, 2011.

Midlantic Machinery Inc., 2007. "Mt. Carmel Cogen, Inc., East-central Pennsylvania company generated power by reclaiming abandoned mine", Featured article in News - A Publication for and About Midlantic Machinery Customers; Website: www.constructionpublications.com/midlantic/Midlantic0701.pdf, Date accessed: September 17, 2010.

Montgomery County, 2009a. "Parsing Federal Stimulus Dollars for Highways", Montgomery County Office of Communications, MontcoPressRelease #PR-09-12, February 26, 2009; Website: http://www2.montcopa.org/montco/cwp/view,A,11,Q,69819.asp, Date accessed: July 28, 2011.

Montgomery County, 2009b. "Montgomery County Commissioners Funding Veterans Memorial Park Expansion", Montgomery County Office of Communications, News Release, March 25, 2009; Website: http://www2.montcopa.org/montco/cwp/view,A,11,Q,70148.asp, Date accessed: July 7, 2011.

Montgomery County, 2009c. "Montgomery County Commissioners Join Local Officials To Break Ground on Sumneytown Pike Widening", Montgomery County Office of Communications, News Release, August, 27, 2009. Website: http://www2.montcopa.org/montco/cwp/view,A,11,Q,72374.asp, Date accessed: July 7, 2011.

Montgomery County, 2011a. "Montgomery County Correctional Facility Begins Major Infrastructure Program to Improve Energy Efficiency", Montgomery County Office of Communications, News Release, March 3, 2011; Website: http://www2.montcopa.org/montco/cwp/view,A,11,Q,79948.asp, Date accessed: July 7, 2001.

Montgomery County, 2011b. "EnergyWorks Funds $2.5M to Transform Brownfield into LEED Certified Building", Montgomery County Office of Communications, News Release, June 7, 2011; Website: http://www2.montcopa.org/montco/cwp/view,A,11,Q,81369.asp, Date accessed: July 7, 2011.

Montour County, 1972. Montour County Zoning Map, 1972.

Montour County, 2008. Montour County Fire Departments, Montour County, Website: http://www.firedepartments.net/county/PA/MontourCounty.html, Date accessed: August 27, 2008.

Montour County EMA, 2009. Emergency Management Agency, Website: http://www.montourema.org/home.html, Date accessed: July 26, 2009.

Montour County Planning Commission, 2009. Montour County Comprehensive Plan--Goals, Objectives, Recommendations, and Strategies, Montour County Planning Commission, Prepared by The Eads Group, April 2009.

Morris Arboretum, 2010. Botanical Research and Activities, Research and Activities of the PA Flora Project, The Morris Arboretum of the University of Pennsylvania, Website: http://www.business-services.upenn.edu/arboretum/botanical_research.shtml, Date accessed: September 3, 2010.

Morris County, 2007. County of Morris NJ Planning and Development, Morris County Planning Board, State of the County Report, Website: http://www.morrisplanning.org/publications.asp, Date accessed: October 28, 2011.

Mt.gov, 2010a. Montana Field Guide, Boreal Bluet - Enallagma boreale, Website: http://fieldguide.mt.gov/detail_IIODO71010.aspx, Date accessed: July 16, 2010.

Mt.gov, 2010b. Montana Field Guide, Sweetflag Spreadwing - Lestes forcipatus, Website: http://fieldguide.mt.gov/detail_IIODO67030.aspx, Date accessed: July 16, 2010.

National Atlas of the United States, 2005. Federal Lands of the United States, Geospatial Data from the National Atlas of the United States, Website: http://nationalatlas.gov/atlasftp.html, Date accessed: May 20, 2009.

NatureServe, 2009a. An Online Encyclopedia of Life – Lampsilis cariosa, Website: http://www.natureserve.org/explorer/index.htm, Date accessed: October 9, 2009.

NatureServe, 2009b. An Online Encyclopedia of Life – Anodonta implicata, Website: http://www.natureserve.org/explorer/index.htm, Date accessed: October 12, 2009.

NatureServe, 2009c. An Online Encyclopedia of Life – Scaphiopus holbrookii, Website: http://www.natureserve.org/explorer/index.htm, Date accessed: October 13, 2009.

NatureServe, 2011a. NatureServe Explorer, Comprehensive Report Species - Notropis chalybaeus, Website: http://www. natureserve.org/explorer/servlet/NatureServe?searchName=Notropis+chalybaeus, Date accessed: July 8, 2011.

National Park Service (NPS), 2010. National Park Service, U.S. Department of the Interior, "Delaware Water Gap National Recreation Area 2010 State of the Park".

NPS, 2011. National Park Service - U.S. Department of the Interior; National Natural Landmarks Program - New Jersey; Website: http://www.nature.nps.gov/nnl/state.cfm?State=NJ, Date accessed: October 6, 2011.

NJDEP, 1995. NJDEP State Owned, Protected Open Space and Recreation Areas in New Jersey (Version 200812), Geospatial Data from the NJDEP GIS Bureau of Geographic Information Systems, Website: http://www.state.nj.us/dep/gis, Date accessed: July 28, 2009.

New Jersey Department of Environmental Protection (NJDEP), 2008a. New Jersey Rare Plant Species and Ecological Community Lists By County, Rare Plant Species and Ecological Communities Presently Recorded in the NJ Natural Heritage Database: Warren County, July 30, 2008, Website: http://www.nj.gov/dep/parksandforests/natural/heritage/countylist.html, Date accessed: August 16, 2011.

New Jersey Department of Environmental Protection (NJDEP), 2008b. New Jersey Rare Plant Species and Ecological Community Lists By County, Rare Plant Species and Ecological Communities Presently Recorded in the NJ Natural Heritage Database: Morris County, July 30, 2008, Website: http://www.nj.gov/dep/parksandforests/natural/heritage/countylist.html, Date accessed: August 26, 2011.

New Jersey Department of Environmental Protection (NJDEP), 2011. New Jersey Rare Plant Species and Ecological Community Lists By County, Rare Plant Species and Ecological Communities Presently Recorded in the NJ Natural Heritage Database: Warren County, Website: http://www.nj.gov/dep/parksandforests/natural/heritage/countylist.html, Date accessed: August 16, 2011.

NJDEP, 2011b. 2010 New Jersey Integrated Water Quality Monitoring and Assessment Report, June 2011.

NJDEP, 2011c. New Jersey Department of Environmental Protection, Division of Parks and Forests, State Park Service, Website: http://www.state.nj.us/dep/parksandforests/parks/maps/index.html, Date accessed: October 6, 2011.

NJDEP, 2011d. New Jersey Global Warming, Website: http://www.nj.gov/globalwarming/, Date accessed: October 30, 2011.

NJDEP, 2011e. New Jersey Department of Environmental Protection, i-MapNJ, Website: http://www.nj.gov/dep/gis/depsplash.htm, Date accessed: October 4, 2011.

NJDEP, 2011f. New Jersey Department of Environmental Protection, Division of Fish and Wildlife, Landscape Mapbook 27, Website: http://www.state.nj.us/dep/fgw/ensp/mapbook.htm, Date accessed: October 30, 2011.

NJDOT, 2006. "Route 21, Newark Needs Analysis; Murray Street to Edison Place", August 3, 2006; Website: http://www.state.nj.us/transportation/works/studies/rte21newark/, Date accessed: July 11, 2011.

NJDOT, 2009. "Route 1, Forrestal Road to Aaron Road; South Brunswick, North Brunswick and Plainsboro Townships, Middlesex County", October 14, 2009; Website: http://www.state.nj.us/transportation/works/studies/rte1forrestaltoaaron/, Date accessed: July 11, 2011.

NJDOT, 2010a. "Route 46 and Notch Road Interchange Little Falls and Woodland Park and Route 3 and Valley Road Interchange Clifton", March 26, 2010; Website: http://www.state.nj.us/transportation/works/studies/rt46/, Date accessed: July 11, 2010.

NJDOT, 2010b. "Route 1 Bridge Replacement Overview; Middlesex County, NJ", October 7, 2010; Website: http://www.state.nj.us/transportation/commuter/roads/route1bridge/, Date accessed: July 28, 2011.

NJDOT, 2010c. "NJ commuter I-287 Rehabilitation Project, Middlesex County" February 2, 2010; Website: http://www.state.nj.us/transportation/commuter/roads/I287/, Date accessed: July 11, 2011.

NJDOT, 2011a. Division of Procurement, Construction Services, Current Advertised Projects, Notices to Contractors, July 7, 2011; Website: http://www.state.nj.us/transportation/business/procurement/ConstrServ/curradvproj.shtm, Date accessed: July 11, 2011.

NJDOT, 2011b. Notice to Contractors, NJDOT Bureau of Construction Services, Route 35 Project; Website: http://www.state.nj.us/transportation/business/procurement/ConstrServ/documents/DP_11118f. pdf, Date accessed: July 11, 2011.

NJDOT, 2011c. Notice to Contractors, NJDOT Bureau of Construction Services, Liberty Water Gap Trail; Website: http://www.state.nj.us/transportation/business/procurement/ConstrServ/documents/DP_11120s- R1.pdf, Date accessed: July 11, 2011.

New Jersey Division of Fish and Wildlife (NJDFW), 2008a. New Jersey Wildlife Action Plan: NJ Wildlife Action Plan Map, NJDEP Division of Fish and Wildlife, Website: http://www.nj.gov/dep/fgw/ensp/wap/wap_zones.htm, Date accessed: September 29, 2011.

New Jersey Division of Fish and Wildlife (NJDFW), 2008b. NJ Wildlife Action Plan: Delaware and Musconetcong River Valleys. pp 588-607 in New Jersey Wildlife Action Plan, Website: http://www.nj.gov/dep/fgw/ensp/wap/wap_zones.htm, Date accessed: September 29, 2011.

New Jersey Division of Fish and Wildlife (NJDFW), 2008c. NJ Wildlife Action Plan: Northern Highlands. pp 563-587 in New Jersey Wildlife Action Plan, Website: http://www.nj.gov/dep/fgw/ensp/wap/wap_zones.htm, Date accessed: September 29, 2011.

New Jersey Division of Fish and Wildlife (NJDFW), 2011a. NJDEP Division of Fish & Wildlife - State Endangered and Threatened Species, New Jersey's Endangered and Threatened Wildlife, Website: http://www.state.nj.us/dep/fgw/tandespp.htm, Date accessed: July 11 and 12, 2011.

New Jersey Division of Fish and Wildlife (NJDFW), 2011b. Online Field Guide for Reptiles and Amphibians, Website: http://www.state.nj.us/dep/fgw/ensp/fieldguide_herps.htm, Date accessed: July 11, 2011.

New Jersey Division of Fish and Wildlife (NJDFW), 2011c. NJDEP Division of Fish & Wildlife - State Endangered and Threatened Species, New Jersey's Endangered and Threatened Wildlife, Mussels: Freshwater Mussels, Website: http://www.state.nj.us/dep/fgw/tandespp.htm, Date accessed: July 11, 2011.

New Jersey Division of Fish and Wildlife (NJDFW), 2011d. 2011 Freshwater Fishing Issue of the Fish and Wildlife Digest, Website: http://www.nj.gov/dep/fgw/digfsh11.htm, Date accessed: November 8, 2011.

New Jersey Division of Fish and Wildlife (NJDFW), 2011e. The Rockport Pheasant Farm, Website: http://www.state.nj.us/dep/fgw/rockport.htm, Date accessed: September 29, 2011.

New Jersey Division of Fish and Wildlife (NJDFW), 2011f. Wild Turkey in New Jersey, Website: http://www.state.nj.us/dep/fgw/turkey_info.htm, Date accessed: September 29, 2011.

New Jersey Division of Fish and Wildlife (NJDFW), 2011g. White-tailed Deer in New Jersey, Website: http://www.state.nj.us/dep/fgw/deer.htm, Date accessed: September 29, 2011.

NJ Herald, 2011. "27 potential solar project sites inspected," Bruce A. Scruton, May 21, 2011; Website: http://www.njherald.com/story/news/15SOLAR--for-05-15-11-web, Date accessed: July 13, 2011.

New Jersey Office of Emergency Management, 2009. NJ Office of Emergency Management, Website: http://www.ready.nj.gov/index.html, Date accessed: July 27, 2009.

NJ Transit, 2005. Northwest New Jersey – Northeast Pennsylvania Rail Corridor Lackawanna Cutoff, Geographic Information System map, November 2005; Website: http://www.njtransit.com/tm/tm_servlet.srv?hdnPageAction=Project019To, Date accessed: September 20, 2010.

New Jersey Turnpike Authority (NJTA), 2011. About NJTA: Our Projects, Turnpike Projects, Interchanges 6 to 9 Widening; Website: http://www.state.nj.us/turnpike/our-projects.html, Date accessed: August 16, 2011.

New York Natural Heritage Program (NYNHP), 2009a. Online Conservation Guide for *Glena cognataria* (Blueberry Gray), Available from website: http://www.acris.nynhp.org/guide.php?id=7935&part=2, Date accessed: July 16, 2010.

New York Natural Heritage Program (NYNHP), 2009b. Online Conservation Guide for Itame sp. 1 nr. inextricata (Barrens Itame), Available from website: http://www.acris.nynhp.org/guide.php?id=7928, Date accessed: August 26, 2011.

NJODES, 2006. The Dragonflies & Damselflies of New Jersey, Website: http://njodes.com/default.htm, Date accessed: July 16, 2010.

NJSiteMart, 2008. State of New Jersey Brownfields SiteMart, Website: http://www.njsitemart.com/sitemart/site/default.asp, Date accessed: September 16, 2008.

Norristown Patch, 2011. "USM Brings Some Green to Norristown", Sarah Chocchimiglio, January 11, 2011; Website: http://norristown.patch.com/articles/usm-brings-some-green-tonorristown, Date accessed: July 7, 2011.

Northampton County, 2010. Community Development Block Grants, Annual Action Plan, Fourth Fiscal Year, Northampton County; Website: http://www.northamptoncounty.org/northampton/lib/northampton/depts/economicdevelopment/1 1_aap.pdf, Date accessed: July 7, 2011.

NorthcentralPA.com, 2010. "Region's Railroads Look to the New Year", by the SEDA-Council of Government, February 19, 2010; Website: http://northcentralpa.com/article/regions-railroadslook- new-year, Date accessed: September 17, 2010.

Northumberland County, 2009. Northumberland County History, Website: http://www.northumberlandco.org/default.asp?iId=JKDHH, Date accessed: October 10, 2009.

Northumberland County Department of Public Safety, 2009. Emergency Management Agency, Website: http://www.publicsafety.norrycopa.net/, Date accessed: July 26, 2009.

NPC, 2003. Lower West Branch Susquehanna River Conservation Plan, Draft, The Pennsylvania Rivers Conservation Program, May 2003; Website: www.npcweb.org/rcp_complete.pdf.

NPS, 2009. U.S. Department of the Interior (DOI), Mandatory Class I Areas Map, Website: http://www.nature.nps.gov/air/maps/images/ClassIAreas.jpg, Date accessed: June 17, 2009.

NRC, 1976. Regulatory Guide 4.2 - Preparation of Environmental Reports for Nuclear Power Stations, U.S. Nuclear Regulatory Commission, Revision 2, July 1976.

NRC, 1998. Regulatory Guide 4.7 - General Site Suitability Criteria for Nuclear Power Stations, Revision 2, U.S. Nuclear Regulatory Commission, April 1998.

NRC, 1999. Standard Review Plans for Environmental Reviews for Nuclear Power Plants, NUREG 1555, Nuclear Regulatory Commission, October.

NRC, 2004. Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues in Appendix D. NRR Office Instruction LIC 203, Revision 1. Office of Nuclear Reactor Regulation. May.

NRC, 2007. Standard Review Plans for Environmental Reviews for Nuclear Power Plants (NUREG 1555), Draft Revision 1, U.S. Nuclear Regulatory Commission, July.

NRC, 2010a. Susquehanna Steam Electric Station, Unit 1; Website: http://www.nrc.gov/infofinder/ reactor/susq1.html, Date accessed: September 17, 2010.

NRC, 2010b. Susquehanna Steam Electric Station, Unit 2; Website: http://www.nrc.gov/infofinder/ reactor/susq2.html, Date accessed: September 17, 2010.

NRC, 2010c. Three Mile Island Nuclear Station, Unit 1; Website: http://www.nrc.gov/infofinder/ reactor/tmi1.html, Date accessed: September 17, 2010.

NRC, 2011a. Limerick Generating Station, Unit 1; Website: http://www.nrc.gov/infofinder/reactor/lim1.html, Date accessed: June 29, 2011.

NRC, 2011b. Limerick Generating Station, Unit 2; Website: http://www.nrc.gov/infofinder/reactor/lim2.html, Date accessed: June 29, 2011.

NRHP, 2011. National Park Service, U.S. Department of the Interior, The National Register of Historic Places, Warren County, Website: http://nrhp.focus.nps.gov/natreghome.do, Date accessed: October 4, 2011.

NRHP, 2009a. National Park Service, The National Register of Historic Places, Luzerne County, Website: http://nrhp.focus.nps.gov/natreghome.do, Date accessed: July 24, 25 and 26, 2009.

NRHP, 2009b. National Park Service, The National Register of Historic Places, Columbia County, Website: http://nrhp.focus.nps.gov/natreghome.do, Date accessed: July 24, 25 and 26, 2009.

NRHP, 2009c. National Park Service, The National Register of Historic Places, Montour County, Website: http://nrhp.focus.nps.gov/natreghome.do, Date accessed: July 24, 25 and 26, 2009.

NRHP, 2009d. National Park Service, The National Register of Historic Places, Northumberland County, Website: http://nrhp.focus.nps.gov/natreghome.do, Date accessed: July 24, 25 and 26, 2009.

NYDEC. 2009. Northern Cricket Frog Fact Sheet, Website: http://www.dec.ny.gov/animals/7120.html, Date accessed: October 12, 2009.

Office of the Federal Register, 2009. "Texas Eastern Transmission, LP; Notice of Availability of the Environmental Assessment for the Proposed TEMAX and TIME III Projects", Federal Register, Department of Energy, Federal Energy Regulatory Commission [Docket No. CP09-68-000], Notices, Volume 74, Number 180, pages 47937-47938, Friday, September 18, 2009; Website: http://www.access.gpo.gov/su_docs/fedreg/a090918c.html, Date accessed: September 16, 2010.

Office of the Governor, 2009. "Governor Rendell Announces $355 Million Investment in Water Infrastructure", Office of the Governor, Commonwealth of Pennsylvania, July 21, 2009; Website: http://www.state.pa.us/portal/server.pt/gateway/PTARGS_0_2_742507_0_0_18/GOVERNOR% 20RENDELL%20ANNOUNCES%20355%20MILLION%20INVESTMENT%20IN %20WATER%2 0INFRASTRUCTURE.pdf, Date accessed: August 6, 2010.

Ohio DNR, 2009a. A to Z Species Guide: Blanding's Turtle, Website: http://www.dnr.state.oh.us/Home/species_a_to_z/SpeciesGuideIndex/ blandingsturtle/tabid/6560/Default.aspx, Date accessed: October 9, 2009.

Ohio DNR, 2009b. A to Z Species Guide: Eastern Massasauga, Website: http://www.dnr.state.oh.us/Home/species_a_to_z/SpeciesGuideIndex/ easternmassasauga/tabid/6610/Default.aspx, Date accessed: October 12, 2009.

Ohio DNR, 2009c. A to Z Species Guide: Kirtland's Snake, Website: http://www.dnr.state.oh.us/Home/species_a_to_z/SpeciesGuideIndex/ kirtlandssnake/tabid/6666/Default.aspx, Date accessed: October 9, 2009.

Ohio DNR, 2009d. A to Z Species Guide: Mountain Chorus Frog, Website, http://www.ohiodnr.com/Home/species_a_to_z/SpeciesGuideIndex/ mountainchorusfrog/tabid/6689/Default.aspx, Date accessed: October 9, 2009.

Ohio DNR, 2009e. A to Z Species Guide: Northern Leopard Frog, Website: http://www.dnr.state.oh.us/Home/species_a_to_z/SpeciesGuideIndex/ northernleopardfrog/tabid/6702/Default.aspx, Date accessed: October 12, 2009.

Ohio DNR, 2009f. A to Z Species Guide: Queensnake, Website: http://www.dnr.state.oh.us/Home/species_a_to_z/SpeciesGuideIndex/queensnake/tabid/6728/Default.aspx, Date accessed: October 9, 2009.

Ohio DNR, 2009g. A to Z Species Guide: Rough Green Snake, Website: http://www.dnr.state.oh.us/Home/species_a_to_z/SpeciesGuideIndex/ roughgreensnake/tabid/6745/Default.aspx, Date accessed: October 9, 2009.

Ohio DNR, 2009h. A to Z Species Guide: Spotted Turtle. Website: http://www.dnr.state.oh.us/Home/species_a_to_z/AZReptilesandAmphibians/ tabid/17914/Default.aspx, Date accessed: October 9, 2009.

Ohio DNR, 2009i. A to Z Species Guide: Western Chorus Frog, Website: http://www.dnr.state.oh.us/Home/species_a_to_z/SpeciesGuideIndex/ westernchorusfrog/tabid/6785/Default.aspx, Date accessed: October 12, 2009.

Ohio DNR, 2009j. A to Z Species Guide: Wood Turtle, Website, http://www.dnr.state.oh.us/Home/species_a_to_z/SpeciesGuideIndex/woodturtle/ tabid/6796/Default.aspx, Date accessed: October 9, 2009.

Ohio DNR, 2009k. A to Z Species Guide: Jefferson Salamander, Website: http://www.dnr.state.oh.us/Home/species_a_to_z/SpeciesGuideIndex/ jeffersonsalamander/tabid/6663/Default.aspx, Date accessed: October 9, 2009.

OilShaleGas.com, 2010. Website: http://www.oilshalegas.com/index.html, Date accessed: September 17, 2010.

PA Bulletin, 2007. "Plan Approvals" 47-309-001A: United States Gypsum Co.; Website: http://www.pabulletin.com/secure/data/vol37/37-7/248b.html, Date accessed: September 17, 2010.

PA DCNR, 2008. Letter from Rebecca H. Bowden (Pennsylvania Department of Conservation and Natural Resources) to George Wrobel (UniStar), Re: Environmental Review of Bell Bend Nuclear Power Plant Site, Berwick, Luzerne County, Pennsylvania, March 24, 2008.

PA DCNR, 2008b. "Gov. Rendell says Gouldsboro State Park dam repair completed", February 13, 2008; Website: http://www.dcnr.state.pa.us/news/resource/res2008/08-0213-gouldsborosp.aspx, Date accessed: July 8, 2011.

PA DCNR, 2009. PA DCNR State Parks, Geospatial Data from the Pennsylvania Spatial Data Access, Website: http://www.pasda.psu.edu/default.asp, Date accessed: July 28, 2009.

PA Environment Digest, 2010. "PEC Releases Major Report on Marcellus Shale Drilling", Tuesday, July 13, 2010; Website: http://paenvironmentdaily.blogspot.com/2010/07/pecreleases- major-report-on-marcellus.html, Date accessed: September 17, 2010.

PA Wind Energy Now, 2010. Pennsylvania Wind Working Group, Wind Farms in Pennsylvania; Website: http://www.pawindenergynow.org/pa/farms.html, Date accessed: September 14, 2010.

PADEP, 1996. "Process Change in the Pharmaceutical Industry" in DEP $uccess $tory #4; Website: www.p2pays.org/ref/01/00155.pdf, Date accessed: September 17, 2010.

PADEP, 2009a. Pennsylvania Department of Environmental Protection, eMapPA, Website: http://www.emappa.dep.state.pa.us/emappa/viewer.htm, Date accessed: July 24, 2009.

PADEP, 2009b. Pennsylvania Department of Environmental Protection, eMapPA, Website: http://www.emappa.dep.state.pa.us/emappa/viewer.htm, Date accessed: July 24, 2009.

PADEP, 2009c. Pennsylvania Department of Environmental Protection, Water Standards and Facility Regulation Performance Measures Glossary, Website: http://www.depweb.state.pa.us/watersupply/cwp/view.asp?a=1450&q=512599#POTW, Date accessed: October 9, 2009.

PADEP, 2009d. Pennsylvania Department of Environmental Protection, Water Standards and Facility Regulation, Wastewater Facilities and Permits, Municipal Sewage NPDES Permits Excel Spreadsheet, Updated June 2009, Website: http://www.depweb.state.pa.us/watersupply/cwp/view.asp?a=1450&q=535524#spreadsheet, Date accessed: October 9, 2009.

PADEP, 2009e. Pennsylvania Department of Environmental Protection, eMapPA, Website: http://www.emappa.dep.state.pa.us/emappa/viewer.htm, Date accessed: July 24, 2009.

PADEP, 2009f. Pennsylvania Department of Environmental Protection, eMapPA, Website: http://www.emappa.dep.state.pa.us/emappa/viewer.htm, Date accessed: July 24, 2009.

PADEP, 2009g. Final Susquehanna River Metal TMDL, Luzerne County, For Mine Drainage Affected Segments, February 19, 2009.

PADEP, 2010a. 2010 Pennsylvania Integrated Water Quality Monitoring and Assessment Report; Website: http://www.portal.state.pa.us/portal/server.pt/community/water_quality_standards/10556/integrat ed_water_quality_report_-_2010/682562, Date accessed: August 9, 2010.

PADEP, 2010b. Pennsylvania Landfill Methane Projects. Website: http://www.portal.state.pa.us/portal/server.pt/community/landfill_methane_outreach_program/14091/pa_landfill_methane_projects/589657, Date accessed: September 17, 2010.

PADOT, 2009. Pennsylvania Railroad Map – January 2009. Bureau of Rail Freights, Ports & Waterways, Center for Program Development and Management, Bureau of Planning and Research.

PAGC, 2004a. Pennsylvania Game Commission. Black Bear Wildlife Notes, Website: http://www.pgc.state.pa.us/pgc/cwp/view.asp?a=458&q=150412, Date accessed: October 6, 2009.

PAGC, 2004b. Pennsylvania Game Commission. Ring necked Pheasant Wildlife Notes, Website: http://www.pgc.state.pa.us/pgc/cwp/view.asp?a=458&q=150811, Date accessed: October 7, 2009.

PAGC, 2004c. Pennsylvania Game Commission. Whitetailed Deer Wildlife Notes, Website: http://www.pgc.state.pa.us/pgc/cwp/view.asp?a=458&q=150818, Date accessed: October 9, 2009.

PAGC, 2007. Pennsylvania Game Commission. Wild Turkey Wildlife Notes, Website: http://www.pgc.state.pa.us/pgc/cwp/view.asp?a=458&q=150678, Date accessed: October 6, 2009.

PAGC, 2009a. Pennsylvania Game Commission. 2008 09 Deer Harvest, Website: http://www.pgc.state.pa.us/pgc/cwp/view.asp?a=493&q=159281, Date accessed: October 7, 2009.

PAGC, 2009b. Pennsylvania Game Commission. 2008 Bear Harvest, Website: http://www.pgc.state.pa.us/pgc/cwp/view.asp?a=493&q=159281, Date accessed: October 7, 2009.

PAGC, 2009c. Pennsylvania Game Commission. 2007 Turkey Harvests, Website: http://www.pgc.state.pa.us/pgc/cwp/view.asp?a=493&q=174898, Date accessed: October 7, 2009.

PAGC, 2009d. Pennsylvania Game Commission. Estimated Harvest by Species, 1990 Present, Website: http://www.pgc.state.pa.us/pgc/cwp/view.asp?a=493&q=159239, Date accessed: October 7, 2009.

PAGC, 2009e. Pennsylvania Game Commission. Pennsylvania's Wildlife Action Plan, Website: http://www.pgc.state.pa.us/pgc/cwp/view.asp?a=496&q=162067, Date accessed: October 9, 2009.

PA GCLGS, 2006. Pennsylvania Governor's Center for Local Government Services, 2006 Statewide Municipal Financial Information, Website: http://munstatspa.dced.state.pa.us/Reports.aspx, Date accessed: October 7, 2009.

Page, L.M. and B.M. Burr. 1991. Peterson Field Guides Freshwater Fishes. Note: Copyright protected. Electronic version not available for printing. Reference available for purchase.

PA Geologic Survey, 2000. Commonwealth of Pennsylvania Department of Conservation and Natural Resources, Bureau of Topographic and Geologic Survey, Map 13: Physiographic Provinces of Pennsylvania, Fourth Edition.

PA Geologic Survey, 2010a. Susquehanna Lowlands Section, Website: http://www.dcnr.state.pa.us/topogeo/map13/13sls.aspx, Date accessed: August 5, 2010.

PA Geologic Survey, 2010b. Anthracite Valley Section, Website: http://www.dcnr.state.pa.us/topogeo/map13/13avs.aspx, Date accessed: August 5, 2010.

PA Geologic Survey, 2010c. Anthracite Upland Section, Website: http://www.dcnr.state.pa.us/topogeo/map13/13aus.aspx, Date accessed: August 5, 2010.

PASiteSearch, 2008. Site Selection & Economic Development in Pennsylvania, County Profiles, Website: http://www.pasitessearch.com/selectsites, Date accessed: February 19, 2008.

PDCED, 2005. Regional and County Land Use Profiles, Website: http://www.newpa.com/getlocal- gov-support/community-planning/land-use-reports/regional-and-county-land-use-profiles, Date accessed October 28, 2011.

PDCED, 2011a. Growing Greener database, Berks County; Website: http://www.dced.state.pa.us/growinggreener/Default.aspx, Date accessed: July 8, 2011.

PDCED, 2011b. Growing Greener database, Carbon County; Website: http://www.dced.state.pa.us/growinggreener/Default.aspx, Date accessed: July 8, 2011.

PDCED, 2011c. Growing Greener database, Luzerne County; Website: http://www.dced.state.pa.us/growinggreener/default.aspx?Var=Luzerne, Date accessed: July 8, 2011.

PDCED, 2011d. Growing Greener database, Pike County; Website: http://www.dced.state.pa.us/growinggreener/Default.aspx, Date accessed: July 8, 2011.

PDCED, 2011e. Growing Greener database, Wayne County; Website: http://www.dced.state.pa.us/growinggreener/Default.aspx, Date accessed: July 8, 2011.

PEMA, 2009. PEMA Contact Information, Website: http://www.portal.state.pa.us/portal/server.pt?open=512&objID=4731&mode=2, Date accessed: July 27, 2009.

Penn Future, 2010. Wind Farms in Pennsylvania; Website: http://www.pennfuture.org/content.aspx?MenuID=1&SubSectionID=192&SectionID=178, Date accessed: September 17, 2010.

PennDOT, 2005. Project Description for Interstate 80 16M, Pennsylvania Department of Transportation. Website: http://www.dot.state.pa.us/penndot/districts/district5.nsf/ccd8afa9420ee56c8525734c006ed361/ 2be2dedc712eb60885257793006014 5f?OpenDocument, Date accessed: June 30, 2011.

PennDOT, 2007. "Governor Rendell Announces $10 Million Investment in Rail Freight", December 13, 2007; Website: http://www.dot.state.pa.us/Internet/pdNews.nsf/2e8de06d3eb60621852570eb005484bd/7da03e 3f19efe0a4852573b10048249c?OpenDocument, Date accessed: September 17, 2010.

PennDOT, 2008a. "Governor Rendell Announces $20 Million Investment in Rail Freight", March 26, 2008; Website: http://www.dot.state.pa.us/Internet/pdNews.nsf/2e8de06d3eb60621852570eb005484bd/676f55 b178a89e68852574180073fa8f?OpenDocument, Date accessed: September 17, 2010.

PennDOT, 2008b. "Governor Rendell Announces $38.5 Million Investment in Rail Freight", December 11, 2008; Website: http://www.dot.state.pa.us/Internet/pdNews.nsf/2e8de06d3eb60621852570eb005484bd/4c8e2f 0b4b9002038525751c0069e118?OpenDocument, Date accessed: September 17, 2010.

PennDOT, 2009. "Governor Rendell Announces $24.5 Million Rail Investment in 31 Counties, December 11, 2009; Website: http://www.dot.state.pa.us/Internet/pdNews.nsf/2e8de06d3eb60621852570eb005484bd/6b7e17 f50711e4f1852576890065c28a?OpenDocument, Date accessed: September 17, 2010.

PennDOT, 2010a. Pennsylvania's 2011 Transportation Program, Twelve Year Program Narrative and TYP Project List, August 12, 2010; Website: http://www.dot.state.pa.us/Internet/Bureaus/CPDM.nsf/TransportaionProgramList?OpenForm, Date accessed: September 18, 2010.

PennDOT, 2010b. Governor Rendell Announces $12.9 Million Rail Investment in 10 Counties", May 13, 2010; Website: http://www.dot.state.pa.us/Internet/pdnews.nsf/8c5bc4e349ab4db6852576c800678468/303cf3e a40bd096a85257722006ad94a?OpenDocument, Date accessed: September 17, 2010.

PennDOT, 2010c. Smart Transportation. Pennsylvania Community Transportation Initiative; Website: http://www.smart-transportation.com/pcti.html, Date accessed: August 5, 2010.

Pennsylvania State University-Erie, 2011. Aquatic Invasive Species of Pennsylvania: Delaware River Watershed, Website: http://www.pserie.psu.edu/seagrant/ais/watershed/delaware.htm, Date accessed: July 13, 2011.

Pennsylvania Turnpike, 2009. Pennsylvania Turnpike Construction and Expansion Project Schedule. Website: http://www.lehighbridge.com/project-schedule.aspx, Date accessed: August 11, 2011.

Peterson, Roger Tory, 2002. Birds of Eastern and Central North America. Note: Copyright protected. Electronic version not available for printing. Reference available for purchase.

PFBC, 2002. Pennsylvania Fish and Boat Commission, Lizards and Skinks of Pennsylvania. Website: http://www.fish.state.pa.us/amp_rep.htm, Date accessed: October 9, 2009.

PFBC, 2004. Pennsylvania Fish and Boat Commission, Pennsylvania Angler and Boater Magazine, January February 2004: The Timber Rattlesnake, Website: http://www.fish.state.pa.us/amp_rep.htm, Date accessed: October 9, 2009.

PFBC, 2009a. Pennsylvania Fish and Boat Commission, Popular Sportfishes of Pennsylvania, Website: http://www.fish.state.pa.us/fishes.htm, Date accessed: October 9, 2009.

PFBC, 2009b. Pennsylvania Fish and Boat Commission, Trout Stocking Events in Northumberland County from 3/1/2009 to 2/28/2010, Website: http://pfbc.state.pa.us/pfbc_webgis/TroutStockingDetails.aspx, Date accessed: October 9, 2009.

PFBC, 2010a. PA Stream Sections that Support Natural Reproduction of Trout, Website: http://www.fish.state.pa.us/trout_repro.htm, Date accessed: June 7, 2010. Note: Copyright protected. Electronic version not available for printing.

PFBC, 2010b. PA Warmwater/Coolwater Fisheries, Website: http://pfbc.state.pa.us/wwcw/wwcw.aspx, Date accessed: June 7, 2010.

PFBC, 2011. Pennsylvania Fish and Boat Commission, Letter from Christopher A. Urban to Bradley Wise (PPL), Re: Species Impact Review (SIR)- #35087, Bell Bend Nuclear Plant, Salem Township, Luzerne County, Pennsylvania.

PGC, 2008. Letter from James R. Leigey (Pennsylvania Game Commission) to Rod Krich (Unistar), Re: PNDI Database Search, Berwick, PA NPP 1 Project, Salem Township, Luzerne County, Pennsylvania, April 10, 2008.

PhillyBurbs, 2011. "Stimulus funds to renovate Ambler Boiler House", Margaret Gibbons, June 8, 2011; Website: http://www.phillyburbs.com/news/local/the_intelligencer_news/stimulus-fundsto- renovate-ambler-boiler-house/article_b2a28925-f34d-55ac-a59a-014ba08c2b53.html, Date accessed: August 12, 2011.

PJM, 2008a. 2007 Regional Transmission Expansion Plan, Section 3: PJM Board Approved 15 Year Transmission Expansion Plan: 2007 2022, PJM Interconnection, LLC, February 27, 2008.

PJM, 2008b. PJM Transmission Grid, Website: http://www.pjm.com/documents/maps.aspx.

PJM, 2009. PJM 2008 Regional Transmission Expansion Plan, February 27, 2009.

PJM, 2011. Susquehanna-Roseland, Website: http://www.pjm.com/planning/rtep-upgradesstatus/ backbone-status/susquehanna-roseland.aspx, Date accessed: October 4, 2011.

Platts, 2009. Electric Transmission Lines (Layers), 2008 Metadata, Website: http://www.platts.com/Analytic%20Solutions/Custom/gis/index.xml, Date accessed: June 22, 2009.

PNHP, 2009a. Pennsylvania Natural Heritage Program, Invertebrate Species List Montour County, Website: http://www.naturalheritage.state.pa.us, Date accessed: October 8, 2009.

PNHP, 2009c. Pennsylvania Natural Heritage Program, Vertebrate Species List Montour County, Website: http://www.naturalheritage.state.pa.us, Date accessed: October 8, 2009.

PNHP, 2009d. Pennsylvania Natural Heritage Program, Rank and Status Definitions, Website: http://www.naturalheritage.state.pa.us, Date accessed: October 8, 2009.

PNHP, 2009e. Pennsylvania Natural Heritage Program, Invertebrate Species Luzerne County, Website: http://www.naturalheritage.state.pa.us, Date accessed: October 8, 2009.

PNHP, 2009g. Pennsylvania Natural Heritage Program, Vertebrate Species Luzerne County, Website: http://www.naturalheritage.state.pa.us, Date accessed: October 8, 2009.

PNHP, 2009h. Species of Concern – Eastern Mudminnow, Website: http://www.dcnr.state.pa.us/wrcp/emudmin.aspx, Date accessed: October 12, 2009.

PNHP, 2009i. Pennsylvania Natural Heritage Program, Invertebrate Species List Northumberland County, Website: http://www.naturalheritage.state.pa.us, Date accessed: October 8, 2009.

PNHP, 2009k. Pennsylvania Natural Heritage Program, Vertebrate Species List Northumberland County, Website: http://www.naturalheritage.state.pa.us, Date accessed: October 8, 2009.

PNHP, 2009l. Species of Concern – Greenfloater, Website: http://www.dcnr.state.pa.us/wrcp/greenfloat.aspx, Date accessed: October 13, 2009.

PNHP, 2009m. Species of Concern Checkered Sculpin (Cottus sp.n.), Website: http://mddnr.chesapeakebay.net/ mbss/SA_spec6.cfm?species=Checkered%20sculpin, Date accessed: October 19, 2009.

PNHP, 2010a. State Species List, County: Columbia, All Species, Website: http://www.naturalheritage.state.pa.us/AllSpecies.aspx, Date accessed: August 9, 2010.

PNHP, 2011a. Pennsylvania Natural Heritage Program, Species of Special Concern Lists, Plants, Luzerne County, Website: http://www.naturalheritage.state.pa.us/Species.aspx, Date accessed: August 16, 2011.

PNHP, 2011b. Pennsylvania Natural Heritage Program, Species of Special Concern Lists, Plants, Montour County, Website: http://www.naturalheritage.state.pa.us, Date accessed: August 16, 2011.

PNHP, 2011c. Pennsylvania Natural Heritage Program, Species of Special Concern Lists, Plants, Northumberland County, Website: http://www.naturalheritage.state.pa.us, Date accessed: August 16, 2011.

PNHP, 2011d. Species of Special Concern Lists: All Species: Northampton County, Website: http://www.naturalheritage.state.pa.us/Species.aspx, Date accessed: August 26, 2011.

PPL, 2006. Applicant's Environmental Report SSES Operating License Renewal Stage, Pennsylvania Power and Light, September.

PPL, 2010a. PPL Susquehanna; Website: http://www.pplweb.com/ppl+generation/nuclear+plants/ppl+susquehanna+fact+sheet.htm, Date accessed: September 17, 2010.

PPL, 2010b. PPL Brunner Island; Website: http://www.pplweb.com/ppl+generation/coal+plants/ppl+brunner+island+-+fact+sheet.htm, Date accessed: October 22, 2010.

PPL, 2010c. PPL Montour; Website: http://www.pplweb.com/ppl+generation/coal+plants/ppl+montour+fact+sheet.htm, Date accessed: September 17, 2010.

PPL, 2011a. PPL Martins Creek; Website: http://www.pplweb.com/ppl+generation/coal+plants/ppl+martins+creek/, Date accessed: June 29, 2011.

PPL, 2011b. PPL Susquehanna-Roseland Project Overview; Website: http://www.pplreliablepower.com/projectoverview.htm, Date accessed: July 1, 2011.

PPL, 2011c. PPL Wallenpaupack at a Glance; Website: http://www.pplweb.com/ppl+generation/hydro+plants/ppl+wallenpaupack.htm, Date accessed: June 30, 2011.

PPL, 2011d. PPL Lower Mount Bethel Energy Plant at a Glance; Website: http://www.pplweb.com/ppl+generation/natural+gas+and+oil/lower+mount+bethel.htm, Date accessed: August 26, 2011.

PSEG, 2011. PSEG Power LLC, The Mercer Generating Station; Website: http://www.pseg.com/family/power/fossil/stations/mercer.jsp, Date accessed: June 29, 2011.

Rawlins, John E., 2007. *Pennsylvania's Comprehensive Wildlife Conservation Strategy: Invertebrates*, Version 1.1, Carnegie Museum of Natural History, Section of Invertebrate Zoology. January 12,

Reading Eagle, 2011. "Antietam dam repairs at midway point", June 22, 2011, website: http://readingeagle.com/article.aspx?id=315807, Date accessed: July 8, 2011.

Renewable Energy World, 2007. "Gov. Rendell Dedicates Locust Ridge Wind Farm in PA", June 26, 2007; Website: http://www.renewableenergyworld.com/rea/news/article/2007/06/govrendell- dedicates-locust-ridge-wind-farm-in-pa-49107, Date accessed: September 17, 2010.

RFC, 2007. Long Term Resource Assessment, 2007-2016.

Rhoads, A.F. and T.A. Block, 2007. The Plants of Pennsylvania, Second Edition. University of Pennsylvania Press. 1042pp. Note: Copyright protected. Electronic version not available for printing. Reference available for purchase.

Senator Arlen Specter, 2010a. FY 2010 Energy and Water Appropriations Requests, Thursday, March 25, 2010; Website: http://specter.senate.gov/public/index.cfm?

FuseAction=NewsRoom.NewsletterArticles&Content
Record_id=96D56A91-F0F0-56B9-0044-E1C97F97D2DC, Date accessed: September 18, 2010.

Senator Arlen Specter, 2010b. FY 2011 Energy and Water Appropriations Requests; Website: http://specter.senate.gov/public/index.cfm?
FuseAction=IssueStatements.View&Issue_id=F8C47 7C6-055B-4212-668B-C63355083511, Date accessed: September 18, 2010.

Senator Arlen Specter, 2010c. FY 2011 Transportation, Housing and Urban Development Appropriations Requests; Website: http://specter.senate.gov/public/index.cfm?
FuseAction=IssueStatements.View&Issue_id=F8C47 7C6-055B-4212-668B-C63355083511, Date accessed: September 18, 2010.

Senator Arlen Specter, 2010d. FY 2011 Interior and Environment Appropriations Requests; Website: http://specter.senate.gov/public/index.cfm?
FuseAction=IssueStatements.View&Issue_id=F8C47 7C6-055B-4212-668B-C63355083511, Date accessed: September 18, 2010.

Senator Robert P. Casey, 2010a. FY 2011 Energy and Water Appropriations Requests; Website: http://casey.senate.gov/issues/issue/?id=f761448f-dcb4-4903-a7ae-cf6cd9f4591e, Date accessed: September 18, 2010.

Senator Robert P. Casey, 2010b.FY 2011 Interior and Environment Appropriations Requests; Website: http://casey.senate.gov/issues/issue/?id=f761448f-dcb4-4903-a7ae-cf6cd9f4591e, Date accessed: September 18, 2010.

Senator Robert P. Casey, 2010c. FY 2011 Transportation, Housing and Urban Development Appropriations Requests; Website: http://casey.senate.gov/issues/issue/?id=f761448f-dcb4-4903-a7ae-cf6cd9f4591e, Date accessed: September 18, 2010.

Senator Robert P. Casey, 2010d. FY 2011 Water Resources Development Projects; Website: http://casey.senate.gov/issues/issue/?id=f761448f-dcb4-4903-a7ae-cf6cd9f4591e, Date accessed: September 18, 2010.

Sibley, D.A., 2000. The Sibley Guide to Birds of Eastern North America, The Audubon Society, 490 p. Note: Copyright protected. Electronic version not available for printing. Reference available for purchase.

Site Selection Magazine, 2008. “Region Gets Wired for Key Sector-Support Roles”, Site Selection Online; Website: http://www.siteselection.com/features/2008/sep/Pennsylvania/, Date accessed: September 17, 2010.

SourceWatch, 2011a. Hunlock Power Station; Website: http://www.sourcewatch.org/index.php?title=Hunlock_Power_Station, Date accessed: September 26, 2011.

SourceWatch, 2011b. Kline Cogeneration Facility; Website: http://www.sourcewatch.org/index.php?title=Kline_Cogeneration_Facility, Date accessed: September 26, 2011.

SourceWatch, 2011c. Northampton Generating Plant; Website: http://www.sourcewatch.org/index.php?title=Northampton_Generating_Plant, Date accessed: September 26, 2011.

SourceWatch, 2011d. 2011d. Panther Creek Energy Facility; Website: http://www.sourcewatch.org/index.php?title=Panther_Creek_Energy_Facility, Date accessed: September 26, 2011.

SourceWatch, 2011e. St. Nicholas Cogeneration Plant; Website: http://www.sourcewatch.org/index.php?title=St._Nicholas_Cogeneration_Plant, Date accessed: September 26, 2011.

Spectra Energy, 2007. Texas Eastern Time 3 Project, Delivering Rockies Supply and New Storage Access to Northeast Markets, Binding Open Season Notice, October 1, 2007 – November 16, 2007.

SRAFRC, 2010. Migratory Fish Management and Restoration Plan for the Susquehanna River Basin, Draft for Policy Committee and public review, March 11, 2010.

SRBC, 2005. Groundwater Management Plan for the Susquehanna River Basin. Publication No. 236. June 2005.

SRBC, 2008a. Susquehanna River Basin Commission Regulation of Projects. 18 CFR Parts 801, 806, 807, and 808. Final rulemaking action December 2008, effective January 15, 2009.

SRBC, 2008b. Comprehensive Plan for the Water Resources of the Susquehanna River Basin. Amended December 2009.

SRBC, 2009a. SRBC Comprehensive Plan, Appendix 3; Website: http://www.srbc.net/planning/compplanfiles.asp, Date accessed: July 26, 2010.

SRBC, 2009b. SRBC Project Fact Sheet, Susquehanna River Basin Low Flow Management Study; Website: http://www.srbc.net/programs/programs.htm, Date accessed: August 4, 2010.

SRBC, 2009c. "Accommodating a New Straw in the Water: Extracting Natural Gas from the Marcellus Shale in the Susquehanna River Basin," Website: http://www.srbc.net/programs/projreviewmarcellus.htm, Date accessed: September 16, 2010.

SRBC, 2010a. Programs and Activities; Website: http://www.srbc.net/programs/programs.htm, Date accessed: September 17, 2010.

SRBC, 2010b. Migratory Fish Restoration and Passage on the Susquehanna River; Website: http://www.srbc.net/programs/programs.htm, Date accessed: August 4, 2010.

SRBC, 2010c. Paxton Watershed Stormwater Project, A Chesapeake Bay Targeted Watershed Project; Website: http://www.srbc.net/programs/paxton/index.asp, Date accessed: September 14, 2010.

SRHCES, 2007. Pulse of Heartland 2007, An Annual Report Presented by the SRHCES Susquehanna River Heartland Coalition for Environmental Studies; Website: http://www.srhces.org/Pages/Resources.aspx, Date accessed: September 16, 2010.

SRHCES, 2008. Pulse of Heartland 2008, An Annual Report Presented by the SRHCES Susquehanna River Heartland Coalition for Environmental Studies; Website: http://www.srhces.org/Pages/Resources.aspx, Date accessed: September 16, 2010.

Sumneytown Pike Connector, 2009. "S.R. 1058, Section HAT (Phase I) Construction Begins", Project News, Sumneytown Pike Connector/PA 309, Website; http://www.pa309connector.com/projectnew.html, Date accessed: July 7, 2011.

The News Item, 2009. "North Shore Railroad would move into SEEDCO if Intelliwatt builds", article by Rob Wheary, The News Item, Shamokin, PA., LexisNexis Publication, August 19, 2009; Website: http://newsitem.com/news/north-shore-railroad-would-move-into-seedco-ifintelliwatt- builds-1.196619, Date accessed: September 18, 2010.

The News Item, 2010a. "IntelliWatt Receives $5M State Loan; Could be Final Piece to Make Mount Carmel Twp. Project Reality", article by Rob Wheary, The News Item, Shamokin, PA, January 22, 2010; Website: http://newsitem.com/news/intelliwatt-receives-5m-state-loan-couldbe-final-piece-to-make-mount-carmel-twp-project-reality-1.563384, Date accessed: September 17, 2010.

The News Item, 2010b. "SEEDCO Park Still Has Promise Investor Happy about Pump Station, Worried about Loss of Bartos", article by Justin Strawser, The News Item, Shamokin, PA. June 6, 2010; Website: http://newsitem.com/news/seedco-park-still-has-promise-investor-happyabout-pump-station-worried-about-loss-of-bartos-1.832899, Date accessed: September 18, 2010.

The News Item, 2010c. "Room to grow at SEEDCO", article by Justin Strawser, The News Item, Shamokin, PA. June 7, 2010; Website: http://newsitem.com/news/room-to-grow-atseedco-1.833808, Date accessed: September 17, 2010.

The News Item, 2010d. "'Clean-coal' plant considered for Coal Township-SEEDCO Park", article by Justin Strawser, The News Item, Shamokin, PA, June 8, 2010; Website: http://newsitem.com/news/clean-coal-plant-considered-for-coal-township-seedco-park- 1.835196, Date accessed: September 17, 2010.

The Pennsylvania Code, 2007. Title 25 Environmental Protection, Part 1 Department of Environmental Protection, Subpart C Protection of Natural Resources, Article II Water Resources, Chapter 93 Water Quality Standards, March.

The Pennsylvania Code, 2009. Conservation of Pennsylvania native Wild Plants. Website: http://www.pacode.com/secure/data/017/chapter45/chap45toc.html. Date accessed: October 15, 2009.

The Wildlife Society, 2007. Impacts of Wind Energy Facilities on Wildlife and Wildlife Habitat, Technical Review 07-2, The Wildlife Society Technical Review Committee on Wind Energy Facilities and Wildlife, September 2007.

The Wind Power, 2010. Wind Turbines and Windfarms database, USA, Pennsylvania; Website: http://www.thewindpower.net/wind-farms-list-4-pennsylvania.php, Date accessed: September 17, 2010.

The Wind Power, 2011. Wind turbines and windfarms database, USA, Pennsylvania; Website: http://www.thewindpower.net/country-datasheet-maps-4-usa.php, Date accessed: June 29, 2011.

Trade & Industry Development, 2010. "PA: Amazon.com to Open Distribution Center; Create 1100 Jobs; Invest 20M," Website: http://www.tradeandindustrydev.com/ID-675-news.aspx, Date accessed: September 16, 2010.

TxPW, 2009. Texas Parks and Wildlife Department. Southern Leopard Frog (Rana sphenocephala). Website: http://www.tpwd.state.tx.us/huntwild/wild/species/southernleopardfrog/, Date accessed: October 12, 2009.

UMassAmherst, 2008a. Natural Resources & Environmental Conservation, Information on Snakes, *Eastern Hognose Snake*, Website: http://www.umass.edu/nrec/snake_pit/pages/hog.html, Date accessed: 7/15/2010.

UMassAmherst, 2008b. Natural Resources & Environmental Conservation, Information on Snakes, *Eastern Ribbon Snake*, Website: http://www.umass.edu/nrec/snake_pit/pages/eribbon.html, Date accessed: 7/15/2010.

Union County Board of Commissioners, 2009. Cultivating Community: A Plan for Union County's Future, Website: http://www.cultivatingcommunity.net/, Date accessed: November 9, 2011.

Union of Concerned Scientists, 2008. Climate Change in Pennsylvania, Impacts and Solutions for the Keystone State, A Climate Impacts Assessment for Pennsylvania, October 2008.

UniStar, 2011 Bell Bend Nuclear Power Plant Alternative Site Evaluation v.[2], UniStar Nuclear Energy, May 2011.

USACE, 2005. Public Notice – In Reply to Application Number CENAB-OP-RPA (Shamokin Creek Flood Protection Project/Borough of Mount Carmel) 05-02114-5, U.S. Army Corps of Engineers Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: June 13, 2010.

USACE, 2006a. Public Notice 06-09 – In Reply to Application Number CENAB-OP-RPA (PPL Montour, LLC/Enhancement Activities and 12 Mile Pipeline Corridor) 06-01094-5, Comment Period: March 6, 2006 to April 4, 2006, U.S. Army Corps of Engineers Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: June 13, 2010.

USACE, 2006b. Public Notice 06-13 – In Reply to Application Number CENAB-OP-RPA (Selinsgrove Center Wetland and Stream Mitigation) 06-00698-12, Comment Period: March 13, 2006 to March 27, 2006, U.S. Army Corps of Engineers Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: June 13, 2010.

USACE, 2006c. Public Notice 06-44 – In Reply to Application Number CENAB-OP-RPA (Leidy to Long Island expansion Project) 06-02008-12, Comment Period: June 12, 2006 to July 12, 2006, U.S. Army Corps of Engineers Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: June 13, 2010.

USACE, 2006d. Public Notice 06-33 – In Reply to Application Number CENAB-OP-RPA (PA DCNR – Shikellamy State Park/Adam T. Bower Memorial Dam) 06-02672-5, Comment Period: August 14, 2006 to August 29, 2006, U.S. Army Corps of Engineers Baltimore and New York

District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: June 13, 2010.

USACE, 2007a. Public Notice 07-30 – In Reply to Application Number NAB-2007-1215-P05 (US Gypsum ancillary Improvements), Comment Period: May 10, 2007 to June 10, 2007, U.S. Army Corps of Engineers Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: June 13, 2010.

USACE, 2007b. Public Notice 07-50 – In Reply to Application Number CENAB-OP-RPA (PA DOT – S.R. 6247, Section 0000) 07-1605-P12, Comment Period: August 6, 2007 to September 6, 2007, U.S. Army Corps of Engineers Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: June 13, 2010.

USACE, 2008. Public Notice 08-15 – In Reply to Application Number CENAB-OP-RPA (PA DOT – S.R. 1021, Section 370 – 8th Street Bridge Replacement Over the Susquehanna River) 07-09475-P12, Comment Period: March 24, 2008 to April 7, 2008, U.S. Army Corps of Engineers Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: June 13, 2010.

USACE, 2009a. Public Notice 09-04 – In Reply to Application Number CENAB-OP-RPA (Lycoming County Landfill – Phase II) 08-03780-P12, Comment Period: January 15, 2009 to January 30, 2009, U.S. Army Corps of Engineers Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: June 13, 2010.

USACE, 2009b. Public Notice 09-16 – In Reply to Application Number NAB-2003-00089 (Shikellamy State Park), Comment Period: March 23, 2009 to April 7, 2009, U.S. Army Corps of Engineers Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: June 13, 2010.

USACE, 2009c. Public Notice 09-23 – In Reply to Application Number NAB-2005-02860-P05 (Sunbury Riverfront Reconstruction), Comment Period: May 8, 2009 to June 6, 2009, U.S. Army Corps of Engineers Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: June 13, 2010.

USACE, 2009d. Public Notice 09-54 – In Reply to Application Number CENAB-OP-RPA (PA DOT – S.R. 0080, Section 004 – Arch Street Bridge Replacement) 06-02601-P12, Comment Period: September 21, 2009 to October 21, 2009, U.S. Army Corps of Engineers Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: June 13, 2010.

USACE, 2009e. Public Notice 09-56 – In Reply to Application Number NAB (PA DOT – S.R. 2064, Section 078 – Susquehanna River Bridges Replacement Project) 06-02066-P12, Comment Period: September 21, 2009 to October 21, 2009, U.S. Army Corps of Engineers Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: June 13, 2010.

USACE, 2009f. Malapardis Brook, Hanover, New Jersey, Emergency Streambank Restoration, Fact Sheet, U.S. Army Corps of Engineers – New York District; Website: http://www.nan.usace.army.mil/project/index.php?NJ, Date accessed: July 12, 2011.

USACE, 2010a. American Recovery and Reinvestment Act of 2009, Army Corps of Engineers – Civil Works – Construction; Website: http://www.usace.army.mil/recovery/Pages/Projects.aspx, Date accessed: September 18, 2010.

USACE, 2010b. American Recovery and Reinvestment Act of 2009, Army Corps of Engineers – Civil Works – Operations & Maintenance; Website: http://www.usace.army.mil/recovery/Pages/Projects.aspx, Date accessed: September 18, 2010.

USACE, 2010c. Safety Light Corporation (SLC) Superfund Site Fact Sheet as of 1 January 2010, U.S. Army Corps of Engineers - Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: June 13, 2010.

USACE, 2010d. DDC/DDSP [Defense Distribution Center/Defense Distribution Depot Susquehanna Pennsylvania], New Cumberland, PA Fact Sheet as of January 2010, U.S. Army Corps of Engineers - Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: June 13, 2010.

USACE, 2010e. Tobyhanna Army Depot, Tobyhanna, PA Fact Sheet as of January 2010, U.S. Army Corps of Engineers - Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: September 20, 2010.

USACE, 2010f. Tobyhanna Artillery Range Fact Sheet as of 1 January 2010, U.S. Army Corps of Engineers - Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: September 20, 2010.

USACE, 2010g. Project Factsheet Hazleton Acid Mine Reclamation, Luzerne County, PA, January 2010, U.S. Army Corps of Engineers Philadelphia District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: June 13, 2010.

USACE, 2010h. Lidy Creek, Luzerne County, PA Fact Sheet as of February 2010, U.S. Army Corps of Engineers - Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: June 13, 2010.

USACE, 2010i. Aylesworth Creek Lake, PA Fact Sheet as of March 2010, U.S. Army Corps of Engineers - Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: June 13, 2010.

USACE, 2010j. Fall Brook, Lackawanna County, PA Fact Sheet as of March 15, 2010, U.S. Army Corps of Engineers - Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: June 13, 2010.

USACE, 2010k. Throop Borough, Lackawanna County, PA Fact Sheet as of March 15, 2010, U.S. Army Corps of Engineers - Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: September 14, 2010.

USACE, 2010l. Lackawanna River at Olyphant, PA Fact Sheet as of March 16, 2010, U.S. Army Corps of Engineers - Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: June 13, 2010.

USACE, 2010m. Lackawanna River at Scranton, PA Fact Sheet as of March 16, 2010. U.S. Army Corps of Engineers - Baltimore District. Website: http://www.nab.usace.army.mil/Factsheets/Projects.html. Date accessed: June 13, 2010.

USACE, 2010n. Susquehanna River Low Flow Study Fact Sheet as of March 16, 2010, U.S. Army Corps of Engineers - Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: June 13, 2010.

USACE, 2010o. FUSRAP, Wayne Interim Storage Site (WISS), Wayne, New Jersey, Fact Sheet, U.S. Army Corps of Engineers – New York District; Website: http://www.nan.usace.army.mil/project/index.php?NJ, Date accessed: July 12, 2011.

USACE, 2010p. Public Notice 10-27 – In Reply to Application Number NAB-2010-00529-P05 (Sunbury Airport Campground) Comment Period: May 19, 2010 through June 18, 2010, U.S. Army Corps of Engineers - Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: June 13, 2010.

USACE, 2010q. Wyoming Valley, PA Levee Raising Fact Sheet as of June 18, 2010, U.S. Army Corps of Engineers - Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/Projects.html, Date accessed: September 20, 2010.

USACE, 2010r. Assunpink Creek, Hamilton Township, Mercer County, NJ, Factsheet as of January 2010, U.S. Army Corps of Engineers – Philadelphia District; Website: http://www.nap.usace.army.mil/cenap-dp/projects/projects.htm, Date accessed: June 28, 2011.

USACE, 2010s. Beltzville Lake, Beltzville, PA, Factsheet as of January 2010, U.S. Army Corps of Engineers – Philadelphia District; Website: http://www.nap.usace.army.mil/cenapdp/ projects/projects.htm, Date accessed: June 29, 2011.

USACE, 2010t. Delaware River Basin Comprehensive NY, NJ, DE & PA (Watershed Flood Management Plan), Factsheet as of January 2010, U.S. Army Corps of Engineers – Philadelphia District; Website: http://www.nap.usace.army.mil/cenap-dp/projects/projects.htm, Date accessed: June 28, 2011.

USACE, 2010u. Francis E. Walter Dam, White Haven, PA, Factsheet as of January 2010; U.S. Army Corps of Engineers – Philadelphia District; Website: http://www.nap.usace.army.mil/cenap-dp/projects/projects.htm, Date accessed: June 28, 2011.

USACE, 2010v. Grover's Mill Pond, Mercer County, NJ, Factsheet as of January 2010, U.S. Army Corps of Engineers – Philadelphia District; Website: http://www.nap.usace.army.mil/cenap-dp/projects/projects.htm, Date accessed: June 28, 2011.

USACE, 2010w. Musconetcong River Dam Removals, Bloomsbury, NJ, Factsheet as of January 2010, U.S. Army Corps of Engineers – Philadelphia District; Website: http://www.nap.usace.army.mil/cenap-dp/projects/projects.htm, Date accessed: June 28, 2011.

USACE, 2010x. Former Raritan Arsenal, Edison New Jersey, as of June 2010, U.S. Army Corps of Engineers – New York District; Website: http://www.nan.usace.army.mil/business/buslinks/raritan/index.php, Date accessed: August 12, 2011.

USACE, 2010y. Former Raritan Arsenal Factsheet, Edison New Jersey, as of June 2010, U.S. Army Corps of Engineers – New York District, Website: http://www.nan.usace.army.mil/business/buslinks/raritan/index.php?fact, Date accessed: July 28, 2011.

USACE, 2010z. FUSRAP, Middlesex Sampling Plant (MSP), Middlesex, New Jersey, Fact Sheet, U.S. Army Corps of Engineers – New York District; Website: http://www.nan.usace.army.mil/project/index.php?NJ, Date accessed: July 12, 2011.

USACE, 2011a. Tobyhanna Artillery Range Factsheet as of January 1, 2011, U.S. Army Corps of Engineers – Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/, Date accessed: June 28, 2011.

USACE, 2011b. Delaware River Basin Comprehensive Interim Feasibility Study for New Jersey, Factsheet as of January 2011, U.S. Army Corps of Engineers – Philadelphia District; website: http://www.nap.usace.army.mil/cenap-dp/projects/projects.htm, Date accessed: June 28, 2011.

USACE, 2011c. Passaic Flood Warning System, New Jersey, As of January 2011, U.S. Army Corps of Engineers – New York District; Website: http://www.nan.usace.army.mil/project/index.php?NJ-, Date accessed: July 28, 2011.

USACE, 2011d. Tobyhanna Army Depot, Tobyhanna, PA Factsheet as of January 2011, U.S. Army Corps of Engineers – Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/, Date accessed: June 28, 2011.

USACE, 2011e. Sandy Run, PA Factsheet as of February 7, 2011, U.S. Army Corps of Engineers – Baltimore District; Website: http://www.nab.usace.army.mil/Factsheets/, Date accessed: June 28, 2011.

USACE, 2011f. Francis E. Walter Reservoir Recreation Operations Plan for 2011, U.S. Army Corps of Engineers – Philadelphia District Final February 16, 2011; Website: http://www.nap.usace.army.mil/Projects/FEWalter/walter%202011plan.pdf, Date accessed: August 11, 2011.

USACE, 2011g. Hudson-Raritan Estuary, New York and New Jersey, Ecosystem Restoration [Overall Feasibility Study] As of: February 2011, U.S. Army Corps of Engineers – New York District: Website: http://www.nan.usace.army.mil/project/index.php?NJ, Date accessed: July 11, 2011.

USACE, 2011h. Lower Passaic River Restoration Project, NJ, As of: February 2011, U.S. Army Corps of Engineers – New York District; Website: http://www.nan.usace.army.mil/project/newjers/factsh/pdf/lowerpass.pdf, Date accessed: July 11, 2011.

USACE, 2011i. Raritan River to Arthur Kill Cut-Off Channel, NJ, Federal Navigation Channel Maintenance and Stewardship, as of February 2011, U.S. Army Corps of Engineers – New York District; Website: http://www.nan.usace.army.mil/project/index.php?NJ, Date accessed: July 12, 2011.

USACE, 2011j. Elizabeth River, Valley View Road, Hillside, NJ, Streambank Restoration, As of: March 2011, U.S. Army Corps of Engineers – New York District; Website: http://www.nan.usace.army.mil/project/index.php?NJ, Date accessed: July 12, 2011.

USACE, 2011k. Mill Brook at Highland Park, NJ, Flood Risk Management Project, As of: March 2011, U.S. Army Corps of Engineers – New York District; Website: http://www.nan.usace.army.mil/project/index.php?NJ, Date accessed: July 12, 2011.

USACE, 2011l. Passaic River Basin Flood Management, New Jersey, As of March 2011, U.S. Army Corps of Engineers – New York District; Website: http://www.nan.usace.army.mil/project/index.php?NJ-, Date accessed: July 28, 2011.

USACE, 2011m. Passaic River, Harrison, New Jersey South 1st Street Levee/Floodwall Flood Damage Reduction Project, As of March 2011, U.S. Army Corps of Engineers – New York District; Website: http://www.nan.usace.army.mil/project/index.php?NJ, Date accessed: July 12, 2011.

USACE, 2011n. Passaic River Mainstream and Tributaries, New Jersey, Flood Damage Reduction and Restoration Projects, As of March 2011, U.S. Army Corps of Engineers – New York District; Website: http://www.nan.usace.army.mil/project/index.php?NJ-, Date accessed: July 28, 2011.

USACE, 2011o. Peckman River Basin, New Jersey, Flood Damage Reduction and Ecosystem Restoration Project As of, March 2011, U.S. Army Corps of Engineers - New York District; Website: http://www.nan.usace.army.mil/project/index.php?NJ, Date accessed: July 11, 2011.

USACE, 2011p. Rahway River Basin, NJ, Flood Risk Management and Ecosystem Restoration Study, As of: March 2011, U.S. Army Corps of Engineers – New York District; Website: http://www.nan.usace.army.mil/project/index.php?NJ, Date accessed: July 12, 2011.

USACE, 2011q. Rahway River, New Jersey, Ecosystem Restoration, As of: March 2011, U.S. Army Corps of Engineers – New York District; Website: http://www.nan.usace.army.mil/project/index.php?NJ, Date accessed: July 11, 2011.

USACE, 2011r. South River, Raritan River Basin, New Jersey, Flood Damage Reduction and Ecosystem Restoration, As of: March 2011, U.S. Army Corps of Engineers – New York District; Website: http://www.nan.usace.army.mil/project/index.php?NJ, Date accessed: July 12, 2011.

USACE, 2011s. Dredged Material Management Plan for the Port of New York and New Jersey, As of June 2011; U.S. Army Corps of Engineers – New York District; Website: http://www.nan.usace.army.mil/project/index.php?NJ, Date accessed: July 12, 2011.

USACE, 2011t. Elizabeth River at Hillside, NJ, Flood Control Project factsheet, U.S. Army Corps of Engineers – New York District; Website: http://www.nan.usace.army.mil/project/index.php?NJ, Date accessed: July 12, 2011.

USACE, 2011u. Jackson Brook, NJ, Flood Risk Management Project, Fact Sheet, U.S. Army Corps of Engineers – New York District; Website: http://www.nan.usace.army.mil/project/index.php?NJ, Date accessed: July 12, 2011.

USACE, 2011v. Passaic River – Preservation of Natural Storage Areas, U.S. Army Corps of Engineers – New York District; Website: http://www.nan.usace.army.mil/project/index.php?NJ, Date accessed: July 28, 2011.

USCB, 1999. U.S. Census Bureau, American FactFinder, Table QT-P32: Income Distribution in 1999 of Households and Families: 2000; Data Set: Census 2000 Summary File 3 (SF3) – Sample Data, Website: http://factfinder.census.gov, Date accessed: October 5, 2011.

USCB, 2000a. 2000 Tribal Census Tracts, Geospatial Data from the U.S. Census, Department of Commerce, Geography Division, Website: http://www.census.gov/geo/www/cob/tt2000.html, Date accessed: July 1, 2009.

USCB, 2000b. Salem Township, Website: http://www.census.gov/, Date accessed: October 14, 2009.

USCB, 2000c. Anthony Township, Website: http://www.census.gov/, Date accessed: October 14, 2009.

USCB, 2000d. Census 2000 Summary File 3: Census of Population and Housing 2000; U.S. Department of Commerce Economic and Statistics Administration U.S. Census Bureau. DVD Issue 2003.

USCB, 2000e. Hazle Township, Website: http://www.census.gov/, Date accessed: October 14, 2009.

USCB, 2000f. Coal Township, Website: http://www.census.gov/, Date accessed: October 14, 2009.

USCB, 2007a. U.S. Census Bureau, American FactFinder, New Jersey Selected Housing Characteristics: 2007; Data Set: 2007 American Community Survey 1-Year Estimates; Survey: American Community Survey, Website: http://factfinder.census.gov, Date accessed: October 5, 2011.

USCB, 2007b. U.S. Census Bureau, American FactFinder, Table GCT1901: Median Household Income (In 2007 Inflation-Adjusted Dollars); Universe: Households; Data Set: 2007 American Community Survey 1-Year Estimates; Survey: American Community Survey, Website: http://factfinder.census.gov, Date accessed: October 5, 2011.

USCB, 2007c. U.S. Census Bureau, American FactFinder, Warren County, New Jersey Selected Housing Characteristics: 2007; Data Set: 2007 American Community Survey 1-Year Estimates; Survey: American Community Survey, Website: http://factfinder.census.gov, Date accessed: October 5, 2011.

USCB, 2009a. U.S. Census Bureau, American FactFinder, T1. Population Estimates; Data Set: 2007 Population Estimates, Website: http://factfinder.census.gov, Date accessed: October 13, 2009 and October 5, 2011.

USCB, 2009b. U.S. Census Bureau, American FactFinder, QT P32 Income Distribution in 1999 of Households and Families, Census 2000 Summary File 3, Montour County, Pennsylvania, Website: http://factfinder.census.gov, Date accessed: October 8, 2009.

USCB, 2009c. U.S. Census Bureau, American FactFinder, Table H85 Median Value (Dollars) for all Owner Occupied Housing Units, Census 2000 Summary File 3, Montour and Northumberland Counties, Pennsylvania, Website: http://factfinder.census.gov, Date accessed: October 8, 2009.

USCB, 2009d. U.S. Census Bureau, American FactFinder, Comparison Profile, Pennsylvania, Selected Housing Characteristics: 2008, Website: http://factfinder.census.gov, Date accessed: October 8, 2009.

USCB, 2009e. U.S. Census Bureau, Housing and Household Economic Statistics Division, September 29, 2009, Website: http://www.census.gov/hhes/www/poverty/povdef.html#2, Date accessed: October 20, 2009.

USCB, 2009f. U.S. Census Bureau, American FactFinder, QT P32 Income Distribution in 1999 of Households and Families, Census 2000 Summary File 3, Luzerne County, Pennsylvania, Website: http://factfinder.census.gov, Date accessed: October 14, 2009.

USCB, 2009g. U.S. Census Bureau, American FactFinder, Comparison Profile, Luzerne County, Pennsylvania, Selected Economic Characteristics: 2008, Website: http://factfinder.census.gov, Date accessed: October 14, 2009.

USCB, 2009h. U.S. Census Bureau, American FactFinder, Comparison Profile, Luzerne County, Pennsylvania, Selected Housing Characteristics: 2008, Website: http://factfinder.census.gov, Date accessed: October 14, 2009.

USCB, 2009i. U.S. Census Bureau, American FactFinder, Table H85 Median Value (Dollars) for all Owner Occupied Housing Units, Census 2000 Summary File 3, Luzerne County, Pennsylvania, Website: http://factfinder.census.gov, Date accessed: October 14, 2009.

USCB, 2009j. U.S. Census Bureau, American FactFinder, QT P32 Income Distribution in 1999 of Households and Families, Census 2000 Summary File 3, Northumberland County, Pennsylvania, Website: http://factfinder.census.gov, Date accessed: October 8, 2009.

USCB, 2009k. U.S. Census Bureau, American FactFinder, Comparison Profile, Northumberland County, Pennsylvania, Selected Economic Characteristics: 2008, Website: http://factfinder.census.gov, Date accessed: October 8, 2009.

USCB, 2009l. U.S. Census Bureau, American FactFinder, Comparison Profile, Northumberland County, Pennsylvania, Selected Housing Characteristics: 2008, Website: http://factfinder.census.gov, Date accessed: October 8, 2009.

USCB, 2010. U.S. Census Bureau, 2010 Demographic Profile, Website: http://www.census.gov/popfinder/, Date accessed: October 4, 2011.

USDA, 2009. Natural Resources Conservation Service, U.S. Department of Agriculture, Soil Survey Geographic (SSURGO) Database for Luzerne, Montour, Northumberland, and Schuylkill Counties, Pennsylvania; Website: http://soils.usda.gov/survey/geography/ssurgo/; Date accessed: October 14, 2009.

USEPA, 2001. Decision Rationale Total Maximum Daily Loads Shamokin Creek Watershed For Acid Mine Drainage Affected Segments.

USEPA, 2009a. “EPA Green Book,” Website: http://www.epa.gov/air/oaqps/greenbk/ancl.html, Date accessed: July 21, 2009.

USEPA, 2009b. U.S. Environmental Protection Agency, Safe Drinking Water Information System (SDWIS), List of Water Systems in SDWIS, Community Water Systems, Montour County, Pennsylvania, Website: http://oaspub.epa.gov, Date accessed: October 9, 2009.

USEPA, 2009c. U.S. Environmental Protection Agency, Safe Drinking Water Information System (SDWIS), List of Water Systems in SDWIS, Community Water Systems, Luzerne County, Pennsylvania, Website: http://oaspub.epa.gov, Date accessed: October 14, 2009.

USEPA, 2009d. U.S. Environmental Protection Agency, Safe Drinking Water Information System (SDWIS), List of Water Systems in SDWIS, Community Water Systems, Northumberland County, Pennsylvania, Website: http://oaspub.epa.gov, Date accessed: October 9, 2009.

USEPA, 2010a. National Environmental Policy Act (NEPA), EIS Database, All EISs since 2004 (by state); Website: http://yosemite.epa.gov/oeca/webeis.nsf/viEIS01ST!OpenView&Start=2872, Date accessed: September 13, 2010.

USEPA, 2010b. Facility Detail Report for Mt. Carmel Cogen Plant, Envirofacts, Facility Registry System (FRS); Website: http://oaspub.epa.gov/enviro/fii_query_dtl.disp_program_facility?p_registry_id=110007026306, Date accessed: September 17, 2010.

USEPA, 2010c. Facility Detail Report for Hunlock Creek Power Station, Envirofacts, Facility Registry System (FRS); Website: http://oaspub.epa.gov/enviro/fii_query_dtl.disp_program_facility?p_registry_id=110000335593, Date accessed: September 17, 2010.

USEPA, 2010d. Facility Detail Report for Viking Energy Northumberland/Cogen Plant, Envirofacts, Facility Registry System (FRS); Website: http://oaspub.epa.gov/enviro/fii_query_dtl.disp_program_facility?p_registry_id=110010984131, Date accessed: September 17, 2010.

USEPA, 2010e. "EPA Issues Annual Report on Chemicals Released Into Land, Air and Water in New Jersey; DuPont Chambers Works, Conoco Phillips and Mercer Generating Station Top the List of NJ Polluters", News Releases By Date, Newsroom, December 16, 2010. Website: http://yosemite.epa.gov/opa/admpress.nsf/eeffe922a687433c85257359003f5340/f31ef41ecc6ee24c852577fb00710899!OpenDocument, Date accessed: June 29, 2011.

USEPA, 2010f. Ensuring Results, Mid-Atlantic Water, Chesapeake Bay TMDL, Website: http://www.epa.gov/reg3wapd/tmdl/ChesapeakeBay/EnsuringResults.html?tab2=4, Date accessed: August 23, 2010.

USEPA, 2011a. Middlesex Sampling Plant, New Jersey, EPA Region 2 February 22, 2011; Website: http://www.epa.gov/region02/superfund/npl/0202755c.pdf, Date accessed: July 12, 2011.

USEPA, 2011b. 40 CFR Part 52, Notice of Proposed Rule, Response to the September 2010 Section 126 Petition from New Jersey Regarding SO2 Emissions from Portland Generating Station, March 31, 2011; Website: http://epa.gov/ttncaaa1/t1/fr_notices/126njnpr.pdf, Date accessed: June 29, 2011.

USEPA, 2011c. US EPA Region 2, Lower Passaic River Restoration Project, March 31, 2011; Website: http://www.epa.gov/region2/passaicriver/, Date accessed: July 11, 2011.

USEPA, 2011d. Wayne Interim Storage Site, New Jersey, EPA Region 2, April 6, 2011; Website: http://www.epa.gov/region2/superfund/npl/0202931c.pdf, Date accessed: July 12, 2011.

USEPA, 2011e. US EPA "Lower Passaic River Restoration Project", Phase I Removal Action Fact Sheet, June 2011; Website: http://passaic.sharepointspace.com/Public%20Documents/Removal%20Ph%201%20Start%206 -11%20Factsheet.pdf-, Date accessed: July 29, 2011.

USEPA, 2011f. "EPA Green Book," Website: http://www.epa.gov/air/oaqps001/greenbk/ancl.html, Date accessed: October 3, 2011.

USFWS, 2008a. Letter from David Densmore (U.S. Fish and Wildlife Service) to Rod Krich (Unistar), Re: USFWS Project #2008 518, Federally Listed Endangered and Threatened Species for the Bell Bend Nuclear Power Plant Site, Berwick, Luzerne County, Pennsylvania, January 18, 2008.

USFWS, 2008b. National Wetlands Inventory Download Seamless Wetlands Data by State. Website: http://www.fws.gov/wetlands/data/DataDownloadState.html, Date accessed: July 1, 2009.

USFWS, 2009a. U.S. Fish and Wildlife Service, National Wetland Inventory, CONUS_wet_poly, Classification of Wetlands and Deepwater Habitats of the United States, Washington, DC, FWS/OBS 79/31, National Wetlands Metadata, Website: http://www.fws.gov/wetlands/Data/DataDownloadState.html, Date access: June 17, 2009.

USFWS, 2009b. White-nose syndrome in bats: Frequently Asked Questions, U.S. Fish & Wildlife Service, April 2009.

U.S. Fish and Wildlife Service (USFWS), 2010a. New Jersey Field Office, Northeast Region, Endangered Species, Federally Listed and Candidate Species Occurrences in New Jersey by County and Municipality, October 2010; Website: http://www.fws.gov/northeast/njfieldoffice/endangered/; Date accessed: August 16, 2011.

USFWS, 2010b. White-Nose Syndrome, Conserving the Nature of America, U.S. Fish & Wildlife Service, Website: http://www.fws.gov/whitenosesyndrome/, Date accessed: August 12, 2010.

U.S. Fish and Wildlife Service (USFWS), 2011. New Jersey Field Office, Northeast Region, Endangered Species, Federally Listed and Candidate Species Occurrences in New Jersey by County and Municipality, October 2010; Website: http://www.fws.gov/northeast/njfieldoffice/endangered/; Date accessed: August 16, 2011.

USGS, 1975. Shamokin Quadrangle, Pennsylvania, 7.5 Minute Series (Topographic).

USGS, 1983. Washingtonville Quadrangle, Pennsylvania, 7.5 Minute Series (Topographic).

USGS, 1989. Berwick Quadrangle, Pennsylvania, 7.5 Minute Series (Topographic).

USGS, 2008. Topographic Maps, U.S. Geological Survey, Website: http://www.usgs.gov/pubprod/maps.html, Date accessed: March 2008.

USGS, 2009c. Nonindigenous Aquatic Species FactSheet: Corbicula fluminea. Revised 6/22/2009. Downloaded PDF Document: http://nas.er.usgs.gov/queries/FactSheet.asp?speciesID=92, Date accessed: October 15, 2009.

USGS, 2009d. Nonindigenous Aquatic Species FactSheet: Dreissena polymorpha. Revised 8/29/2009. Downloaded PDF Document: http://nas.er.usgs.gov/queries/FactSheet.asp?speciesID=5, Date accessed: October 15, 2009.

USGS, 2009e. Geographic Names Information System (GNIS) for Pennsylvania, Search Criteria: Airport, 2009. Website: http://www.esri.com/metadata/esriprof80.html.

USGS, 2009f. Geographic Names Information System (GNIS) for Pennsylvania, Search Criteria: Non Populated Places/Parks, 2009. Website: http://www.esri.com/metadata/esriprof80.html.

USGS, 2009h. Geographic Names Information System (GNIS) for New Jersey, Search Criteria: Airport, 2009, Website: http://www.esri.com/metadata/esriprof80.html.

USGS, 2009i. Geographic Names Information System (GNIS) for New Jersey, Search Criteria: Non-populated Places, Website: http://www.esri.com/metadata/esriprof80.html.

USGS, 2010. USGS Real-Time Water Data for USGS 01540500 Susquehanna River at Danville, PA, Website: http://waterdata.usgs.gov/pa/nwis/dv?cb_00060=on&cb_00010=on&cb_00095=on&cb_80154=on&cb_80155=on&cb_00400=on&cb_00300=on&format=gif_default&begin_date=1905-04-01&end_date=2010-07-26&site_no=01540500&referred_module=sw, Date accessed: July 27, 2010.

USGS, 2011a. USGS 01536500 Susquehanna River at Wilkes-Barre, Pennsylvania, Website: http://waterdata.usgs.gov/nwis/dv?cb_00060=on&format=html&begin_date=1900-08-23&end_date=2010-04-27&site_no=01536500&referred_module=sw, Date accessed: October 28, 2011.

USGS, 2011b. USGS 01553500 West Branch Susquehanna River at Lewisburg, Pennsylvania, Website: http://waterdata.usgs.gov/nwis/dv?cb_00060=on&format=html&begin_date=1939-10-01&end_date=2010-05-03&site_no=01553500&referred_module=sw, Date accessed: October 28, 2011.

USGS, 2011c. USGS 01446500 Delaware River at Belvidere, New Jersey, Website: http://waterdata.usgs.gov/nj/nwis/dv?cb_00060=on&format=gif_default&begin_date=1922-10-01&end_date=2010-05-04&site_no=01446500&referred_module=sw, Date accessed: July 26, 2010.

USGS, 2011d. The USGS Store, Digital File Download, Website: http://store.usgs.gov/b2c_usgs/usgs/maplocator/(xcm=r3standardpitrex_prd&layout=6_1_61_75&uiarea=2&ctype=areaDetails&carea=0000001076)/.do, Date accessed: October 4, 2011.

USGS, 2011e. USGS 01463500 Delaware River at Trenton, New Jersey, Website: http://waterdata.usgs.gov/nj/nwis/dv?cb_00060=on&format=rdb&begin_date=1912-10-01&end_date=2011-11-02&site_no=01463500&referred_module=sw, Date accessed: November 4, 2011.

VADGIF, 2009a. Bog turtle species description, Website: http://www.dgif.virginia.gov/wildlife/information/?s=030061, Date accessed: October 9, 2009.

VADGIF, 2009b. Eastern box turtle species description, Website: http://www.dgif.virginia.gov/wildlife/information/?s=030068, Date accessed: October 12, 2009.

VADGIF, 2009c. Eastern hellbender species description, Website: http://www.dgif.virginia.gov/wildlife/information/?s=020020, Date accessed: October 12, 2009.

VADGIF, 2009d. Eastern ribbon snake species description, Website: http://www.dgif.virginia.gov/wildlife/information/?s=030045, Date accessed: October 9, 2009.

VADGIF, 2009e. Four toed salamander species description, Website: http://www.dgif.virginia.gov/wildlife/information/?s=020029, Date accessed: October 12, 2009.

VADGIF, 2009f. Fowler's Toad species description, Website: http://www.dgif.virginia.gov/wildlife/information/?s=020062, Date accessed: October 9, 2009.

VADGIF, 2009g. Mountain earth snake species description, Website: http://www.dgif.virginia.gov/wildlife/information/?s=030048, Date accessed: October 9, 2009.

VADGIF, 2009h. New Jersey chorus frog species description, Website: http://www.dgif.virginia.gov/wildlife/information/?s=020072, Date accessed: October 12, 2009.

VADGIF, 2009i. Northern Red bellied cooter species description, Website: http://www.dgif.virginia.gov/wildlife/information/?s=030057, Date accessed: October 12, 2009.

VADGIF, 2009j. Upland chorus frog species description, Website: http://www.dgif.virginia.gov/wildlife/information/?s=020018, Date accessed: October 12, 2009.

Wagner, D.L, M.W. Nelson, D.F. Schweitzer, 2003. Shrubland Lepidoptera of southern New England and southeastern New York: ecology, conservation, and management. Forest Ecology and Management 185: 95–112. Note: Copyright protected.

Warren County, 2005. Warren County, NJ Planning Department. Warren County Strategic Growth Plan, Website: http://www.co.warren.nj.us/Planning/county_strategic_growth_plan.html, dated December 2004, revised October 2005.

Warren County, 2006. County of Warren New Jersey, 2006 Operating Budget Summary; Website: http://www.co.warren.nj.us/budget/budget2006summary.html, Date accessed: October 6, 2011.

Warren County, 2011a. Historic Sites of Warren County, Website: http://www.co.warren.nj.us/Download/historic.pdf, Date accessed: October 3, 2011.

Warren County, 2011b. County of Warren New Jersey, Environmental Commission, Open Space of Warren County, Website: http://www.co.warren.nj.us/Environment/openspace.html, Date accessed: October 6, 2011.

Warren County Office of Emergency Management, 2009. Office of Emergency Management, Website: http://www.co.warren.nj.us/publicsafety/wcoem/wcoemtop.html, Date accessed: July 26, 2009.

WCHD, 2007. Warren County Health Department Community Health Improvement Plan, January 30, 2007.

WFMZ News, 2011. "PPL Gets Approval from New Jersey Solar Farm", Kyle Andersen, March 9, 2011, Website: http://www.wfmz.com/newjerseynews/27133774/detail.html, Date accessed: June 27, 2011.

Wheelabrator, 2010. Wheelabrator Frackville; Website: http://www.wheelabratortechnologies.com/wtius/index.cfm/our-clean-energyplants/independent-power-plants/wheelabrator-frackville/, Date accessed: September 17, 2010.

Williams Energy Services, 2001. Williams Announces Construction of Two Power Generation Facilities And Expansion of a Third Facility, February 02, 2001; Website: http://www.williams.com/newsmedia/newsreleases/rel667.html, Date accessed: September 17, 2010.

Williams Energy Services, 2009. Williams Completes Pipeline Expansion to Provide Additional Natural Gas Service to Northeast, November 19, 2009; Website: http://www.williams.com/newsroom/, Date June 13, 2010.

Whitaker, John O. Jr. and William J. Hamilton Jr. 1998. Mammals of the Eastern United States, Third Edition. Cornell University Press, Ithaca. Note: Copyright protected. Electronic version not available for printing. Reference available for purchase.

World Port Source, 2009. Ports in Pennsylvania, available at website: http://www.worldportsource.com/ports/USA_PA.php, accessed July 27, 2009.

World Port Source, 2011. Map of Ports in New Jersey, Website: http://www.worldportsource.com/ports/USA_NJ.php, Date accessed: October 26, 2011.

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	Shortleaf 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
(Page 1 of 2)

	Number of Minority Census Block Groups									
State/County	**Total Census Block Groups**	**Black**	**American Indian or Alaskan Native**	**Asian**	Native Hawaiin 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
Wyoming	19	0	0	0	0	0	0	0	0	0
TOTAL	**1015**	**16**	**1**	**0**	**0**	**0**	**0**	**19**	**0**	**3**

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

	Number of Minority Census Block Groups	

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
(Page 1 of 3)

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	-
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	-

Table 9.3-3— State and Federal Threatened and Endangered Species in Luzerne County, Pennsylvania
(Page 2 of 3)

Scientific Name	Common Name	State Status	Proposed Status	Federal Status
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	Susquehanna Cherry	-	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	-
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	-
Reptiles				
Crotalus horridus	Timber Rattlesnake	PC	CA	-
Amphibians				
Acris crepitans	Northern Cricket Frog	PE	PE	-
Fish				
Umbra pygmaea	Eastern Mudminnow	PC	CP	-
Molluscs				
Anodonta implicata	Alewife Floater	-	CU	-

Table 9.3-3— State and Federal Threatened and Endangered Species in Luzerne County, Pennsylvania
(Page 3 of 3)

Scientific Name	Common Name	State Status	Proposed Status	Federal Status
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
(Page 1 of 2)

	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

(Page 2 of 2)

	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
(Page 1 of 2)

Scientific Name	Common Name	State Status	Proposed Status	Federal Status
		Plants		
Alisma trivial	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	-
		Birds		
Solidago rigida	Hard-leaved Goldenrod	TU	PE	-
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	-
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	-

Table 9.3-5— State and Federal Threatened and Endangered Species in Northumberland County, Pennsylvania
(Page 2 of 2)

Scientific Name	Common Name	State Status	Proposed Status	Federal Status

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
(Page 1 of 2)

	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**	**MultiRacial**	**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
York	36	0	0	0	0	0	0	0	0	0
TOTAL	**1681**	**76**	**0**	**0**	**0**	**33**	**0**	**133**	**62**	**12**

Table 9.3-6— Census Block Groups within 50 mi (80 km) of the Seedco Industrial Park with Minority and Low Income Populations
(Page 2 of 2)

	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	MultiRacial	Aggregate (Total)[1]	Hispanic[2]	Number of Low Income Census Block Groups

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

Table 9.3-8— Site Ranking Criteria
(Page 1 of 12)

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
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
(Page 2 of 12)

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)
2c. Water Availability SCORED BY USING SCREENING DATA	Metric based on lowest 7 day consecutive low flow in a 10 year return frequency (i.e., 7Q10) in the entire period of record and need for 50 million gallons per day (MGD) [189 million liters per day (MLD)] total water withdrawal for use by the plant.	5 = When 50 MGD (77.4 cubic feet per second [cfs]) is ≤ 5% of 7Q10 4 = When 50 MGD (77.4 cfs) is > 5% and ≤ 10% of 7Q10 3 = When 50 MGD (77.4 cfs) is > 10% and ≤ 20% of 7Q10 2 = When 50 MGD (77.4 cfs) is > 20% and ≤ 50% of 7Q10 1 = When 50 MGD (77.4 cfs) is > 50% of 7Q10
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 mapped habitat types onsite 3 = T&E mapped habitat types mapped within 1 mi of the site but not onsite 1 = T&E mapped habitat types onsite

Table 9.3-8— Site Ranking Criteria
(Page 3 of 12)

Ranking Criteria[1]	Metric[2]	Scoring Basis[2]
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)		
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
(Page 4 of 12)

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.
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
(Page 5 of 12)

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
(Page 6 of 12)

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		
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

Table 9.3-8— Site Ranking Criteria
(Page 7 of 12)

Ranking Criteria[1]	Metric[2]	Scoring Basis[2]
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
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
(Page 8 of 12)

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 SC3 = Number of vacant housing units is greater than 5 timesREENING 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
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.

Table 9.3-8— Site Ranking Criteria
(Page 9 of 12)

Ranking Criteria[1]	Metric[2]	Scoring Basis[2]
12a. 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
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
(Page 10 of 12)

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 = 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

Table 9.3-8— Site Ranking Criteria
(Page 11 of 12)

Ranking Criteria[1]	Metric[2]	Scoring Basis[2]
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
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

Table 9.3-8— Site Ranking Criteria
(Page 12 of 12)

Ranking Criteria[1]	Metric[2]	Scoring Basis[2]
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
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
(Page 1 of 7)

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.
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.

Table 9.3-9— Site Ranking Rationale
(Page 2 of 7)

Ranking Criteria[1]	Metric	Rationale
2b. Receiving Body Water Quality	Applicable State water quality classification Tier I, Tier II (as described and defined in COMAR 28.02.08.041) and Tier III (Outstanding National Resource Waters [ONRW] as described and defined in COMAR 28.02.08.042)	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.
2c. Water availability	Metric based on lowest 7day 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 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.
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.

Table 9.3-9— Site Ranking Rationale
(Page 3 of 7)

Ranking Criteria[1]	Metric	Rationale
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.

Table 9.3-9— Site Ranking Rationale
(Page 4 of 7)

Ranking Criteria[1]	Metric	Rationale
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.
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 / Nonattainment Area	In or out of an attainment / nonattainment area and Prevention of Significant Deterioration (PSD) Class I area	Seeks to preserve air quality by discouraging plant siting within a nonattainment 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.
10. Postulated Accidents(a)		

Table 9.3-9— Site Ranking Rationale
(Page 5 of 7)

Ranking Criteria[1]	Metric	Rationale
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.
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.

Table 9.3-9— Site Ranking Rationale
(Page 6 of 7)

Ranking Criteria[1]	Metric	Rationale
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.
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.

Table 9.3-9— Site Ranking Rationale
(Page 7 of 7)

Ranking Criteria[1]	Metric	Rationale
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	24.54	15.48	20.40	21.48	22.14	22.92	15.72	22.68	8.93	19.32
2.	Hydrology	36.00	42.00	42.00	36.00	36.00	33.00	39.00	36.00	33.00	24.00
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	18.70	23.10	23.10	23.10	23.10	15.40	20.90	22.00	16.50	17.60
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	32.00	32.00	32.00	24.00	24.00	24.00	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
	Total:	**364.3**	**311.8**	**313.9**	**371.0**	**310.7**	**364.1**	**332.6**	**354.4**	**325.3**	**305.7**

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
(Page 1 of 6)

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; scrubshrub 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; Scrubshrub 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 foreststhickets; 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; scrubshrub 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
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 NightHeron	*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

Table 9.3-11— Ecologically Important Species in Pennsylvania
(Page 2 of 6)

Common Name	Scientific Name	Habitat Type	Source
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
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
Eastern Mudminnow	*Umbra pygmaea*	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

(Page 3 of 6)

Common Name	Scientific Name	Habitat Type	Source
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 xpunctatus*	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
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

Table 9.3-11— Ecologically Important Species in Pennsylvania
(Page 4 of 6)

Common Name	Scientific Name	Habitat Type	Source
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
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; scrubshrub 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
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

Table 9.3-11— Ecologically Important Species in Pennsylvania
(Page 5 of 6)

Common Name	Scientific Name	Habitat Type	Source
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
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

Table 9.3-11— Ecologically Important Species in Pennsylvania
(Page 6 of 6)

Common Name	Scientific Name	Habitat Type	Source
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
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 foreststhickets 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
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

(Page 1 of 2)

	BBNPP[1]		Humboldt		Montour		Seedco		Martins Creek	
Property Acreage	2,055 ac (831.6 ha)		3,796 ac (1,536.2 ha)		3,538 ac (1,431.8 ha)		1,061 ac (429.4 ha)		542.9 ac (219.7 ha)	
Wetlands – Total Property[2]	159 ac (64.3 ha)		119.3 ac (48.3 ha)		137.3 ac (55.6 ha)		1.9 ac (0.7 ha)		0 ac (0 ha)	
Wetlands – Site[3]	28.5 ac (11.6 ha)		3.8 ac (1.5 ha)		0 ac (0 ha)		0.7 ac (0.3 ha)		0 ac (0 ha)	
Streams – Total Property[4]	24,014 lf (7,320 m)		23,391 lf (7,129.6 m)		42,463 lf (12,942.7 m)		21,101 lf (6,431.6 m)		4,457 lf (1,358.5 m)	
Streams – Site[5]	1,562.5 lf (476.3 m)		5,057 lf (1,541.4 m)		3,891 lf (1,186.0 m)		3,790 lf (1,155 m)		3254 lf (991.9 m)	
Wetlands Affected – Site[6]	28.5 ac (11.6 ha)		3.8 ac (1.5 ha)		0 ac (0 ha)		0.7 ac (0.3 ha)		0 ac (0 ha)	
Streams Affected – Site[7]	1,562.5 lf (476.3 m)		5,057 lf (1,541.4 m)		3,891 lf (1,186.0 m)		3,790 lf (1,155 m)		3254 lf (991.9 m)	
Offsite Wetlands/Waterways Affected –ROWs and Interconnects[8]	**Wetlands**	**Streams**	**Wetlands**	**Streams**	**Wetlands**	**Streams**	**Wetlands**	**Streams**	**Wetlands**	**Streams**
CWIS (inwater 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)	0.2 ac (0.08 ha)	0 (streams classified as wetlands)
CW Pump House[10]	0	0	0	0	0	0	0	0	0	0
Water Line ROW[11]	0	0	1.1 ac (0.4 ha)	596.3 lf (181.8 m)	1.3 (0.6 ha)	3,417 lf (1,042 m)	0 ac(0 ha)	430.1 lf (131.1 m)	0	0
Transmission Line ROW[12]	0	0	7.2 ac(2.9 ha)	2,210 lf (673.7 m)	4.1 ac(1.6 ha)	2,321 lf (707.4 m)	4.5 ac(1.8 ha)	2,040 lf (621.7 m)	11.1 ac (4.5 ha)	2,431 lf (741.0 m)
Railroad Spur/Improvements[11, 13]	NA	NA	NA	NA	0	0	0	208 lf(63.3 m)	0	0
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)	NA	NA

Table 9.3-12— Comparison of Wetland and Waterway Impacts: BBNPP vs. Alternative Sites
(Page 2 of 2)

	BBNPP[1]	Humboldt	Montour	Seedco	Martins Creek

Notes:
[1]ER Section 4.1.1.1 states the BBNPP and supporting facilities will be located on 2,055 acres; ER Section 4.3.1.3 states the construction of BBNPP will permanently fill approximately 742 LF of stream and 1.4 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 alternative 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 inwater construction activities are temporary in nature.
[9]An assumption has been made to allow a 100'x100' area of impact for inwater cooling water intake system (CWIS) components. No alternative 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, except that the width of the ROW would be reduced to 80' when crossing streams and wetlands. 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 200' 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
(Page 1 of 2)

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) 3.1 ac (1.3 ha) 2) 19.2 ac (7.8 ha)) 3) 6.2 ac (2.5 ha)
Humboldt	10	1) Freshwater Pond (Onsite) 2) Freshwater Pond 3) Freshwater Pond 4) Riverine 5) Freshwater Forested/Shrub Wetland 6) Freshwater Pond 7) Freshwater Forested/Shrub Wetland 8) Freshwater Emergent Wetland 9) Riverine 10) Freshwater Pond	1) 3.8 ac (1.5 ha) 2) 0.5 ac (0.2 ha) 3) 0.2 ac (0.1 ha) 4) 0.3 ac (0.1 ha) 5) 0.1 ac (0.03 ha) 6) 1.1 ac (0.4 ha) 7) 0.8 ac (0.3 ha) 8) 0.3 ac (0.1 ha) 9) 3.6 ac (1.5 ha) 10) 1.4 ac (0.6 ha)
Montour	9	1) Freshwater Forested/Shrub Wetland 2) Freshwater Forested/Shrub Wetland 3) Freshwater Emergent Wetland 4) Freshwater Emergent Wetland 5) Freshwater Emergent Wetland 6) Freshwater Forested/Shrub Wetland 7) Freshwater Pond 8) Riverine 9) Freshwater Pond (Offsite Road Impact)	1) 0.02 ac (0.01 ha) 2) 0.1 ac (0.04 ha) 3) 0.2 ac (0.1 ha) 4) 0.1 ac (0.06 ha) 5) 0.5 ac (0.2 ha) 6) 0.4 ac (0.2 ha) 7) 0.1 ac (0.03 ha) 8) 4.0 ac (1.6 ha) 9) 0.5 ac (0.2 ha)
Seedco	6	1) Freshwater Pond (Onsite) 2) Freshwater Pond 3) Freshwater Emergent Wetland 4) Freshwater Forested/Shrub Wetland 5) Freshwater Forested/Shrub Wetland 6) Freshwater Emergent Wetland	1) 0.7 ac (0.3 ha) 2) 0.5 ac (0.2 ha) 3) 1.0 ac (0.4 ha) 4) 0.5 ac (0.2 ha) 5) 0.7 ac (0.3 ha) 6) 1.8 ac (0.7 ha)

Table 9.3-13— Summary of Potential Onsite and Offsite Wetland Impacts, BBNPP and Alternative Sites
(Page 2 of 2)

Site	Number of discrete wetlands or systems	Wetland types (NWI classification)[1]	Description
Martins Creek	21	1) Freshwater Pond 2) Freshwater Forested/Shrub Wetland 3) Freshwater Emergent Wetland 4) Freshwater Pond 5) Freshwater Emergent Wetland 6) Freshwater Forested/Shrub Wetland 7) Freshwater Forested/Shrub Wetland 8) Freshwater Forested/Shrub Wetland 9) Freshwater Forested/Shrub Wetland 10) Freshwater Emergent Wetland 11) Freshwater Forested/Shrub Wetland 12) Freshwater Forested/Shrub Wetland 13) Freshwater Forested/Shrub Wetland 14) Freshwater Pond 15) Freshwater Pond 16) Freshwater Forested/Shrub Wetland 17) Riverine 18) Riverine 19) Freshwater Forested/Shrub Wetland 20) Freshwater Forested/Shrub Wetland 21) Freshwater Pond	1) 0.1 ac (0.04 ha) 2) 0.01 ac (0.004 ha) 3) 0.4 ac (0.2 ha) 4) 0.1 ac (0.04 ha) 5) 1.3 ac (0.5 ha) 6) 1.4 ac (0.6 ha) 7) 0.004 ac (0.002 ha) 8) 0.1 ac (0.04 ha) 9) 0.03 ac (0.01 ha) 10) 1.4 ac (0.6 ha) 11) 0.3 ac (0.1 ha) 12) 0.2 ac (0.1 ha) 13) 1.5 ac (0.6 ha) 14) 1.4 ac (0.6 ha) 15) 1.3 ac (0.5 ha) 16) 0.2 ac (0.1 ha) 17) 0.4 ac (0.2 ha) 18) 0.1 ac (0.04 ha) 19) 0.4 ac (0.2 ha) 20) 0.4 ac (0.2 ha) 21) 0.1 ac (0.04 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 2,055 acres; ER Section 4.3.1.3 states the construction of BBNPP will permanently fill approximately 742 lf of stream and 1.4 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

(Page 1 of 3)

Site	Number of/names of streams[1]	Stream type	Description
BBNPP[2]	A. Walker Run (Onsite)	A. Perennial	A. 2,875 lf (877.4 m)
Humboldt	A. Stony Creek (Onsite)	A. Perennial	A. 5,057 lf (1541.4 m)
	B. Tributary of Stony Creek	B. Intermittent	B. 120.5 lf (36.7 m)
	C. Black Creek	C. Perennial	C. 134.7 lf (41.1 m)
	D. Tributary of Black Creek	D. Perennial	D. 128.3 lf (39.1 m)
	E. Tributary of Black Creek	E. Perennial	E. 88.2 lf (26.9 m)
	F. Tributary of Black Creek	F. Perennial	F. 124.6 lf (38.0 m)
	G. Tributary of Stony Creek	G. Perennial	G. 240.0 lf (73.2 m)
	H. Stony Creek	H. Perennial	H. 336.9 lf (102.7 m)
	I. Black Creek	I. Perennial	I. 205.0 lf (62.5 m)
	J. Tributary of Little Nescopeck Creek	J. Perennial	J. 207.7 lf (63.3 m)
	K. Tributary of Black Creek	K. Perennial	K. 239.0 lf (72.9 m)
	L. Big Wapwallopen Creek	L. Perennial	L. 295.8 lf (90.2 m)
	M. Tributary of Big Wapwallopen Creek	M. Perennial	M. 216.9 lf (66.1 m)
	N. Tributary of Big Wapwallopen Creek	N. Perennial	N. 262.2 lf (79.9 m)
	O. Susquehanna River	O. Perennial	O. 206.8 lf (63.0 m)

Table 9.3-14— Summary of Potential Onsite and Offsite Waterway Impacts, BBNPP and Alternative Sites
(Page 2 of 3)

Site	Number of/names of streams[1]	Stream type	Description
Montour	A. East Branch Chillisquaque Creek (Onsite)	A. Perennial	A. 3,891 lf (1186.0 m)
	B. East Branch Chillisquaque Creek	B. Perennial	B. 144.0 lf (43.9 m)
	C. Chillisquaque Creek	C. Perennial	C. 177.7 lf (54.2 m)
	D. County Line Branch	D. Perennial	D. 130.6 lf (39.8 m)
	E. Beaver Run	E. Perennial	E. 681.9 lf (207.8 m)
	F. Beaver Run	F. Perennial	F. 204.8 lf (62.4 m)
	G. Tributary of Beaver Run	G. Perennial	G. 184.9 lf (56.4 m)
	H. Beaver Run	H. Perennial	H. 289.8 lf (88.3 m)
	I. Tributary of Warrior Run	I. Perennial	I. 141.5 lf (43.1 m)
	J. Tributary of Warrior Run	J. Perennial	J. 212.2 lf (64.7 m)
	K. Warrior Run	K. Perennial	K. 627.2 lf (191.2 m)
	L. Tributary of Warrior Run	L. Intermittent	L. 276.8 lf (84.4 m)
	M. Warrior Run	M. Perennial	M. 11.8 lf (3.6 m)
	N. Warrior Run	N. Perennial	N. 206.5 lf (62.9 m)
	O. Warrior Run	O. Perennial	O. 127.5 lf (38.9 m)
	P. Tributary of Mud Creek	P. Perennial	P. 200.3 lf (61.1 m)
	Q. Mud Creek	Q. Perennial	Q. 200.0 lf (61.0 m)
	R. Tributary of Mud Creek	R. Intermittent	R. 269.9 lf (82.3 m)
	S. Mahoning Creek	S. Perennial	S. 205.9 lf (62.8 m)
	T. Tributary of Mahoning Creek	T. Intermittent	T. 298.3 lf (90.9 m)
	U. Frozen Run	U. Intermittent	U. 205.3 lf (62.6 m)
	V. Frozen Run	V. Perennial	V. 201.8 lf (61.5 m)
	W. Tributary of Frozen Run	W. Perennial	W. 303.4 lf (92.5 m)
	X. Montour Run	X. Perennial	X. 223.0 lf (68.0 m)
	Y. Susquehanna River	Y. Perennial	Y. 213.4 lf (65.0 m)
Seedco	A. Shamokin Creek (Onsite)	A. Perennial	A. 3790.0 lf (1155.2 m)
	B. Quaker Run	B. Perennial	B. 132.6 lf (40.4 m)
	C. Tributary of Shamokin Creek	C. Perennial	C. 174.3 lf (53.1 m)
	D. Little Roaring Creek	D. Intermittent	D. 123.2 lf (37.6 m)
	E. Tributary of Shamokin Creek	E. Perennial	E. 207.5 lf (63.2 m)
	F. Tributary of Mugser Run	F. Intermittent	F. 484.5 lf (147.7 m)
	G. Mugser Run	G. Perennial	G. 200.2 lf (61.0 m)
	H. Tributary of Roaring Creek	H. Intermittent	H. 302.0 lf (92.0 m)
	I. Tributary of Roaring Creek	I. Perennial	I. 205.3 lf (62.6 m)
	J. Roaring Creek	J. Perennial	J. 427.2 lf (130.2 m)
	K. Tributary of Roaring Creek	K. Intermittent	K. 213.1 lf (65.0 m)

Table 9.3-14— Summary of Potential Onsite and Offsite Waterway Impacts, BBNPP and Alternative Sites
(Page 3 of 3)

Site	Number of/names of streams[1]	Stream type	Description
Martins Creek	A. Buckhorn Creek (Onsite) B. Pophandusing Brook C. Tributary of Pequest River D. Tributary of Pequest River E. Tributary of Pequest River F. Pohatcong Creek G. Unnamed Canal/Ditch H. Trout Brook I. Musconetcong River	A. Perennial B. Perennial C. Perennial D. Perennial E. Perennial F. Perennial G. Canal/Ditch H. Perennial I. Perennial	A. 3254.3 lf (991.9 m) B. 221.3 lf (67.5 m) C. 200.1 lf (61.0 m) D. 426.7 lf (130.1 m) E. 398.7 lf (121.5 m) F. 246.6 lf (75.2 m) G. 506.9 lf (154.5 m) H. 202.4 lf (61.7 m) I. 228.3 lf (69.6 m)

Notes:
[1]Unless otherwise indicated, the stream/creek listed is located offsite.
[2]BBNPP water bodies are identified in COLA ER Sections 2.3.1.1 and 2.4.2 and were mapped during field surveys in 2008, 2010, and 2011. However, to allow for consistent comparison with the alternative sites, only Walker Run was assumed to be “onsite.”

Table 9.3-15— State and Federal Threatened and Endangered Species in Columbia County, Pennsylvania

Scientific Name	Common Name	State Status	Proposed Status	Federal Status
		Plants		
Arabis missouriensis	Missouri Rock-cress	PE	PE	-
Carex ormostachya[1]	Spike Sedge	N	PT	-
Dodecatheon radicatum	Jeweled Shooting-star	PT	PT	-
Pinus echinata[1]	Short-leaf Pine	N	PT	-
Polystichum braunii	Braun's Holly Fern	PE	PE	-
Scirpus ancistrochaetus	Northeastern Bulrush	PE	PT	LE
Sisyrinchium atlanticum	Eastern Blue-eyed Grass	PE	PE	-
		Birds		
Haliaeetus leucocephalus	Bald Eagle	PT	PT	-
		Mammals		
Cryptotis parva	Least Shrew	PE	PE	-
Myotis leibii	Eastern Small-footed Myotis	PT	PT	-

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, 2010a

[1] Pennsylvania Biological Survey Suggested Status Definitions

Table 9.3-16— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Montour County, Pennsylvania
(Page 1 of 6)

Scientific Name	Common Name	Habitat	Montour Site	Montour Transmission Line	Montour Water Lines/ Intake Structure	Seedco Water Lines/ Intake structure
Dodecatheon radicatum	Jeweled Shooting-star	Open woods, slopes, and bluffs over limestone	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Carya laciniosa	Shellbark Hickory	Moist rich bottomlands and floodplains	Could occur along stream riparian areas. Impacts would likely be SMALL.	Could occur along stream riparian areas. Impacts would likely be SMALL.	Could occur along stream riparian areas. Impacts would likely be SMALL.	Could occur along stream riparian areas. Impacts would likely be SMALL.
Rotala ramosior	Tooth-cup	Sandy shores and swampy open ground	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.

Table 9.3-16— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Montour County, Pennsylvania
(Page 2 of 6)

Scientific Name	Common Name	Habitat	Montour Site	Montour Transmission Line	Montour Water Lines/ Intake Structure	Seedco Water Lines/ Intake structure
Carex retrorsa	Backward Sedge	Marshes, swales, and wet thickets	Could occur but potential for suitable habitat is limited. Impacts would likely be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Carex typhina	Cattail Sedge	Calcareous bottomlands and swamps	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Lysimachia hybrida[1]	Lance-leaf Loosestrife	Swamps, wet meadows, fens, and pond margins	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.

Table 9.3-16— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Montour County, Pennsylvania
(Page 3 of 6)

Scientific Name	Common Name	Habitat	Montour Site	Montour Transmission Line	Montour Water Lines/ Intake Structure	Seedco Water Lines/ Intake structure
Pinus echinata[1]	Short-leaf Pine	Wooded slopes or ridges	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Platanthera hookeri[2]	Hooker's Orchid	Rich well-drained deciduous woods	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Rosa virginiana	Virginia Rose	Pastures, roadsides, open woods, fields, thickets.	Could occur on the site. Impacts would likely be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.

Table 9.3-16— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Montour County, Pennsylvania
(Page 4 of 6)

Scientific Name	Common Name	Habitat	Montour Site	Montour Transmission Line	Montour Water Lines/ Intake Structure	Seedco Water Lines/ Intake structure
Ranunculus flammula	Lesser Spearwort	Muddy ground, gravelly or sandy shores, shallow water, and springy thickets	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Trichostema setaceum	Blue-curls	Dry sandy banks and shaly slopes	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Triosteum angustifolium[2]	Horse-gentian	Woods and thickets	Could occur along riparian areas. Impacts would likely be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Cistothorus palustris	Marsh Wren	Emergent wetlands and marshes	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Terrapene carolina	Eastern Box Turtle	Terrestrial habitats	Could occur onsite. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.

Table 9.3-16— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Montour County, Pennsylvania
(Page 5 of 6)

Scientific Name	Common Name	Habitat	Montour Site	Montour Transmission Line	Montour Water Lines/ Intake Structure	Seedco Water Lines/ Intake structure
Lampsilis cariosa	Yellow Lampmussel	Medium to large Rivers	Would not occur as habitat is lacking.	Could occur at Susquehanna River.	Could occur at intake/ discharge structures. Any impacts would be expected to be SMALL.	Could occur at intake/ discharge structures. Any impacts would be expected to be SMALL.
Tyto alba	Barn Owl	Forests and open areas with cavities	Could occur in Riparian areas along streams flowing through site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Haliaeetus leucocephalus	Bald Eagle	Forested areas adjacent to large water bodies	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.
Falco peregrinus	Peregrine Falcon	Riparian, grassland, forested, and urban areas	Could occur onsite. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Porzana carolina	Sora	Fresh marshes and wet meadows	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Lestes forcipatus	Sweetflag Spreadwing	Ponds and lakes with emergent vegetation, bogs, fens, and slow vegetated streams	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Sympetrum semicinctum	Band-winged Meadowhawk	Forested wetlands	Could occur in Riparian areas along streams flowing through site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Alasmidonta marginata	Elktoe	Prefers smaller shallow rivers with moderate current over fine gravel and sand	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.

Table 9.3-16— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Montour County, Pennsylvania
(Page 6 of 6)

Scientific Name	Common Name	Habitat	Montour Site	Montour Transmission Line	Montour Water Lines/ Intake Structure	Seedco Water Lines/ Intake structure
Alasmidonta undulata	Triangle Floater	Streams and rivers with sand and gravel substrates	Could occur along streams flowing through site. Any impacts would be expected to be SMALL.	Could occur along route.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Glyptemys insculpta	Wood Turtle	Forests and meadows	Could occur onsite. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Clemmys guttata	Spotted Turtle	Meadows, bogs, and swamps	Could occur onsite. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.

Plant species list from PNHP, 2011b. Plant habitat information from Rhoads and Block, 2007.

Animal species list from PNHP, 2009a and PNHP, 2009c. Animal habitat information from Mt.gov, 2010b; NJODES, 2006; PNHP, 2011b; Conant and Collins, 1998.

[1]Pennsylvania Biological Survey Suggested Status of PT

[2]Pennsylvania Biological Survey Suggested Status of PE

Table 9.3-17— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Columbia County, Pennsylvania
(Page 1 of 4)

Scientific Name	Common Name	Habitat	Seedco Transmission Line	Montour Transmission Line
Aplectrum hyemale	Puttyroot	Rich wooded slopes and bottomlands	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Arabis missouriensis	Missouri Rock-cress	Dry slopes	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Carex disperma	Soft-leaved Sedge	Rocky woods and shale barrens	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Carex ormostachya	Spike Sedge	Bogs and wet acidic woods	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Dodecatheon radicatum	Jeweled Shooting-star	Open woods, slopes, and bluffs over limestone	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Isoetes valida	Quillwort	Shallow water of lakes, ponds, and slow moving rivers and streams	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route due to co-location with existing ROWs.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route due to co-location with existing ROWs.

Table 9.3-17— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Columbia County, Pennsylvania
(Page 2 of 4)

Scientific Name	Common Name	Habitat	Seedco Transmission Line	Montour Transmission Line
Juncus gymnocarpus	Coville's Rush	Sphagnous swamps, seeps and springheads	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the southern portion of route and northern portion of route is outside the species range.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the southern portion of route and northern portion of route is outside the species range
Pinus echinata	Short-leaf Pine	Wooded slopes or ridges	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Polystichum braunii	Braun's Holly Fern	Cool rocky shaded ravines	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route due to co-location with existing ROWs.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route due to co-location with existing ROWs.
Scirpus ancistrochaetus	Northeastern Bulrush	Intermittently wet or inundated depressions	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Sisyrinchium atlanticum	Eastern Blue-eyed Grass	Moist to dry sandy open ground and thin woods	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Aeshna verticalis	Green-striped Darner	Open marsh areas and open fields	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Alasmidonta marginata	Elktoe	Smaller shallow rivers with moderate current over fine gravel and sand	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.

Table 9.3-17— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Columbia County, Pennsylvania
(Page 3 of 4)

Scientific Name	Common Name	Habitat	Seedco Transmission Line	Montour Transmission Line
Alasmidonta undulata	Triangle Floater	Streams and Rivers with sand and gravel substrates	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Ardea herodias	Great Blue Heron	Marshes, swamps, shores, and tidal flats	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Crotalus horridus	Timber Rattlesnake	Deciduous forests and rocky outcrops	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Cryptotis parva	Least Shrew	Meadows, pastures, old fields	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Euphydryas phaeton	Baltimore Checkerspot	Wet meadows, bogs, and marshes	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Glyptemys insculpta	Wood Turtle	Forests and meadows	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Haliaeetus leucocephalus	Bald Eagle	Forested areas adjacent to large water bodies	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.
Heterodon platirhinos	Eastern Hognose Snake	Sandy terrestrial areas	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Lampsilis cariosa	Yellow Lampmussel	Medium to large rivers	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.

Table 9.3-17— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Columbia County, Pennsylvania
(Page 4 of 4)

Scientific Name	Common Name	Habitat	Seedco Transmission Line	Montour Transmission Line
Lasmigona subviridis	Green Floater	Small creeks to large rivers over gravel and sand	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Libellula incesta	Slaty Skimmer	Wetlands and slow moving rivers with mucky bottoms	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Myotis leibii	Eastern Small-footed Myotis	Caves and abandoned mine shafts	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.
Myotis septentrionalis	Northern Myotis	Forests	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Poanes massasoit	Mulberry Wing	Freshwater marshes or bogs	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Speyeria atlantis	Atlantis Fritillary	Pastures, bogs, and meadows	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.

Plant species list from PNHP, 2010a. Plant habitat information from Rhoads and Block, 2007.

Animal species list from PNHP, 2010a. Animal habitat information from BAMONA, 2010; Butterflies and Skippers of North America, 2010; PNHP, 2010b; Conant and Collins, , 1998; Peterson, 2002.

Table 9.3-18— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Northumberland County, Pennsylvania
(Page 1 of 10)

Scientific Name	Common Name	Habitat	Seedco Site	Seedco Transmission Line	Seedco Water Lines/ Intake Structure	Montour Water Transmission Line
Alisma triviale	Northern Water-plantain	Ditches, lake margins, streams	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Bartonia paniculata	Screw-stem	Bogs and peaty lake margins	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Carex bullata	Bull Sedge	Swamps	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Carex longii	Long's Sedge	Wet or seasonally wet sandy soils in swamps, thickets, and meadows	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route due to co-location with existing ROWs.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route due to co-location with existing ROWs.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Carex lupuliformis	False Hop Sedge	Calcareous marshes and wet woods	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.

Table 9.3-18— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Northumberland County, Pennsylvania
(Page 2 of 10)

Scientific Name	Common Name	Habitat	Seedco Site	Seedco Transmission Line	Seedco Water Lines/ Intake Structure	Montour Water Transmission Line
Carya laciniosa	Shellbark Hickory	Moist rich bottomlands and floodplains	Could occur along Shamokin Creek on SW part of property.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Cuscuta polygonorum	Smartweed Dodder	Moist shores and riverbanks	Could occur along Shamokin Creek on SW part of property.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Dodecatheon radicatum	Jeweled Shooting-star	Open woods, slopes, and bluffs over limestone	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Erythronium albidum	White Trout-lily	Moist woods and rich slopes on limestone	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route due to co-location with existing ROWs.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route due to co-location with existing ROWs.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.

Table 9.3-18— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Northumberland County, Pennsylvania
(Page 3 of 10)

Scientific Name	Common Name	Habitat	Seedco Site	Seedco Transmission Line	Seedco Water Lines/ Intake Structure	Montour Water Transmission Line
Eupatorium rotundifolium	A Eupatorium	Sandy or clayey fields or open thickets	Could occur along Shamokin Creek on SW part of property.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Juncus biflorus	Grass-leaved Rush	Moist open woods, boggy fields, gravel pits, ditches	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route due to co-location with existing ROWs.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route due to co-location with existing ROWs.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route due to co-location with existing ROWs.
Juncus gymnocarpus	Coville's Rush	Sphagnous swamps, seeps and springheads	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the southern portion of route and northern portion of route is outside the species range.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the southern portion of route and northern portion of route is outside the species range.	Would not occur along route, route is outside species range.
Juncus scirpoides	Scirpus-like Rush	Moist sandy or peaty soil	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.

Table 9.3-18— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Northumberland County, Pennsylvania
(Page 4 of 10)

Scientific Name	Common Name	Habitat	Seedco Site	Seedco Transmission Line	Seedco Water Lines/ Intake Structure	Montour Water Transmission Line
Lactuca hirsuta	Downy Lettuce	Meadows, fields, rocky hillsides, and roadside banks	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Lipocarpha micrantha	Common Hemicarpa	Moist sand	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Ludwigia polycarpa	False Loosestrife Seedbox	Wet meadows and swales	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Lysimachia hybrida	Lance-leaf Loosestrife	Swamps, wet meadows, fens, and pond margins	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.

Table 9.3-18— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Northumberland County, Pennsylvania
(Page 5 of 10)

Scientific Name	Common Name	Habitat	Seedco Site	Seedco Transmission Line	Seedco Water Lines/ Intake Structure	Montour Water Transmission Line
Monarda punctata	Spotted Bee-balm	Dry, open sandy fields	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Orontium aquaticum	Golden Club	Swamps, lakes, ponds, streams, and ditches Note – recommended for removal from state list due to now known to be in greater abundance.	Would not occur onsite as suitable habitat is lacking. AMD impacts to Shamokin Creek would preclude this species from that stream.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Platanthera ciliaris	Yellow-fringed Orchid	Bogs, moist meadows, open woods	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Ranunculus ambigens	No common name	Wet ground, swamps, muddy ditches	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Rotala ramosior	Tooth-cup	Sandy shores and swampy open ground	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.

Table 9.3-18— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Northumberland County, Pennsylvania
(Page 6 of 10)

Scientific Name	Common Name	Habitat	Seedco Site	Seedco Transmission Line	Seedco Water Lines/ Intake Structure	Montour Water Transmission Line
Salix petiolaris	Meadow Willow	Meadows and swales	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Schoenoplectus fluviatilis	River Bulrush	Sandy shores and marshes	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Solidago rigida	Hard-leaved Goldenrod	Moist fields or thickets on calcareous rocks	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Alasmidonta marginata	Elktoe	Prefers smaller shallow rivers with moderate current over fine gravel and sand	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.
Alasmidonta undulata	Triangle Floater	Streams and Rivers with sand and gravel substrates	Unlikely to occur as habitat is lacking due to AMD impacts.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Ardea herodias	Great Blue Heron	Marshes, swamps, shores, and tidal flats	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.

Table 9.3-18— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Northumberland County, Pennsylvania
(Page 7 of 10)

Scientific Name	Common Name	Habitat	Seedco Site	Seedco Transmission Line	Seedco Water Lines/ Intake Structure	Montour Water Transmission Line
Asio otus	Long-eared Owl	Woodlands, thickets, and conifer groves	Could occur along riparian areas. Due to limited amount of suitable habitat, any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Bartramia longicauda	Upland Sandpiper	Open country such as large fallow fields, pastures, and grassy areas	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Botaurus lentiginosus	American Bittern	Emergent and forested wetlands	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Catocala miranda	Miranda Underwing	No habitat information available	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL
Cistothorus palustris	Marsh Wren	Emergent wetlands and marshes	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Cistothorus platensis	Sedge Wren	Damp meadows and marshes	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Citheronia sepulcralis	Pine Devil	Coastal pine forests	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.

Table 9.3-18— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Northumberland County, Pennsylvania
(Page 8 of 10)

Scientific Name	Common Name	Habitat	Seedco Site	Seedco Transmission Line	Seedco Water Lines/ Intake Structure	Montour Water Transmission Line
Crotalus horridus	Timber Rattlesnake	Deciduous forests and rocky outcrops	Could occur in southern part of site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Epirrita autumnata henshawi	November Moth	Forests	Could occur in southern part of site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Euphyes conspicuus	Black Dash	Boggy marshes, wet meadows, and marshy stream banks	Occurrence would be limited to the Shamokin Creek area on SW part of site. AMD impacts to stream make this unlikely.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Falco peregrinus	Peregrine Falcon	Riparian, grassland, forested, and urban areas	Species unlikely to occur as there is no suitable roosting habitat onsite. Incidental foraging could occur in the area.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Gallinula chloropus	Common Moorhen	Fresh marshes, cattail and reedy ponds	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Haliaeetus leucocephalus	Bald Eagle	Forested areas adjacent to large water bodies	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.
Hypagyrtis esther	Esther Moth	No habitat information available	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL
Ixobrychus exilis	Least Bittern	Dense extensive marshlands	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.

Table 9.3-18— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Northumberland County, Pennsylvania
(Page 9 of 10)

Scientific Name	Common Name	Habitat	Seedco Site	Seedco Transmission Line	Seedco Water Lines/ Intake Structure	Montour Water Transmission Line
Lampsilis cariosa	Yellow Lampmussel	Medium to large rivers	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Could occur at intake/ discharge structures. Any impacts would be expected to be SMALL.	Could occur at intake/ discharge structures. Any impacts would be expected to be SMALL.
Lasmigona subviridis	Green Floater	Small creeks to large rivers over gravel and sand	Unlikely to occur as habitat is lacking due to AMD impacts.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Lycaena hyllus	Bronze Copper	Low, wet areas such as bogs, marshes, wet meadows, ponds	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Myotis leibii	Eastern Small-footed Myotis	Caves and abandoned mine shafts	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.
Myotis septentrionalis	Northern Myotis	Forests	Could occur in southern part of site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Porzana carolina	Sora	Fresh marshes and wet meadows	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Rallus limicola	Virginia Rail	Early successional marshlands	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Scaphiopus holbrookii	Eastern Spadefoot	Sandy or loose soil forests	Species could occur in forested portion of site. Any impacts would be expected to be SMALL	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.

Table 9.3-18— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Northumberland County, Pennsylvania
(Page 10 of 10)

Scientific Name	Common Name	Habitat	Seedco Site	Seedco Transmission Line	Seedco Water Lines/ Intake Structure	Montour Water Transmission Line
Sorex dispar	Long-tailed or Rock Shrew	Upland areas among rock and boulders in talus slopes and along mountain streams	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Terrapene carolina	Eastern Box Turtle	Terrestrial habitats	Could occur throughout site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Tyto alba	Barn Owl	Forests and open areas with cavities	Could occur in southern part of site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Xestia elimata	Southern Variable Dart Moth	No habitat information available	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL
Zale metata	A Zale Moth	No habitat information available	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL

Plant species list from PNHP, 2011c. Plant habitat information from Rhoads and Block, 2007.

Animal species list from PNHP, 2009i and PNHP, 2009k. Animal habitat information from BAMONA, 2010; Butterflies and Skippers of North America, 2010; PNHP, 2010b; Conant and Collins, 1998; Peterson, 2002; Rawlins, J.E., 2007; Whitaker and Hamilton, 1998.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 1 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Aletris farinosa	Colic-root	Periphery of emergent wetlands.	Unlikely to occur on the site, would be limited to the margins of the depressional wetlands and species was not observed during site walkover when it would have been visible vegetatively.	Could occur in seasonally moist areas within southern portion of existing ROW, remainder of route is outside the range of the species. Would not be affected by clearing. Potential for impacts during construction of new transmission line would be SMALL. Species commonly occurs in ROWs throughout its range, would persist in seedbank and recolonize any suitable areas.	Would not occur along route. Habitat along southern portion of route is unsuitable and remainder of route is outside range of the species.
Alopecurus aequalis	Short-awn Foxtail	Shallow water of emergent wetlands	Unlikely to occur on the site, would be limited to the depressional wetlands and species was not observed during site walkover when it would have been flowering/ fruiting.	Could occur in emergent wetlands within existing ROW, would not be affected by clearing. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur in emergent wetlands within along route, would not be affected by clearing. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Amelanchier humilis	Serviceberry	Rocky slopes	Could occur along rocky bluffs on northern portion of site. Due to limited amount of suitable habitat, any impacts would be expected to be SMALL.	Could occur in dry rocky areas adjacent to southern portion of existing ROW, Potential for impacts during construction of new transmission line would be SMALL due to limited are of potential habitat. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur along route. Would traverse areas where potential habitat could occur in previously disturbed ROWs.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 2 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Amelanchier obovalis	Coastal Juneberry	Open woods and thickets	Would not occur onsite as suitable habitat is lacking.	Could occur in open woods adjacent to southern portion of existing ROW, remainder of route is outside the range of the species. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impact during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route. Habitat along southern portion of route is unsuitable and remainder of route is outside range of the species.
Amelanchier sanguinea	Roundleaf Serviceberry	Rocky slopes	Could occur along rocky bluffs on northern portion of site. Due to limited amount of suitable habitat, any impacts would be expected to be SMALL.	Could occur in dry rocky areas adjacent to southern portion of existing ROW. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur along route. Would traverse areas where potential habitat could occur in previously disturbed ROWs.
Andromeda polifolia	Bog-rosemary	Bogs	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Aristida purpurascens	Arrow-feathered Three Awned	Serpentine barens	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 3 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Asclepias variegata	White Milkweed	Dry woods	Unlikely to occur on the site, species was not observed during site walkover when it would have been vegetative or flowering.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Baptisia australis	Blue False-indigo	Open woods, streambanks, and sandy floodplains	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Bartonia paniculata	Screw-stem	Bogs and peaty lake margins	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Bidens discoidea	Small Beggar-ticks	Swamps, vernal pools, and swampy ground	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Bouteloua curtipendula	Tall Gramma	Dry calcareous clearings	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 4 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Bromus kalmii	Brome Grass	Rocky wooded slopes and woods	Could occur in rocky woods on northern portion of site. Due to limited amount of suitable habitat, any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Carex bicknellii	Bicknell's Sedge	Bogs	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Carex disperma	Soft-leaved Sedge	Dry woods, thickets, and serpentine barrens	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Carex lasiocarpa	Slender Sedge	Sphagnum bogs	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Carex limosa	Mud Sedge	Sphagnum bog mats	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Carex oligosperma	Few-seeded Sedge	Sphagnum bogs	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 5 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Carex polymorpha	Variable Sedge	Barrens and peaty soils	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW in southern part of route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Carex siccata	A Sedge	Sandy woods and fields	Would not occur onsite as suitable habitat is lacking.	Would not occur along route. Habitat along southern portion of route is unsuitable and remainder of route is outside range of the species.	Would not occur along route. Habitat along southern portion of route is unsuitable and remainder of route is outside range of the species.
Chenopodium foggii	Fogg's Goosefoot	Dry shaly slopes	Would not occur onsite as suitable habitat is lacking.	Could occur along dry ridges route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 6 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Cladium mariscoides	Twig Rush	Marshes, floating bogs, and lake margins	Unlikely to occur on the site, would be limited to the margins of the depressional wetlands and species was not observed during site walkover.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Coeloglossum viride	Long-bracted Green Orchid	Rich woods	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Cuscuta coryli	Hazel Dodder	Dry rocky woods	Could occur in rocky woods on northern portion of site. Due to limited amount of suitable habitat, any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 7 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Cynoglossum boreale	Northern Hound's-tongue	Open woods	Unlikely to occur on the site, species was not observed during site walkover when it would have been vegetative or flowering.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Cyperus diandrus	Umbrella Flatsedge	Moist stream banks, bogs, and marshes	Could occur along upper reach of Stony Creek onsite - potetnially suitable habitat limited to approximately 100 linear feet of streambanks. Due to limited amount of suitable habitat, any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts is limited to stream crossing areas with very moist riparian areas. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited to stream crossing areas with very moist riparian areas. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Cypripedium calceolus var. parviflorum	Small Yellow Lady's-slipper	Moist woods and bogs on limestone	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 8 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Dichanthelium boreale (Panicum bicknellii)	Bicknell's Panic Grass	Dry woods	Could occur in woods on northern portion of site. Due to limited amount of suitable habitat, any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Dryopteris clintoniana	Clinton's Wood Fern	Swampy woods, especially red maple swamps	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Elatine americana	Long-stemmed Water-wort	Muddy shores	Extirpated in PA, no suitable habitat occurs onsite.	Extirpated in PA, no suitable habitat occurs along route.	Extirpated in PA, no suitable habitat occurs along route.
Eleocharis olivacea	Capitate Spike-rush	Bogs and sandy-peaty depressions Note – recommended for removal from state list due to now known to be in greater abundance	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Elymus trachycaulus	Slender Wheatgrass	Open woods and barrrens	Unlikely to occur on the site, species was not observed during site walkover in potentially suitable habitat areas when it would have been vegetative.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Eriophorum tenellum	Rough Cotton-grass	Bogs, peaty depressions, and peaty swamps	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 9 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Eurybia radula	Rough-leaved Aster	Wet woods, swamps, seeps, and bogs	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Gaultheria hispidula	Creeping Snowberry	Wet woods and bogs	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Goodyera repens	Lesser Rattlesnake-plantain	Moist forested slopes, mossy woods, and swamps	Unlikely to occur on the site, species was not observed during site walkover in potentially suitable habitat areas when it would have been vegetative.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Helianthemum bicknellii	Bicknell's Hoary Rockrose	Dry rocky slopes, open woods, and serpentine barrens	Could occur in rocky woods on northern portion of site. Due to limited amount of suitable habitat, any impacts would be expected to be SMALL.	Could occur in dry rocky areas adjacent to southern portion of existing ROW, Potential for impacts during construction of new transmission line would be SMALL due to limited are of potential habitat. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 10 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Helianthemum propinquum	Low Rockrose	Dry sandy ground and barrens	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens adjacent to southern portion of existing ROW, Potential for impacts during construction of new transmission line would be SMALL due to limited are of potential habitat. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Hieracium umbellatum	Umbellate Hawkweed	Thickets, clearings, and roadside banks	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Juncus filiformis	Thread Rush	Bogs and sandy shores	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Juncus militaris	Bayonet Rush	Shallow water of lakes and ponds	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Ledum groenlandicum	Common Labrador-tea	Bogs and peaty wetlands	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 11 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Liatris scariosa	Round-head Gayfeather	Dry woods, shaly slopes, and barrens	Could occur in rocky woods on northern portion of site. Due to limited amount of suitable habitat, any impacts would be expected to be SMALL.	Could occur in barrens adjacent to southern portion of existing ROW, Potential for impacts during construction of new transmission line would be SMALL due to limited are of potential habitat. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Linum sulcatum	Grooved Yellow Flax	Sandy barrens	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens adjacent to southern portion of existing ROW, Potential for impacts during construction of new transmission line would be SMALL due to limited are of potential habitat. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Lonicera hirsuta	Hairy Honeysuckle	Swamps, moist woods, rocky thickets	Unlikely to occur on the site, species was not observed during site walkover in potentially suitable habitat areas when when flowers or fruits would have been present.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Lupinus perennis	Lupine	Sandy acidic soils	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 12 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Malaxis bayardii	Bayard's Malaxis	Shale barrens	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Megalodonta beckii	Beck's Water-marigold	Calcareous lakes and swamps	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Minuartia glabra	Appalachian Sandwort	Exposed sandstone rocks	Could occur in rocky woods on northern portion of site. Due to limited amount of suitable habitat, any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Muhlenbergia uniflora	Fall Dropseed Muhly	Marshes, bogs, and moist sandy roadsides	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Myriophyllum heterophyllum	Broad-leaved Water-milfoil	Ponds and lakes	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 13 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Orontium aquaticum	Golden Club	Swamps, lakes, ponds, streams, and ditches	Would not occur onsite as suitable habitat is lacking. Stony creek is too shallow to support the species onsite and it was not obnserved during site walkover.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Oryzopsis pungens	Slender Mountain-ricegrass	Dry sandy thickets and barrens	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW in southern part of route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Panicum bicknellii	Bicknell's Panic Grass	Dry woods	Could occur in rocky woods on northern portion of site. Due to limited amount of suitable habitat, any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Panicum xanthophysum	Slender Panic-grass	Dry woods	Could occur in rocky woods on northern portion of site. Due to limited amount of suitable habitat, any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 14 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Platanthera blephariglottis	White Fringed-orchid	Sphagnum bogs and swamps	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Platanthera ciliaris	Yellow-fringed Orchid	Bogs, moist meadows, open woods	Unlikely to occur onsite due to recent disturbance of potentially suitable habitat from mine reclamation.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Poa languida	Drooping Bluegrass	Moist woods and fens	Unlikely to occur on the site, would be limited to the moist forest along upper reach of Stony Creek and species was not observed during site walkover when it would have been fruiting.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 15 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Poa paludigena	Bog Bluegrass	Boggy woods and swamps	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Polemonium vanbruntiae	Jacob's-ladder	Sphagnous glades, swamps, and marshes	Unlikely to occur on the site, would be limited to the depressional wetlands and species was not observed during site walkover when it would have been flowering.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Polystichum braunii	Braun's Holly Fern	Cool rocky shaded ravines	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route due to co-location with existing ROWs.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route due to co-location with existing ROWs.
Potamogeton confervoides	Tuckerman's Pondweed	Glacial lakes and boggy ponds	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Potamogeton gramineus	Grassy Pondweed	Lakes and deep streams	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 16 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Potamogeton oakesianus	Oakes' Pondweed	Ponds and lakes	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Potamogeton vaseyi	Vasey's Pondweed	Ponds, lagoons, and slow moving waters	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Potentilla tridentata	Three-toothed Cinquefoil	Dry exposed rocky balds and mountain tops	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Prunus pumila var. susquehanae	Susquehanna Sandcherry	Dry exposed rock outcrops and mountain tops	Could occur along rocky bluffs on northern portion of site. Due to limited amount of suitable habitat, any impacts would be expected to be SMALL.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania

(Page 17 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Ranunculus aquatilis var. diffusus	White Water-crowfoot	Lakes, ponds, rivers, and streams	Would not occur onsite as suitable habitat is lacking. Stony creek is too shaded to support the species and it was not obnserved during site walkover.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Ranunculus fascicularis	Tufted Buttercup	Thin dry woods and exposed calcareous slopes and ledges	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Ribes lacustre	Swamp Currant	Swamps and cool wet woods	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route due to co-location with existing ROWs.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route due to co-location with existing ROWs.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 18 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Rosa virginiana	Virginia Rose	Pastures, roadsides, open woods, fields, thickets.	Unlikely to occur on the site, species was not observed during site walkover when it would have been flowering.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Scheuchzeria palustris	Pod-grass	Sphagnum bogs	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Schoenoplectus subterminalis	Water Bulrush	Slow water of lakes, ponds, and boggy streams	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Schoenoplectus torreyi	Torrey's Bulrush	Lake and pond margins	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Solidago rigida	Hard-leaved Goldenrod	Moist fields or thickets on calcareous rocks	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Sparganium angustifolium	Bur-reed	Lakes and bogs	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania

(Page 19 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Stellaria borealis	Mountain Starwort	Springy slopes, shpagnous swamps, and streamsides	Could occur along Stony Creek in adjacent riparian area. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Streptopus amplexifolius	White Twisted-stalk	Seepy outcrops near waterfalls	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Utricularia cornuta	Horned Bladderwort	Shallow water of marshes, ponds, and ditches	Could occur on the site, would be limited to the depressional wetlands. Species may not have been visible at time of walkover. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new water line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Utricularia intermedia	Flat-leaved Bladderwort	Lakes and exposed floating bog mats	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 20 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Viola selkirkii	Great-spurred Violet	Cool woods and rock crevices on limestone	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route due to co-location with existing ROWs.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route due to co-location with existing ROWs.
Acris crepitans	Northern Cricket Frog	Edges of sunny marshes, marshy ponds, and small slow-moving streams in open country	Could occur onsite, but unlikely to occur due to the recent creation of wetlands during restoration of previous mining onsite. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission lines would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Aeshna constricta	Lance-tipped Darner	Marshy ponds and streams	Could occur along Stony Creek. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Aeshna tuberculifera	Black-tipped Darner	Small ponds and marshy streams	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Aeshna verticalis	Green-striped Darner	Open marsh areas and open fields	Could occur onsite, would be limited to emergent wetlands. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Alasmidonta undulata	Triangle Floater	Streams and rivers with sand and gravel substrates	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 21 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Amblyscirtes vialis	Common Roadside Skipper	Open areas in or near woodlands	Could occur adjacent to riparian area along Stony Creek. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Anax longipes	Comet Darner	Lakes and ponds	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.
Anodonta implicata	Alewife Floater	Streams, rivers, ponds, and lakes that have anadromous runs of alewife	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Apamea burgessi	A Cutworm Moth	No habitat information available	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL
Aplectoides condita	A Noctuid Moth	No habitat information available	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL
Ardea herodias	Great Blue Heron	Marshes, swamps, shores, and tidal flats	Could occur onsite, would be limited to emergent wetlands. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Argia bipunctulata	Seepage Dancer	Wooded grassy seeps and bog areas	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Arigomphus furcifer	Lilypad Clubtail	Ponds or lakes with lily pads or floating vegetation	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 22 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Boloria selene myrina	Silver Bordered Fritillary	Wet meadows, bogs, marshes	Could occur onsite, would be limited to emergent wetlands. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Botaurus lentiginosus	American Bittern	Emergent and forested wetlands	Could occur onsite, would be limited to emergent wetlands. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Boyeria grafiana	Ocellated Darner	Streams with rocky substrate	Could occur along Stony Creek. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Calopteryx aequabilis	River Jewelwing	Medium-sized rivers and streams	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Calopteryx amata	Superb Jewelwing	Rivers	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Could occur at intake/ discharge structures. Potential for impacts during construction of new water line would be SMALL.
Carterocephalus palaemon mandan	Arctic Skipper	Openings in heavily forested woods, moist meadows, and streamsides	Could occur along Stony Creek. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Catharus ustulatus	Swainson's Thrush	Spruce forests	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 23 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Celithemis eponina	Halloween Pennant	Near lakes, ponds, or marshes	Could occur at the emergent wetland in southern part of site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Chaetaglaea cerata	a sallow moth	Pitch-pine oak scrub barrens on sand	Would not occur as habitat is lacking.	Could occur along southern portion of route. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur as habitat is lacking.
Chlosyne harrisii	Harris' Checkerspot	Moist areas including marshes, pastures, bogs, and meadows	Could occur at the emergent wetland in southern part of site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Circus cyaneus	Northern Harrier	Wetlands, marshland, and grasslands	Could occur at the emergent wetland in southern part of site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Cistothorus palustris	Marsh Wren	Emergent wetlands and marshes	Could occur at the emergent wetland in southern part of site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Clemmys guttata	Spotted Turtle	Meadows, bogs, and swamps	Could occur at the emergent wetland in southern part of site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Cordulia shurtleffi	American Emerald	Wet and bog habitats	Could occur at the emergent wetland in southern part of site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 24 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Crotalus horridus	Timber Rattlesnake	Deciduous forests and rocky outcrops	Could occur in Rocky bluffs in northern part of site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Diarsia rubifera	Red Dart	No habitat information available	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL
Dorocordulia lepida	Petite Emerald	Bog areas; often found along roads and power lines away from water	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Empidonax flaviventris	Yellow-bellied Flycatcher	Coniferous forest, alder thickets, and mountain bogs	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Enallagma annexum	Northern Bluet	Bogs and fens	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.
Enallagma aspersum	Azure Bluet	Barrow pits and retention basins	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Enallagma boreale	Boreal Bluet	Ponds and lakes and open marshes with abundant vegetation	Could occur at the emergent wetland in southern part of site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 25 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Enallagma divagans	Turquoise Bluet	Rivers and streams	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Enallagma laterale	New England Bluet	Emergent and forested wetlands	Could occur at the emergent wetlands in southern part of site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Epiglaea apiata	Pointed Sallow	Pine Barrens	Would not occur as habitat is lacking.	Habitat is unlikely to occur along route.	Habitat is unlikely to occur along route.
Erynnis persius persius	Persius Duskywing	Mountain grasslands, marshes, seeps, and streamsides	Could occur along Stony Creek. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Euphydryas phaeton	Baltimore	Wet meadows, bogs, and marshes	Could occur at the emergent wetlands in southern part of site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Falco peregrinus	Peregrine Falcon	Riparian, grassland, forested, and urban areas	Could occur along Stony Creek. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Gallinago delicata	Wilson's Snipe	Marshes, wet meadows, wet fields	Could occur at the emergent wetland in southern part of site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 26 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Glaucomys sabrinus	Northern Flying Squirrel	Old-growth forest; dense spruce/fir forests, birch, and hemlock	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Glena cognataria	Blueberry Gray	Bogs and pine barrens with Lowbush Blueberry (Vaccinium angustifolium and Vaccinium pallidum)	Could occur on northern part of site where pines and lowbush blueberry occur - but vegetation density is greater than optimal from barrens habitat. Any impacts would be expected to be SMALL.	Could occur on southern part of route where it passes through barrens habitat. Would not occur on remainder of route. Any impacts would be expected to be SMALL.	Habitat is unlikely to occur along route.
Gomphaeschna furcillata	Harlequin Darner	Bogs and wooded swamps	Would not occur as habitat is lacking.	Habitat is unlikely to occur along route.	Habitat is unlikely to occur along route.
Gomphus adelphus	Mustached Clubtail	Streams and lake shores	Could occur along Stony Creek. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Gomphus descriptus	Harpoon Clubtail	Rivers and streams	Could occur along Stony Creek. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Gomphus vastus	Cobra Clubtail	Large sandy-bottomed lakes and rivers	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Could occur at intake/ discharge structures. Potential for impacts during construction of new water line would be SMALL.
Haliaeetus leucocephalus	Bald Eagle	Forested areas adjacent to large water bodies	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 27 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Helocordulia uhleri	Uhler's Sundragon	No habitat information available	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL
Hemileuca maia	Barrens Buckmoth	scrub oak thickets	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Hemipachnobia monochromatea	Sundew Cutworm Moth	No habitat information available	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL
Hesperia leonardus	Leonard's Skipper	Open grassy areas	Could occur on southern part of site where mine reclamation has resulted in establishment of grassy habitat. Any impacts are expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Heterodon platirhinos	Eastern Hognose Snake	Sandy woodlands, fields, farmland	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Ischnura kellicotti	Lilypad forktail	Ponds and lakes with lily pads	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.
Itame sp. 1 nr. inextricata	Barrens Itame (Cf I. Inextricata)	Pitch pine-oak scrub barrens and ridgetops	Would not occur as habitat is lacking.	Could occur along southern portion of route. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur as habitat is lacking.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 28 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Lampsilis cariosa	Yellow Lampmussel	Medium to largerivers	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Could occur at intake/ discharge structures. Potential for impacts during construction of new water line would be SMALL.
Lasmigona subviridis	Green Floater	Small creeks to large rivers over gravel and sand	Would not occur as habitat is lacking	Would not occur as habitat is lacking	Could occur at intake/ discharge structures. Potential for impacts during construction of new water line would be SMALL.
Lestes eurinus	Amber-winged Spreadwing	Ponds (often temporary), bogs, lakes without fish	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Lestes forcipatus	Sweetflag Spreadwing	Ponds and lakes with emergent vegetation, bogs, fens, and slow vegetated streams	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Leucorrhinia glacialis	Crimson-ringed Whiteface	Bogs, lakes and ponds	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Leucorrhinia proxima	Red-waisted Whiteface	Bogs, lakes and ponds	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Libellula auripennis	Golden-winged Skimmer	Grassy ponds, ditches, slow streams	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 29 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Libellula incesta	Slaty Skimmer	Wetlands and slow moving rivers with mucky bottoms	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Lontra canadensis	Northern River Otter	Lakes and large rivers	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Could occur at intake/ discharge structures. Potential for impacts during construction of new water line would be SMALL.
Lycaena epixanthe	Bog Copper	Acid bogs with cranberries	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.
Metaxaglaea semitaria	Footpath Sallow Moth	No habitat information available	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL	Presume species could occur, as specific habitat data are unavailable. Any impacts would be expected to be SMALL
Microtus chrotorrhinus	Rock Vole	Rocky areas with ferns	Would not occur as habitat is lacking.	Could occur along route, but unlikely due to co-location with existing disturbed ROWs. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route, but unlikely due to co-location with existing disturbed ROWs. Potential for impacts during construction of new water line would be SMALL.
Myotis leibii	Eastern Small-footed Myotis	Caves and abandoned mine shafts	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.
Myotis septentrionalis	Northern Myotis	Forests	Could occur along Stony Creek. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Myotis sodalis	Indiana or Social Myotis	Wooded riparian areas	Could occur along Stony Creek. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 30 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Nannothemis bella	Elfin Skimmer	Bogs and calcareous fens	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.
Neotoma magister	Allegheny Woodrat	Caves and cliff faces	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.
Nycticorax nycticorax	Black-crowned Night-heron	Large wetland complexes	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.
Ophiogomphus carolus	Riffle Snaketail	Clear, cool, rocky streams	Could occur along Stony Creek. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Ophiogomphus mainensis	Maine Snaketail	Streams and small rivers	Could occur along Stony Creek. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Pandion haliaetus	Osprey	Both wild and urban environments near quality fish resource	Any use of site would be incidental to foraging. Suitable roosting site are lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Papaipema sp. 1	Flypoison Borer Moth	Woodlands and forested habitats	Could occur along Stony Creek. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Platyperigea meralis	A Noctuid Moth	Sandy grassland areas	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Poanes massasoit	Mulberry Wing	Freshwater marshes or bogs	Could occur at the emergent wetlands in southern part of site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 31 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Porzana carolina	Sora	Fresh marshes and wet meadows	Could occur at the emergent wetlands in southern part of site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Psectraglaea carnosa	Pink Sallow	Sandplain pitch pine/scrub barrens	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.
Rallus limicola	Virginia Rail	Early successional marshlands	Could occur at the emergent wetlands in southern part of site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Satyrium edwardsii	Edwards' Hairstreak	Oak thickets in rocky open habitats	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Satyrodes eurydice	Eyed Brown	Open sedge meadows, freshwater marshes, slow-moving streams	Could occur at the emergent wetlands in southern part of site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Sciurus niger vulpinus	Eastern Fox Squirrel	Hardwood forests	Could occur along Stony Creek but amount of habitat is limited. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Sideridis maryx	Maroonwing	Pitch-pine scrub oak barrens	Would not occur as habitat is lacking.	Could occur along southern portion of route. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur as habitat is lacking.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 32 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Somatochlora elongata	Ski-tailed Emerald	Small streams and outlets of beaver ponds	Could occur along Stony Creek. Impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Somatochlora incurvata	Incurvate Emerald	Sphagnum bogs	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.
Somatochlora walshii	Brush-tipped Emerald	Open swamps and bogs	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.
Sorex palustris albibarbis	Water Shrew	Riparian areas and marshes	Could occur at the emergent wetlands in southern part of site or along Stony Creek. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Speyeria atlantis	Atlantis Fritillary	Pastures, bogs, and meadows	Could occur at the emergent wetlands in southern part of site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Sphinx gordius	Apple Sphinx	Coastal barrens, bogs, and deciduous forests	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Sympetrum semicinctum	Band-winged Meadowhawk	Forested wetlands	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.
Thamnophis sauritus	Eastern Ribbon Snake	Wetlands, edges of ponds and streams	Could occur at the emergent wetlands in southern part of site. Any impacts would be expected to be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.

Table 9.3-19— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Luzerne County, Pennsylvania
(Page 33 of 33)

Scientific Name	Common Name	Habitat	Humboldt Site	Humboldt Transmission Line	Humboldt Water Lines/ Intake Structure
Umbra pygmaea	Eastern Mudminnow	Mud-bottomed and vegetated streams, sloughs, swamps, and ponds	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water line would be SMALL.

Plant species list from PNHP, 2011a. Plant habitat information from Rhoads and Block, 2007, Gleason and Cronquist, 1991. Recommendations for removal from PNHP list from Morris Arboretum, 2010.

Animal species list from PNHP, 2009e and PNHP, 2009g. Animal habitat information from Cornell Laboratory of Ornithology, 2009; BAMONA, 2010; Brou, 2009; BugGuide.Net, 2010a; BugGuide.Net, 2010b; Butterflies and Skippers of North America, 2010; InsectsofWestVirginia.net, 2010; MDFW, 2008a; MDFW, 2008b; MDFW, 2008c; MDFW, 2008d; MDFW, 2008e; Mt.gov, 2010a; Mt.gov, 2010b; NJODES, 2006; NYDEC, 2010; NYNHP, 2009a; NYNHP, 2009b; Conant and Collins, 1998; Peterson, 2002; UMassAmherst, 2008a; UMassAmherst, 2008b; Wagner et. al, 2003; Whitaker and Hamilton, 1998; NYDEC, 2009.

[1]Pennsylvania Biological Survey Suggested Status of PE

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 1 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Adlumia fungosa	Climbing fumitory	Moist rocky slopes and woodlands	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Agastache nepetoides	Yellow Giant Hyssop	Rich woods, moist thickets, fields, and roadsides	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Agastache scrophulariiifolia	Purple Giant Hyssop	Rich woods, moist thickets, and roadsides	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 2 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Agrimonia microcarpa	Small-fruited Groovebur	Woods	Unlikely to occur on the site as woods are not known to occur on the site.	Could occur in emergent wetlands within existing ROW, would not be affected by clearing. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and woods are not known to occur on the site.
Alisma triviale	Large Water-plantain	Ditches, lake margins, and stream edges	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Alopecurus aequalisvar. aequalis	Short-awn Foxtail	Shallow water of emergent wetlands	Unlikely to occur on the site as emergent wetlands are not known to occur on the site.	Could occur in emergent wetlands within existing ROW, would not be affected by clearing. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and emergent wetlands are not known to occur on the site.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 3 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Amelanchier humilis	Serviceberry	Rocky slopes	Unlikely to occur on the site as no rocky slopes are known to occur on the site.	Could occur in dry rocky areas adjacent to existing ROW, Potential for impacts during construction of new transmission line would be SMALL due to limited potential habitat along route. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and rocky slopes are not known to occur on the site.
Amianthium muscitoxicum	Fly poison	Woods and barrens, primarily in mountains	Unlikely to occur on the site as habitat is lacking.	Could occur in dry rocky areas adjacent to existing ROW, Potential for impacts during construction of new transmission line would be SMALL due to limited potential habitat along route. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and these habitat types are not known to occur on the site.
Angelica venenosa	Hairy Angelica	Dry woods and thickets	Unlikely to occur on the site as habitat is lacking.	Could occur in dry rocky areas adjacent to existing ROW, Potential for impacts during construction of new transmission line would be SMALL due to limited potential habitat along route. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and these habitat types are not known to occur on the site.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 4 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Arceuthobium pusillum	Dwarf Mistletoe	Parasite on black spruce and less oftern white spruce	Unlikely to occur on the site as habitat is lacking.	Could occur in dry rocky areas adjacent to existing ROW, Potential for impacts during construction of new transmission line would be SMALL due to limited potential habitat along route. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and these species are not known to occur on the site.
Arenaria stricta	Rock Sandwort	Exposed rocky, gravelly, or calcareous soils	Unlikely to occur on the site as habitat is lacking.	Could occur in dry rocky areas adjacent to existing ROW, Potential for impacts during construction of new transmission line would be SMALL due to limited potential habitat along route. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and these habitat types are not known to occur on the site.
Aristolochia serpentaris	Virginia Snakeroot	Upland woods	Unlikely to occur on the site as habitat is lacking.	Could occur in dry rocky areas adjacent to existing ROW, Potential for impacts during construction of new transmission line would be SMALL due to limited potential habitat along route. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and habitat is not known to occur on the site.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 5 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Armoracia lacustris (Neobeckia aquatica)	Lake Water-cress	Clear, slow-moving water with regular fluctuations in water level	Unlikely to occur on the site as no suitable habitat is known to occur on the site.	Could occur along route, Potential for impacts during construction of new transmission line would be SMALL due to limited potential habitat along route. Species would persist in seedbank and recolonize any suitable areas.	Potential to occur where lines enters Delaware River. Would not occur along remainder of route as no potentially suitable habitat exists. No impacts are expected because route of line could be adjusted to avoid the species should it occur.
Asclepias verticillata	Whorled milkweed	Fields, roadsides, upland woods, and prairies	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Asplenium bradleyi	Bradley's Spleenwort	Non-calcareous cliffs and rocks	Would not occur on the site as no suitable habitat exists.	Unlikely to occur along the route as these habitats would likely be avoided. Any impacts from installation of transmission lines would be SMALL.	Would not occur on the route as no suitable habitat exists.
Asplenium montanum	Mountain Spleenwort	Cliff crevices in non-calcareous rocks	Would not occur on the site as no suitable habitat exists.	Unlikely to occur along the route as these habitats would likely be avoided. Any impacts from installation of transmission lines would be SMALL.	Would not occur on the route as no suitable habitat exists.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 6 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Aster prenanthoides (Symphyotrichum prenanthoides)	Crooked-stem Aster	Swamps and low woods	Would not occur on the site as no suitable habitat exists.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur on the route as no suitable habitat exists.
Aster tradescantii (Symphyotrichum tradescantii)	Tradescant's Aster	Seasonally inundated streambanks and shores, often rocky	Would not occur on the site as no suitable habitat exists.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur on the route as no suitable habitat exists.
Athyrium pycnocarpon	Galde Fern	Cool woods and talus slopes	Would not occur on the site as no suitable habitat exists	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur on the route as no suitable habitat exists.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 7 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Betula papyrifera var, papyrifera	Paper Birch	Seral following fire or other disturbance	Unlikely to occur on the site as disturbance is ongoing.	Could occur along route, Potential for impacts during construction of new transmission line would be SMALL due to limited potential habitat along route. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and seral habitats are not known to occur on the site.
Betula pumila var. pumila	Swamp Birch	Bogs	Would not occur on the site as no suitable habitat exists.	Unlikely to occur along the route as these habitats would likely be avoided. Any impacts from installation of transmission lines would be SMALL.	Would not occur on the route as no suitable habitat exists.
Boltonia montana	Appalachian Mountain Boltonia	Calcareous sinkhole ponds	Would not occur on the site as no suitable habitat exists.	Unlikely to occur along the route as these habitats would likely be avoided.	Would not occur on the route as no suitable habitat exists.
Botrychium multifidum	Leathery Grape Fern	Meadows and open woods	Unlikely to occur on the site as disturbance is ongoing.	Could occur along route, Potential for impacts during construction of new transmission line would be SMALL due to limited potential habitat along route. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and these habitat types are not known to occur on the site.
Botrychium oneidense	Blunt-lobe Grape Fern	Rich moist woods and swamps	Unlikely to occur on the site as disturbance is ongoing.	Could occur along route, Potential for impacts during construction of new transmission line would be SMALL due to limited potential habitat along route. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and habitat is not known to occur on the site.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 8 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Botrychium simplex var. simplex	Least Moonwort	Open marshy places and edges of woodland ponds	Unlikely to occur on the site as disturbance is ongoing.	Could occur along route, Potential for impacts during construction of new transmission line would be SMALL due to limited potential habitat along route. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and habitat is not known to occur on the site.
Bouteloua curtipendula	Side-oats Gramma	Dry calcareous clearings	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Would not be impacted by tree clearing.	Would not occur along route - specific habitat requirements are unlikely to occur.
Cacalia atriplicifolia (Arnoglossum atriplicigolium)	Pale Indian-plantain	Woods and open places	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Calystegia spithamaea	Erect Bindweed	Dry rocky or sandy soils in fields and woods	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 9 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Cardamine rotundifolia	Round-leaf Bittercress	Wet soil of swamps or running water	Unlikely to occur on the site as disturbance is ongoing.	Could occur along route, Potential for impacts during construction of new transmission line would be SMALL due to limited potential habitat along route. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and these habitat types are not known to occur on the site.
Carex albursina	White Bear Lake Sedge	Calcareous rich woods	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Carex alopecoidea	Foxtail Sedge	Wet meadows	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 10 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Carex aquatilis	Water Sedge	Shallow water and wet soil	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Carex bebbii	Bebb's Sedge	Calcareous wet meadows and shores	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Carex buxbaumii	Brown Sedge	Calcareous swamps and swales	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 11 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Carex crawei	Crawe's Sedge	Calcareous wet meadows, shores, and ledged	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Carex crawfordii	Crawford's Sedge	Wet soil, swamps, and shores	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Carex cryptolepis	Small Yellow Sedge	Calcareous wet meadows and shores	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 12 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Carex diandra	Lesser Painted Sedge	Swamps and sphagnum bogs	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Carex eburnea	Ebony Sedge	Calcareous soils	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Carex frankii	Frank's Sedge	Swamps and wet woods	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Carex haydenii	Cloud Sedge	Marshes, wet meadows, and wet open woods	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 13 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Carex hitchcockiana	Hitchcock's Sedge	Moist rich woods	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Carex jamesii	Jame's Sedge	Calcareous rich woods	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Carex leptonervia	Fine-nerve Sedge	Moist woods	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Carex oligocarpa	Few-fruit Sedge	Moist rich woods	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 14 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Carex pallescens	Pale Sedge	Moist woods and meadows	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Carex plantaginea	Plantain-leaf Sedge	Rich moist woods	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Carex polymorpha	Variable Sedge	Barrens and peaty soils	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Carex prairea	Prairie Sedge	Swamps, wet meadows, and wet prairies	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 15 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Carex pseudocyperus	Cyperus-like Sedge	Swamps and bogs	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Carex retrorsa	Retrorse Sedge	Swampy woods and wet meadows	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Carex siccata	A Sedge	Sandy woods and fields	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Carex sterilis	Dioecious Sedge	Calcareous wetlands	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 16 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Carex tuckermanii	Tuckerman's Sedge	Swampy woods, pond margins, and wet meadows	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Carex utriculata	Bottle-shaped Sedge	Wet soil and shallow water	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Carex viridula var. viridula	Green Sedge	Calcareous boggy and marly shores	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 17 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Carex willdenowii var. willdenowii	Willdenow's Sedge	Moist acidic soils	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Castilleja coccinea	Scarlet Indian-paintbrush	Meadows, damp prairies, and moist sandy soils	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Cheilanthes lanosa	Hairy Lipfern	Subacidic cliffs and shale outcrops	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]

(Page 18 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Chenopodium simplex	Maple-leaf Goosefoot	Rocky woods	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Clematis occidentalis var. occidentalis	Purple Clematis	Rocky woods	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Coeloglossum viride var. virescens	Long-bracted Green Orchid	Rich woods	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 19 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Conioselinum chinense	Hemlock Parsley	Swamps, bogs, and wet meadows	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Corallorhiza trifida	Early Coral Root	Moist woods and bogs	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and these habitat types are not known to occur on the site.
Cornus amomum var. schuetzeana	Pale Dogwood	Moist or wet woods along streams	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 20 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Cornus canadensis	Bunchberry	Moist acidic woods and bogs	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements arlacking.
Crataegus calpodendron	Pear Hawthorn	Woods, thickets, and low meadows	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Crataegus chrysocarpa var. chrysocarpa	Fireberry Hawthorn	Woods and roadsides	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 21 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Crataegus dodgei	Dodge's Hawthorn	Thickets and forest edges	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Crataegus succulent	Fleshy Hawthorn	Woods, thickets, banks, fencerows, and meadows	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Cuphea viscosissima	Blue Waxweed	Dry open banks and fencerows	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]

(Page 22 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Cuscuta cephlanthi	Buttonbush Dodder	Swamps and moist thickets	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Cuscuta polygonorum	Smartweed Dodder	Moist shores and riverbanks	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur at intake. Potential for impacts during construction of water lines would be SMALL. Species and host species would persist in seedbank and recolonize any suitable areas.
Cypripedium candidum	Small White Lady's-slipper	Calcareous bogs, open swamps, and wet prairies	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 23 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Cypripedium parviflorum var makasin	Fen Small Yellow Lady's-slipper	Mesic to wet fens, prairies, meadows, thickets, open coniferous and mixed forest	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and required habitat elements are lacking.
Cypripedium reginaer	Showy Lady's-slipper	Swamps, bogs, and wet woods	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Cystopteris protrusa	Lowland Fragile fern	Mesic woods	Unlikely to occur on the site as this habitat is not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 24 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Dicentra exemia	Wild Bleeding- heart	Dry or moist mountain woods	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Dirca palustris	Leatherwood	Moist rich woods	Unlikely to occur on the site as this habitat is not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Eleocharis compressa	Flatstem Spikerush	Marshes and shores	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along Delaware River. Potential for impacts during construction of water lines would be SMALL. Species and host species would persist in seedbank and recolonize any suitable areas.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 25 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Eleocharis pauciflora	Few-flower Spikerush	Calcareous shores and boggy areas	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Eleocharis quandrangulata	Angled Spikerush	Shallow water	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Epilobium angustifolium ssp. circumvagum	Narrowleaf Fireweed	Forest edges and recent clearings in open sandy soil; more abundant following fire	Unlikely to occur on the site as this habitat is not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 26 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Epilobium strictum	Downy Willowherb	Bogs and swamps	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Equisetum variegatum	Variegated Horsetail	Wet thickets, bogs, and sandy shores	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Eragrostis frankii	Frank’s Love Grass	Riverbanks, sandbanks, and moist ground	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 27 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Eriophorum gracile	Slender Cotton-grass	Bogs and swamps	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Eriophorum viridicarinatum	Thin-leaf Cotton-grass	Swamps, bogs, and wet meadows	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Euonymous atropurpurea var. atropurpurea	Wahoo	Moist woods	Unlikely to occur on the site as this habitat is not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 28 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Eupatorium altissmum	Tall Boneset	Woods, thickets, savannas, glades, and thickets	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Galium labradoricum	Labrador Marsh Bedstraw	Bogs, swamps, and wet thickets	Unlikely to occur on the site as this habitat is not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Galium palustre	Marsh Bedstra	Wet soil	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 29 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Galium trifidum	Small Bedstraww	Moist areas	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Gentianella quinquefolia var. quinquefolia	Stiff Gentian	Woods and moist or wet open areas	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and these habitats are not known to occur on the site.
Geum vernum	Spring Avens	Rich woods	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and these habitats are not known to occur on the site..

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 30 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Glyceria grandis	American Manna Grass	On banks and in the water of streams, ditches, ponds, and wet meadows	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and these habitats are not known to occur on the site.
Goodyera tesselata	Checkered Rattlesnake Plantain	Coniferous or hardwood forests	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and these habitats are not known to occur on the site.
Gymnocarpon dryopteris	Oak Fern	Cool woods and talus slopes	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 31 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Hybanthus concolor	Green Violet	Rich woods and ravines	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Hydrophyllum canadense	Broad-leaf Waterleaf	Moist rich woods	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and these habitats are not known to occur on the site.
Hypericum majus	Larger Canadian St John's-wort	Wet meadows and shores	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and these habitats are not known to occur on the site..

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 32 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Hypericum prolificum	Shrubby St John's-wort	Swamp margins to cliffs to dry woods	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Hypericum pyramidatum	Great St John's-wort	Moist soil	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Ilex montana	Large-leaf Holly	Woods	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and these habitats are not known to occur on the site.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 33 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Isanthus brachiatus (Trichostema brachiatum)	False Pennyroyal	Dry soil	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Isoetes tuckermanii	Tuckerman's Quillwort	Lakes, ponds, and less frequently rivers, rooted in sand, gravel, or mud	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur at intake structure site. No impacts are expected because route of line could be adjusted to avoid the species should it occur.
Juncus brachycephalus	Fen Rush	Wet meadows and sandy shores	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 34 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Juncus brevicaudatus	Narrow-panicle Rush	Marshes, wet meadows, and shores	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur at intake structure site. No impacts are expected because route of line could be adjusted to avoid the species should it occur.
Kalmia polifolia	Pale-laurel	Bogs	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Kuhnia eupaorioides	False Boneset	Dry open places in sandy soils	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 35 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Lathyrus venosus	Veiny Vetchling	Rocky shores, wooded slopes, and railroad banks	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Lemna triuscula	Star Duckweed	Lakes, ponds, swamps, marshes, and streams	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur at intake structure site. No impacts are expected because route of line could be adjusted to avoid the species should it occur.
Lilium philadelphicum var. philadelphicum	Wood Lily	Dry open woods and thickets	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 36 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Linnaea borealis	Twinflower	Moist or dry woods and cold bogs	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Lobelia dortmana	Water Lobelia	Borders of ponds	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Lygodium palmatum	Climbing Fern	Moist thickets and woods in acid soils	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Lysimachia hybrida	Lowland Loosestrife	Sloughs, wet woods, and wet prairies	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 37 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Lythrum alatum var. alatum	Winged Loosestrife	Moist or wet soil, usually on prairies	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Maianthemum canadensis var. interius	Western False Lily-of-the-Valley	Moist woods	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Menyanthes trifoliata	Buck Bean	Quiet shallow cold water	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 38 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Mimulus moschatus var. moschatus	Muskflower	Cool wet soil along brooks and springs	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Monarda didyma	Oswego-tea	Moist woods and thickets	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Muhlenbergia glomerata	Eastern Smoke Grass	Marshes, gravelly shores, wet meadows, seepage areas, and bogs	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 39 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Nuphar microphyllum	Small Yellow Pond-lily	Ponds	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Orthilla secunda	Sidebells	Moist woods and mossy bogs	Would not occur onsite as suitable habitat is lacking.	Could occur in barrens within and adjacent to existing ROW along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Oryzopsis asperifolia	White-grained Mountain Rice-grass	Upland woods	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 40 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Panax quinquefolia	American Ginseng	Rich woods	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Panicum flexile	Wiry Panic Grass	Moist or dry soil	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Pedicularis lanceolata	Swamp Lousewort	Swamps and wet soil	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 41 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Phegopteris connectilis	Northern Beech Fern	Cool shaded woods	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL as it would not be affected by clearing. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Phlox pilosa	Downy Phlox	Prairies and upland woods	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL as it would not be affected by clearing. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]

(Page 42 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Picea rubens	Red Spruce	Rocky woods and hillsides, primarily in mountains	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL as it would not be affected by clearing. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Platanthera ciliaris	Yellow-fringed Orchid	Bogs, moist meadows, open woods	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Platanthera flava var. herbiola	Tubercled Rein Orchid	Boggy or swampy ground and floodplains	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 43 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Platanthera hookeri	Hooker's Orchid	Moist rich woods	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Poa languida	Drooping Spear Grass	Moist woods and fens	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Polemonium vanbruntiae	Jacob's Ladder	Swamps and stream banks	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 44 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Polygala senega	Seneca Snakeroot	Calcareous woods and prairies	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL as it would not be affected by clearing. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Porteranthus trifoliatus	Bowman's Root	Dry or moist woods, primarily in mountains	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Potamogeton alpinus	Northern Pondweed	Ponds or slow streams	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 45 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Potamogeton vaginatus	Sheathed Pondweed	Deep alkaline or brackish waters	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Potamogeton zosteriformis	Eel-grass Pondweed	Ponds or slow streams	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Potentilla palustris	Marsh Cinquefoil	Swamps, bogs, and streambanks	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 46 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Prunus pumila var. depressa	Low Sand Cherry	Calcareous sandy or gravelly beaches and shores	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL as it would not be affected by clearing. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Quercus muehlenbergii	Yellow Oak	Calcareous soils	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL as it would not be affected by clearing. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 47 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Ranunculus ambiguens	Water-plantain Spearwort	Low wet ground, swmps, and muddy ditches	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and these habitat types are not known to occur on the site..
Ranunculus flabellaris	Yellow Water Buttercup	Shallow water and muddy shores	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Ranunculus longitrostrus	Long-beak Water Buttercup	Ponds and slow streams	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 48 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Ranunculus micranthus	Rock Buttercup	Rich woods, rocky hillsides, and cal;careous banks	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Ranunculus reptans	Creeping Spearwort	Sandy or muddy shores	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Ranunculus trichlophyllus var. trichlophyllus	Thread-leaf Water Buttercup	Ponds and slow streams	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 49 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Rhododendron canadense	Rhodora	Bogs and wet woods	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Rhynchospora capillacea	Capillary Beaked-rush	Calcareous swamps, bogs, and shores	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Rubus canadensis	Smooth Blackberry	Open deciduous forests and mountain ledges	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 50 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Sagittaria cuneata	Arum-leaf Arrowhead	Ponds or marshes in water or mud	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Salix candida	Hoary Willow	Fens and wet meadows on calcareous soils	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Salix pedicellaris	Bog Willow	Fens and Bogs	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 51 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Salix serissima	Autumn Willow	Fens and wet meadows on calcareous soils	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Sanicula trifoliata	Large-fruit Black-Snakeroot	Woods	Unlikely to occur on the site as this habitat is not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and this habitat is not known to occur on the site.
Schoenoplectus acutus var. acutus	Hard-stem Bulrush	Marshes and muddy shores of lakes and streams	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL as it would not be affected by clearing. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 52 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Scirpus microcarpus	Barberpole bulrush	Wet low ground	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Scirpus pendulus	Reddish bulrush	Marshes and wet meadows	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL as it would not be affected by clearing. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 53 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Scleria pauciflora var. pauciflora	Papilose Nut-rush	Damp or dry sandy or sterile soils	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL as it would not be affected by clearing. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Scleria verticillata	Whorled Nut-rush	Wet sandy soil	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL as it would not be affected by clearing. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 54 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Scutellaria nervosa	Veined Skullcap	Moist woods	Unlikely to occur on the site as this habitat isnot known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL as it would not be affected by clearing. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Selaginella rupestris	Rock Spike-moss	Ledges and rocky slopes in full sun	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL as it would not be affected by clearing. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 55 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Sisyrinchium montanum	Strict blue-eyed Grass	Open ground and meadows	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Smilax tamnoides	Bristly Greenbrier	Wet to dry woods, thickets, bottomlands	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Solidago rigida	Hard-leaved Goldenrod	Moist fields or thickets on calcareous rocks	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 56 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Sparganium chlorocarpum	Green-fruited Bur-reed	Swamps, muddy shores, and shallow water	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL as it would not be affected by clearing. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Sparganium minimum	Small Bur-reed	Shallow water	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL as it would not be affected by clearing. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 57 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Sphenopholis pennsylvanica	Swamp Oats	Swamps and wet woods	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL as it would not be affected by clearing. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Spiranthes lucida	Shining Ladies'-tresses	Calcareous damp woods, marshes, and wet shores	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL as it would not be affected by clearing. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 58 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Spiranthes ochreoleuca	Yellowish Nodding Ladies'-tresses	Woods and roadsides	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Sporobolus compositus var. compositus	Long-leaf Rush-grass	Dry sandy banks	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL as it would not be affected by clearing. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 59 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Sporobolus neglectus	Small Rush-grass	Dry sterile or sandy soil	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL as it would not be affected by clearing. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Stachys tenuifolia	Smooth Hedge-nettle	Shaded moist soil	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL as it would not be affected by clearing. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Streptopus amplexifolius	White Twisted-stalk	Seepy outcrops near waterfalls	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 60 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Taxus canadensis	American Yew	Coniferous woods and bogs	Would not occur onsite as suitable habitat is lacking.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Would not occur along route - specific habitat requirements are lacking.
Tiarella cordifolia	Foamflower	Rich woods	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and moist woods are not known to occur on the site.
Triadenum fraseri	Fraser's St. John's-wort	Bogs, marshes, and wet shores	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and moist woods are not known to occur on the site.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 61 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Trichomanes intricatum	Weft Fern	Deep shade of non-calcareous rock houses	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Would not occur along route - specific habitat requirements are lacking.
Trollius laxus ssp. laxus	Spreading Globe-flower	Swamps, wet woods, and wet meadows	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and moist woods are not known to occur on the site.
Utricularia intermedia	Flat-leaved Bladderwort	Lakes and exposed floating bog mats	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Would not occur along route - specific habitat requirements are lacking.
Utricularia minor	Lesser Bladderwort	Shallow water	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Vaccinium oxycoccos	Small Cranberry	Bogs	Would not occur onsite as suitable habitat is lacking.	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.	Would not occur along route - specific habitat requirements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 62 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Verbena simplex	Narrow-leaf Vervain	Dry woods, fields, rocky places, and roadsides	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Veronica catenata	Sessile Water-speedwell	Slow flowing streams and ditches	Could occur onsite. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of facility would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Could occur along route. Potential for impacts is limited due to extent of previous disturbance. Potential for impacts during construction of water lines would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Viburnum opulus var. americana	Highbush Cranberry	Moist woods	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and moist woods are not known to occur on the site.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 63 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Vicia americana var. americana	American Purple Vetch	Moist woods	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and moist woods are not known to occur on the site.
Vicia caroliniana	Carolina Wood Vetch	Moist woods and thickets	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and these habitat types are not known to occur on the site.
Viola hirsutula	Southern Wood Violet	Well-drained sandy soils in open woods	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and open woods are not known to occur on the site.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 64 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Waldsteinia fragaroides var. fragaroides	Barren-strawberry	Moist or dry woods	Unlikely to occur on the site as these habitats are not known to occur on the site.	Could occur along route. Potential for impacts is limited due to extent of co-location of route with existing disturbed ROWs for most of length. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.	Unlikely to occur on route as route is confined to the site and woodsare not known to occur on the site.
Accipiter cooperii	Cooper's Hawk	In northern New Jersey, the species inhabits mixed riparian woodlands, eastern hemlock/ white pine forests, and conifer plantations. Winter foraging extends into other habitats	Any use of site would be incidental to foraging. Suitable roosting site are lacking.	Could occur along route as roosting or nesting and foraging habitat could occur. Potential for impacts during construction of new transmission line would be SMALL.	Any use of route would be incidental to foraging. Suitable roosting site are lacking.
Accipiter gentilis	Northern Goshawk	Nest in mature, contiguous forests, forage in various woodland habitats	Any use of site would be incidental to foraging. Suitable roosting site are lacking.	Could occur along route as roosting or nesting and foraging habitat could occur. Potential for impacts during construction of new transmission line would be SMALL.	Any use of route would be incidental to foraging. Suitable roosting site are lacking.
Alasmidonta heterodon	Dwarf Wedgemussel	Muddy sand to sand and gravel/pebble bottoms in rivers and creeks with slow to moderate current	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Could occur at intake. Potential for impacts during construction of intake structure line would be SMALL.
Alasmidonta undulata	Triangle Floater	Streams and Rivers with sand and gravel substrates	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur at intake. Potential for impacts during construction of intake structure line would be SMALL.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 65 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Alasmidonta varicosa	Brook floater	Small streams to large rivers with consistently flowing water	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur at intake. Potential for impacts during construction of intake structure line would be SMALL.
Ambystoma laterale	Blue-spotted Salamander	Breeds in woodland vernal pools, marshes, swamps, and ditches. Adults found in mature woods	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur along route as required habitat elements are lacking.
Ambystoma tigrinum	Eastern Tiger Salamander	Breed in early successional vernal pools or abandoned gravel pits. In June, the young metamorphose and move into the surrounding upland habitat and live below ground.	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur along route as required habitat elements are lacking.
Ammodranus henslowii	Henslow's Sparrow	Fallow and grassy fields, sedge meadows, and pastures	Could occur on site. Potential for impacts during construction of facility would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water lines would be SMALL.
Ammodramus savannarum	Grasshopper Sparrow	Grassland, upland meadow, pasture, hayfield, and old field habitats	Could occur on site. Potential for impacts during construction of facility would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water lines would be SMALL.
Asio flammeus	Short-eared Owl	Coastal tidal and brackish marshes, inland fields, pastures, and grasslands	Could occur on site. Potential for impacts during construction of facility would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water lines would be SMALL.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 66 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Asio otus	Long-eared Owl	Mosaic of wooded and open habitats. Roosting and nesting sites in dense hardwoods with vines or dense stands of natural or ornamental evergreens. Forage in fallow fields, farm fields, and marshes	Could forage on site. Potential for impacts during construction of facility would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could forage along route. Potential for impacts during construction of new water lines would be SMALL.
Atrytone arogos arogos	Arogos Skipper	Xeric to dry-mesic grasslands dominated by its host plant,little bluestem	Could occur on site. Potential for impacts during construction of facility would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water lines would be SMALL.
Boloria selene myrina	Silver Bordered Fritillary	Wet meadows, bogs, marshes	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur along route as required habitat elements are lacking.
Botaurus lentiginosus	American Bittern	Emergent and forested wetlands	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur along route as required habitat elements are lacking.
Buteo lineatus	Red-shouldered hawk	Mature wet woods such as hardwood swamps and riparian forests	Would not occur as habitat is lacking.	Could occur along route, but suitable habitat would likely be avoided. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur as habitat is lacking.
Caladris canutus	Red knot	Shore and tidal areas of Delaware Bay	Site is outside the range of the species in New Jersey. Species would not occur.	Route is outside the range of the species in New Jersey. Species would not occur.	Route is outside the range of the species in New Jersey. Species would not occur.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 67 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Callophrys irus	Frosted Elfin	Natural or artificial dry openings or clearings	Could occur on site. Potential for impacts during construction of facility would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water lines would be SMALL.
Charadrius melodus	Piping Plover	Oceanfront beaches and barrier islands	Site is outside the range of the species in New Jersey. Species would not occur.	Route is outside the range of the species in New Jersey. Species would not occur.	Route is outside the range of the species in New Jersey. Species would not occur.
Circus cyaneus	Northern Harrier	Wetlands, marshland, and grasslands	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur along route as required habitat elements are lacking.
Cistothorus platensis	Sedge Wren	Wet meadows, freshwater marshes, bogs, and the drier portions of salt or brackish coastal marshes	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur as habitat is lacking.
Clemmys insculpta	Wood Turtle	Clean streams through meadows, woods, and farmlands	Could occur on site. Potential for impacts during construction of facility would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water lines would be SMALL.
Clemmys muhlenbergii	Bog Turtle	Marshes, wet meadows, and fen	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur along route as required habitat elements are lacking.
Crotalus horridus	Timber Rattlesnake	Deciduous forests and rocky outcrops	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur as habitat is lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 68 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Dolichonyx oryzivorus	Bobolink	Hayfields, pastures, lush fallow fields, and meadows	Could occur on site. Potential for impacts during construction of facility would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water lines would be SMALL.
Elaphe guttata guttata	Corn Snake	Pine-oak forests with an understory of low brush	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur along route as required habitat elements are lacking.
Eurycea longicaudata	Long-tailed Salamander	Slow moving streams, sinkhole ponds, fens, and swamps	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur along route as required habitat elements are lacking.
Falco peregrinus	Peregrine Falcon	Riparian, grassland, forested, and urban areas	Any use of site would be incidental to foraging. Suitable roosting site are lacking.	Could occur along route as roosting or nesting and foraging habitat could occur. Potential for impacts during construction of new transmission line would be SMALL.	Any use of route would be incidental to foraging. Suitable roosting site are lacking.
Haliaeetus leucocephalus	Bald Eagle	Forested areas adjacent to large water bodies	Any use of site would be incidental to foraging. Suitable roosting site are lacking.	Could occur along route as roosting or nesting and foraging habitat could occur. Potential for impacts during construction of new transmission line would be SMALL.	Any use of route would be incidental to foraging. Suitable roosting site are lacking.
Hyla andersonii	Pine barrens Treefrog	Restricted to the acidic waters of the New Jersey Pine Barrens	Site is outside the range of the species in New Jersey. Species would not occur.	Route is outside the range of the species in New Jersey. Species would not occur.	Route is outside the range of the species in New Jersey. Species would not occur.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 69 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Hyla chrysocelis	Southern Gray Treefrog	Breed in vernal ponds or swamps, and remain in mixed forested uplands during the rest of the year	Would not occur as habitat is lacking.	Could occur along route as roosting or nesting and foraging habitat could occur. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur as habitat is lacking.
Lampsilis cariosa	Yellow Lampmussel	Medium to Large Rivers	Would not occur as habitat is lacking.	Would not occur as habitat is lacking.	Restricted to Delaware River in New Jersey. Could occur at intake/discharge structures. Potential for impacts during construction of new water line would be SMALL.
Lampsilis radiata	Eastern Lampmussel	A variety of aquatic habitats with medium to coarse sands	Would not occur as habitat is lacking.	Species is not known from the Delaware River system of New Jersey and would not be expected to occur along route.	Species is not known from the Delaware River of New Jersey and would not be expected to occur at intake.
Lanius ludovicianus	Loggerhead Shrike	Short-grass pastures, weedy fields, grasslands, agricultural areas, swampy thickets, orchards, and right-of-way corridors	Could occur on site. Potential for impacts during construction of facility would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water lines would be SMALL.
Lasmigona subviridis	Green Floater	Small creeks to large rivers over gravel and sand	Would not occur as habitat is lacking	Would not occur as habitat is lacking	Considered extirpated from Delaware River in New Jersey. Unlikely to occur at intake/discharge structures.
Laterallus jamaicensis	Black Rail	Coastal salt and brackish marshes	Site is outside the range of the species in New Jersey. Species would not occur.	Route is outside the range of the species in New Jersey. Species would not occur.	Route is outside the range of the species in New Jersey. Species would not occur.
Leptodea ochracea	Tidewater Mucket	Tidal waters of the Delaware River	Site is outside the range of the species in New Jersey. Species would not occur.	Route is outside the range of the species in New Jersey. Species would not occur.	Route is outside the range of the species in New Jersey. Species would not occur.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 70 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Ligumia nasuta	Eastern pondmussel	Delaware River and its tributaries	Could occur on site but level of previous and ongoing disturbance makes this unlikely. Potential for impacts during construction of facility would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur at intake/ discharge structures. Potential for impacts during construction of new water line would be SMALL.
Lycaena hyllus	Bronze Copper	Brackish and freshwater marshes, bogs, fens, seepages, wet sedge meadows, riparian zones, wet grasslands, and drainage ditches	Could occur on site. Potential for impacts during construction of facility would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water lines would be SMALL.
Lynx rufus	Bobcat	Forests, areas of mixed forest and agriculture and rural areas near cities and small towns	Could occur on site. Potential for impacts during construction of facility would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water lines would be SMALL.
Melanerpes erythrocephalus	Red-headed Woodpecker	Open woods with sparse undergrowth	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur as habitat is lacking.
Myotis sodalis	Indiana or Social Myotis	Forages in wooded riparian areas and wooded areas; summer roosts in trees, Hibernated in caves	Any use of site would be incidental to foraging. Suitable roosting site are lacking.	Could occur along route as potentially suitable foraging and summer roosting habitat occurs. Potential for impacts during construction of new transmission line would be SMALL.	Any use of route would be incidental to foraging. Suitable roosting site are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 71 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Nyctanassa violaceus	Yellow-crowned Night-heron	Nest on barrier islands, dredge spoil islands, and bay islands that contain forested wetlands or scrub/shrub thickets; forage along the shores of tidal creeks and tide pools within salt and brackish marshes and mudflats	Site is outside the range of the species in New Jersey. Species would not occur.	Route is outside the range of the species in New Jersey. Species would not occur.	Route is outside the range of the species in New Jersey. Species would not occur.
Nycticorax nycticorax	Black-crowned Night-heron	Large wetland complexes	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur as habitat is lacking.
Pandion haliaetus	Osprey	Both wild and urban environments near quality fish resource	Any use of site would be incidental to foraging. Suitable roosting site are lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could forage near intake structure. Potential for impacts during construction of new water line would be SMALL.
Passerculus sandwichensis	Savanna Sparrow	Hay and alfalfa fields, fallow fields, grasslands, upland meadows, airports, pastures, and vegetated landfills	Could occur on site. Potential for impacts during construction of facility would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water lines would be SMALL.
Pituophis melanoleucus melanoleucus	Northern pine Snake	Sandy habitat of the New Jersey Pine Barrens	Site is outside of range of species. Would not occur as habitat is lacking.	Route is outside of range of species. Would not occur as habitat is lacking.	Route is outside of range of species. Would not occur as habitat is lacking.
Podilymbus podiceps	Pied-billed grebe	freshwater marshes associated with ponds, bogs, lakes, reservoirs, or slow-moving rivers	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur along route as required habitat elements are lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 72 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Pontia protodice	Checkered White	Savannas, old fields, vacant lots, and power line right-of-ways	Could occur on site. Potential for impacts during construction of facility would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water lines would be SMALL.
Pooecetes gramineus	Vesper Sparrow	Cultivated fields, grasslands, fallow fields, and pastures	Could occur on site. Potential for impacts during construction of facility would be SMALL.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur along route. Potential for impacts during construction of new water lines would be SMALL.
Pseudotriton montanus	Easter Mud Salamander	Mud and muck of unpolluted water sources such as springs, seepage areas, and cranberry bogs	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur along route as required habitat elements are lacking.
Pyrgus wyandot	Appalachian Grizzled Skipper	Open, sparsely grassed and barren areas in proximity (< 100 ft) to oak or pine forests	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur along route as required habitat elements are lacking.
Regina septemvittata	Queen Snake	Streams and rivers with rocky bottoms and abundant crayfish	Would not occur as habitat is lacking.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.	Could occur at intake. Potential for impacts during construction of new water lines would be SMALL.
Rynchops niger	Black Skimmer	Nests on open sandy beaches, inlets, sandbars, offshore islands, and dredge sparsely vegetated disposal islands; forage in shallow-water tidal creeks, inlets, and ponds	Site is outside of range of species. Would not occur as habitat is lacking.	Route is outside of range of species. Would not occur as habitat is lacking.	Route is outside of range of species. Would not occur as habitat is lacking.

Table 9.3-20— Potential Occurrence of State and Federal Threatened and Endangered Species and Other Ecologically Important Species in Warren County, New Jersey [a, b]
(Page 73 of 73)

Scientific Name	Common Name	Habitat	Martins Creek Facility Site	Martins Creek Transmission Line	Martins Creek Water Line/ Intake Structure
Sterna antillarum	Least tern	Nest on barrier island beaches or mainland beach strands; sandy dredge disposal sites, and sand piles from mining operations. Forage in bays, lagoons, estuaries, rivers and lakes along the coast	Site is outside of range of species. Would not occur as habitat is lacking.	Route is outside of range of species. Would not occur as habitat is lacking.	Route is outside of range of species. Would not occur as habitat is lacking.
Stryx varia	Barred Owl	Remote, contiguous, old-growth wetland forests	Would not occur as habitat is lacking.	Could occur along route, but habitat would likely be avoided. Potential for impacts during construction of new transmission line would be SMALL.	Would not occur as habitat is lacking.

[a] Marine and brackish water species are omitted from the table as these habitats do not occur in Warren County.

[b] Federally listed species included are limited to those identified for the municipalities and townships that may be crossed by the project (USFWS, 2010a).

Animal species occurrences from NJDFW, 2011a and USFWS, 2010a. Plant species list from NJDEP, 2008a, and USFWS, 2010a. Plant habitat information from FNA, 2011a; FNA, 2011b; Rhoads and Block, 2007; Gleason and Cronquist, 1991; Landscope America, 2011.

Animal habitat information from Cornell Laboratory of Ornithology, 2009; BAMONA, 2010; Brou, 2009; BugGuide.Net, 2010a; BugGuide.Net, 2010b; Butterflies and Skippers of North America, 2010; InsectsofWestVirginia.net, 2010; MDFW, 2008a; MDFW, 2008b; MDFW, 2008c; MDFW, 2008d; MDFW, 2008e; Mt.gov, 2010a; Mt.gov, 2010b; NJ DFW; 2011a; NJDFW, 2011b; NJ DFW, 2011c; NJODES, 2006; NYDEC, 2010; NYNHP, 2009a; NYNHP, 2009b; PNHP, 2010b; Conant and Collins, 1998; Peterson, 2002; USFWS, 2010a; UMassAmherst, 2008a; UMassAmherst, 2008b; Wagner et. al, 2003; Whitaker and Hamilton, 1998.

Table 9.3-21— Potential Occurrence of State and Federal Threatened and Endangered Species in Morris County New Jersey [a, b]
(Page 1 of 14)

Scientific Name	Common Name	Habitat	Martins Creek Transmission Line
Andromeda glaucophylla	Bog Rosemary	Bogs and peaty wetlands	Could occur in along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Asplenium bradleyi	Bradley's Spleenwort	Non-calcareous cliffs and rocks	Unlikely to occur along the route as these habitats would likely be avoided. Any impacts from installation of transmission lines would be SMALL.
Aster radula (Eurybia radula)	Low Rough Aster	Acidic wet woods, swamps, seeps, and bogs	Could occur in woods along route, but is unlikely as species does not persist in communities with disturbed vegetation. Potential for impacts during construction of new transmission line would be SMALL.
Botrychium multifidum	Leathery Grape Fern	Meadows and open woods	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL due to limited potential habitat along route. Species would persist in seedbank and recolonize any suitable areas.
Calystegia spithamaea	Erect Bindweed	Dry rocky or sandy soils in fields and woods	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Carex brunescens	Ropundspike Brownish Sedge	Borders of bogs and acidic woods	Could occur in along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Carex haydenii	Cloud Sedge	Marshes, wet meadows, and wet open woods	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.

Table 9.3-21— Potential Occurrence of State and Federal Threatened and Endangered Species in Morris County New Jersey [a, b]
(Page 2 of 14)

Scientific Name	Common Name	Habitat	Martins Creek Transmission Line
Carex leptonervia	Fine-nerve Sedge	Moist woods	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Carex limosa	Mud Sedge	Sphagnum bogs and hummocks	Could occur in along route, but habitats would likely be avoided. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Carex louisianica	Louisiana Sedge	Wet woods and swamps	Could occur in along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Carex polymorpha	Variable Sedge	Barrens and peaty soils	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Carex siccata	A Sedge	Sandy woods and fields	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Cercis canadensis	Redbud	Rich woods on limestone or diabase	Could occur in along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Cuscuta cephlanthi	Buttonbush Dodder	Swamps and moist thickets	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.

Table 9.3-21— Potential Occurrence of State and Federal Threatened and Endangered Species in Morris County New Jersey [a, b]
(Page 3 of 14)

Scientific Name	Common Name	Habitat	Martins Creek Transmission Line
Cypripedium reginae	Showy Lady's-slipper	Swamps, bogs, and wet woods	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Desmodium humifusum	Trailing Tick-trefoil	Dry sandy woods	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Equisetum pratense	Meadow Horsetail	Meadows and wet woodlands	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Equisetum variegatum	Variegated Horsetail	Wet thickets, bogs, and sandy shores	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Eriophorum gracile	Slender Cotton-grass	Bogs and swamps	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Eriophorum tenellum	Rough Cotton-grass	Bogs, peaty depressions, and peaty swamps	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Glyceria grandis	American Manna Grass	On banks and in the water of streams, ditches, ponds, and wet meadows	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.

Table 9.3-21— Potential Occurrence of State and Federal Threatened and Endangered Species in Morris County New Jersey [a, b]
(Page 4 of 14)

Scientific Name	Common Name	Habitat	Martins Creek Transmission Line
Gnaphalium mcounii (Pseudognaphalium mcounii)	Fragrant cudweed	Oldfields, cut-over woods, clearings, and roadsides	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Helonias bullata	Swamp Pink	Swamps and bogs	Could occur along route, but these habitats would be avoided if possible. Potential for impacts during construction of new transmission line would be SMALL.
Hemicarpa micrantha (Lipocarpa micrantha)	Small-flower Halfchaff Sedge	Moist sand	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Hieracium kalmii (H. umbellatum)	Canada hawkweed	Thickets, clearings, and roadside banks	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Hottonia inflata	Featherfoil	Ponds and ditches	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Ilex montana	Large-leaf Holly	Woods	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Isotria medeoloides	Small Whorled Pogonia	Dry open oak forests	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Kalmia polifolia	Pale-laurel	Bogs	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.

Table 9.3-21— Potential Occurrence of State and Federal Threatened and Endangered Species in Morris County New Jersey [a, b]
(Page 5 of 14)

Scientific Name	Common Name	Habitat	Martins Creek Transmission Line
Lobelia dortmanna	Water Lobelia	Borders of ponds	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Lycopodium annotinum	Stiff Club-moss	Cool shades moist forests on rocky sites	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Malaxis bayardii	Bayard long's Adder's Mouth	Dry open upland forests and shale barrens	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Melanthium virginicum (Veratrum virginicum)	Virginia Bunchflower	Moist woods, seepages, and damp clearings	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Milium effusum	Tall Millet Grass	Cool rich woods	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Myriophyllum verticillatum	Whorled Water-milfoil	Shallow water of ponds or marshes	Could occur along route but these habitat types would not be impacted by transmission lines. No impacts would be expected.
Nuphar microphyllum	Small Yellow Pond-lily	Ponds	Could occur along route but this habitat type would not be impacted by transmission lines. No impacts would be expected.
Panicum boreale (Dichanthelium boreale)	Northern Panic Grass	Bogs and fens	Could occur along route but these habitat types would not be impacted by transmission lines. No impacts would be expected.

Table 9.3-21— Potential Occurrence of State and Federal Threatened and Endangered Species in Morris County New Jersey [a, b]

(Page 6 of 14)

Scientific Name	Common Name	Habitat	Martins Creek Transmission Line
Phlox pilosa	Downy Phlox	Prairies and upland woods	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL as it would not be affected by clearing. Species would persist in seedbank and recolonize any suitable areas.
Picea rubens	Red Spruce	Rocky woods and hillsides, primarily in mountains	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL as it would not be affected by clearing. Species would persist in seedbank and recolonize any suitable areas.
Platanthera hookeri	Hooker's Orchid	Moist rich woods	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Potamogeton alpinus	Northern Pondweed	Ponds or slow streams	Could occur along route but these habitat types would not be impacted by transmission lines. No impacts are expected.
Potamogeton illinoensis	Illinois Pondweed	Lakes and streams	Could occur along route but these habitat types would not be impacted by transmission lines. No impacts are expected.
Potamogeton obtusifolius	Blunt-leaf Pondweed	Boggy ponds and lakes	Could occur along route but these habitat types would not be impacted by transmission lines. No impacts are expected.
Potamogeton robbinsii	Robbin's pondweed	Quiet water of lakes and ponds	Could occur along route but these habitat types would not be impacted by transmission lines. No impacts are expected.
Potamogeton zosteriformis	Eel-grass Pondweed	Ponds or slow streams	Could occur along route but these habitat types would not be impacted by transmission lines. No impacts are expected.
Potentilla palustris	Marsh Cinquefoil	Swamps, bogs, and streambanks	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.

Table 9.3-21— Potential Occurrence of State and Federal Threatened and Endangered Species in Morris County New Jersey [a, b]
(Page 7 of 14)

Scientific Name	Common Name	Habitat	Martins Creek Transmission Line
Prenanthes racemosa	Smooth Rattlesnake-root	Moist boggy ground	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Prunus alleghaniensis	Allegheny Plum	Rocky bluffs, shale barrens, roadsides, floodplains	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Pycnanthemum torrei	Torrey's Mountain-mint	Upland woods and thickets	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Ranunculus fasicularis	Early Buttercup	Exposed calcareous slopes and ledges	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Rhododendron canadense	Rhodora	Bogs and wet woods	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Salix pedicellaris	Bog Willow	Fens and Bogs	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Scheuchzeria palustris	Arrow-grass	Sphagnum bogs	Could occur along route but this habitat types would not be impacted by transmission lines. No impacts are expected.
Smilacina trifoliata (Maianthemum trifoliatum)	Three-leaf false Solomon's Seal	Bogs and peaty wetlands	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.
Solidago rigida	Hard-leaved Goldenrod	Moist fields or thickets on calcareous rocks	Unlikely to occur along route - specific habitat requirements are unlikely to occur along the route.

Table 9.3-21— Potential Occurrence of State and Federal Threatened and Endangered Species in Morris County New Jersey [a, b]

(Page 8 of 14)

Scientific Name	Common Name	Habitat	Martins Creek Transmission Line
Sparganium angustifolium	narrow-leaf Burr-reed	Shallow water	Could occur along route but these habitat types would not be impacted by transmission lines. No impacts are expected.
Sparganium minimum	Small Burr-reed	Shallow water	Could occur along route but these habitat types would not be impacted by transmission lines. No impacts are expected.
Sporobolus neglectus	Small Rush-grass	Dry sterile or sandy soil	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Stellaria borealis	Boreal Starwort	Springy slopes, sphagnous swamps, and streambanks	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Tiarella cordifolia	Foamflower	Rich woods	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Triphora trianthophora	Three Birds orchid	Humus-rich moist forests	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Trollius laxus ssp. laxus	Spreading Globe-flower	Swamps, wet woods, and wet meadows	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Verbena simplex	Narrow-leaf Vervain	Dry woods, fields, rocky places, and roadsides	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.

Table 9.3-21— Potential Occurrence of State and Federal Threatened and Endangered Species in Morris County New Jersey [a, b]
(Page 9 of 14)

Scientific Name	Common Name	Habitat	Martins Creek Transmission Line
Viola canadensis	Canada Violet	Moist woods and swamps	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL. Species would persist in seedbank and recolonize any suitable areas.
Accipter cooperii	Cooper's Hawk	Mixed riparian woodlands, eastern hemlock/ white pine forests, and conifer plantations. Winter foraging extends into other habitats	Could occur along route as roosting or nesting and foraging habitat could occur. Potential for impacts during construction of new transmission line would be SMALL.
Accipiter gentilis	Northern Goshawk (breeding)	Nest in mature, contiguous forests, forage in various woodland habitats	Could occur along route as roosting or nesting and foraging habitat could occur. Potential for impacts during construction of new transmission line would be SMALL.
Alasmidonta heterodon	Dwarf Wedgemussel	Muddy sand to sand and gravel/pebble bottoms in rivers and creeks with slow to moderate current	Could occur along route as roosting or nesting and foraging habitat could occur. Potential for impacts during construction of new transmission line would be SMALL.
Alasmidonta undulata	Triangle Floater	Streams and Rivers with sand and gravel substrates	Could occur along route but these habitat types would not be impacted by transmission lines. No impacts are expected.
Alasmidonta varicosa	Brook floater	Small streams to large rivers with consistently flowing water	Could occur along route but these habitat types would not be impacted by transmission lines. No impacts are expected.
Ambystoma laterale	Blue-spotted Salamander	Breeds in woodland vernal pools, marshes, swamps, and ditches. Adults found in mature woods	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Ambystoma tigrinum	Eastern Tiger Salamander	Breed in early successional vernal pools or abandoned gravel pits. In June, the young metamorphose and move into the surrounding upland habitat and live below ground.	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Ammodranus henslowii	Henslow's Sparrow	Fallow and grassy fields, sedge meadows, and pastures	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Ammodramus savannarum	Grasshopper Sparrow (breeding)	Grassland, upland meadow, pasture, hayfield, and old field habitats	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.

Table 9.3-21— Potential Occurrence of State and Federal Threatened and Endangered Species in Morris County New Jersey [a, b]
(Page 10 of 14)

Scientific Name	Common Name	Habitat	Martins Creek Transmission Line
Asio flammeus	Short-eared Owl (breeding)	Coastal tidal and brackish marshes, inland fields, pastures, and grasslands	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Asio otus	Long-eared Owl	Mosaic of wooded and open habitats. Roosting and nesting sites in dense hardwoods with vines or dense stands of natural or ornamental evergreens. Forage in fallow fields, farm fields, and marshes	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Atrytone arogos arogos	Arogos Skipper	Xeric to dry-mesic grasslands dominated by its host plant, little bluestem	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Boloria selene myrina	Silver Bordered Fritillary	Wet meadows, bogs, marshes	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Botaurus lentiginosus	American Bittern (breeding)	Emergent and forested wetlands	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Buteo lineatus	Red-shouldered hawk	Mature wet woods such as hardwood swamps and riparian forests	Could occur along route, but suitable habitat would likely be avoided. Potential for impacts during construction of new transmission line would be SMALL.
Caladris canutus	Red knot	Shore and tidal areas of Delaware Bay	Route is outside the range of the species in New Jersey. Species would not occur.
Callophrys irus	Frosted Elfin	Natural or artificial dry openings or clearings	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Charadrius melodus	Piping Plover	Oceanfront beaches and barrier islands	Route is outside the range of the species in New Jersey. Species would not occur.
Circus cyaneus	Northern Harrier (breeding)	Wetlands, marshland, and grasslands	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Cistothorus platensis	Sedge Wren	Wet meadows, freshwater marshes, bogs, and the drier portions of salt or brackish coastal marshes	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Clemmys insculpta	Wood Turtle	Clean streams through meadows, woods, and farmlands	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.

Table 9.3-21— Potential Occurrence of State and Federal Threatened and Endangered Species in Morris County New Jersey [a, b]
(Page 11 of 14)

Scientific Name	Common Name	Habitat	Martins Creek Transmission Line
Clemmys muhlenbergii	Bog Turtle	Marshes, wet meadows, and fen	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Crotalus horridus	Timber Rattlesnake	Deciduous forests and rocky outcrops	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Dolichonyx oryzivorus	Bobolink (breeding)	Hayfields, pastures, lush fallow fields, and meadows	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Elaphe guttata guttata	Corn Snake	Pine-oak forests with an understory of low brush	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Eurycea longicaudata	Long-tailed Salamander	Slow moving streams, sinkhole ponds, fens, and swamps	Could occur along route but these habitat types would not be impacted by transmission lines. No impacts are expected.
Falco peregrinus	Peregrine Falcon	Riparian, grassland, forested, and urban areas	Could occur along route as roosting or nesting and foraging habitat could occur. Potential for impacts during construction of new transmission line would be SMALL.
Haliaeetus leucocephalus	Bald Eagle	Forested areas adjacent to large water bodies	Could occur along route as roosting or nesting and foraging habitat could occur. Potential for impacts during construction of new transmission line would be SMALL.
Hyla andersonii	Pine barrens Treefrog	Restricted to the acidic waters of the New Jersey Pine Barrens	Route is outside the range of the species in New Jersey. Species would not occur.
Hyla chrysocelis	Southern Gray Treefrog	Breed in vernal ponds or swamps, and remain in mixed forested uplands during the rest of the year	Could occur along route as roosting or nesting and foraging habitat could occur. Potential for impacts during construction of new transmission line would be SMALL.
Lampsilis cariosa	Yellow Lampmussel	Medium to Large Rivers	Would not occur as habitat is lacking.
Lampsilis radiata	Eastern Lampmussel	A variety of aquatic habitats with medium to coarse sands	Species is not known from the Delaware River system of New Jersey and would not be expected to occur along route. No impacts are expected.
Lanius ludovicianus	Loggerhead Shrike	Short-grass pastures, weedy fields, grasslands, agricultural areas, swampy thickets, orchards, and ROW corridors	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.

Table 9.3-21— Potential Occurrence of State and Federal Threatened and Endangered Species in Morris County New Jersey [a, b]
(Page 12 of 14)

Scientific Name	Common Name	Habitat	Martins Creek Transmission Line
Lasmigona subviridis	Green Floater	Small creeks to large rivers over gravel and sand	Could occur along route but these habitat types would not be impacted by transmission lines. No impacts are expected.
Laterallus jamaicensis	Black Rail	Coastal salt and brackish marshes	Route is outside the range of the species in New Jersey. Species would not occur.
Leptodea ochracea	Tidewater Mucket	Tidal waters of the Delaware River	Route is outside the range of the species in New Jersey. Species would not occur.
Ligumia nasuta	Eastern pondmussel	Delaware River and its tributaries	Could occur along route but these habitat types would not be impacted by transmission lines. No impacts are expected.
Lycaena hyllus	Bronze Copper	Brackish and freshwater marshes, bogs, fens, seepages, wet sedge meadows, riparian zones, wet grasslands, and drainage ditches	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Lynx rufus	Bobcat	Forests, areas of mixed forest and agriculture and rural areas near cities and small towns	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Melanerpes erythrocephalus	Red-headed Woodpecker	Open woods with sparse undergrowth	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Myotis sodalis	Indiana or Social Myotis	Forages in wooded riparian areas and wooded areas; summer roosts in trees, Hibernated in caves	Could occur along route as potentially suitable foraging and summer roosting habitat occurs. Potential for impacts during construction of new transmission line would be SMALL.
Nyctanassa violaceus	Yellow-crowned Night-heron	Nest on barrier islands, dredge spoil islands, and bay islands that contain forested wetlands or scrub/shrub thickets; forage along the shores of tidal creeks and tide pools within salt and brackish marshes and mudflats	Route is outside the range of the species in New Jersey. Species would not occur.
Nycticorax nycticorax	Black-crowned Night-heron (breeding)	Large wetland complexes	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Pandion haliaetus	Osprey	Both wild and urban environments near quality fish resource	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.

Table 9.3-21— Potential Occurrence of State and Federal Threatened and Endangered Species in Morris County New Jersey [a, b]
(Page 13 of 14)

Scientific Name	Common Name	Habitat	Martins Creek Transmission Line
Passerculus sandwichensis	Savanna Sparrow	Hay and alfalfa fields, fallow fields, grasslands, upland meadows, airports, pastures, and vegetated landfills	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Pituophis melanoleucus melanoleucus	Northern pine Snake	Sandy habitat of the New Jersey Pine Barrens	Route is outside of range of species. Would not occur as habitat is lacking.
Podilymbus podiceps	Pied-billed grebe (breeding)	Freshwater marshes associated with ponds, bogs, lakes, reservoirs, or slow-moving rivers	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Pontia protodice	Checkered White	Savannas, old fields, vacant lots, and power line right-of-ways	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Pooecetes gramineus	Vesper Sparrow	Cultivated fields, grasslands, fallow fields, and pastures	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Pseudotriton montanus	Easter Mud Salamander	Mud and muck of unpolluted water sources such as springs, seepage areas, and cranberry bogs	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Pyrgus wyandot	Appalachian Grizzled Skipper	Open, sparsely grassed and barren areas in proximity (< 100 ft) to oak or pine forests	Could occur along route. Potential for impacts during construction of new transmission line would be SMALL.
Regina septemvittata	Queen Snake	Streams and rivers with rocky bottoms and abundant crayfish	Could occur along route but these habitat types would not be impacted by transmission lines. No impacts are expected.
Rynchops niger	Black Skimmer	Nests on open sandy beaches, inlets, sandbars, offshore islands, and dredge sparsely vegetated disposal islands; forage in shallow-water tidal creeks, inlets, and ponds	Route is outside of range of species. Would not occur as habitat is lacking.
Sterna antillarum	Least tern	Nest on barrier island beaches or mainland beach strands; sandy dredge disposal sites, and sand piles from mining operations. Forage in bays, lagoons, estuaries, rivers and lakes along the coast	Route is outside of range of species. Would not occur as habitat is lacking.
Stryx varia	Barred Owl	Remote, contiguous, old-growth wetland forests	Could occur along route, but habitat would likely be avoided. Potential for impacts during construction of new transmission line would be SMALL.

Table 9.3-21— Potential Occurrence of State and Federal Threatened and Endangered Species in Morris County New Jersey [a, b]

(Page 14 of 14)

Scientific Name	Common Name	Habitat	Martins Creek Transmission Line

[a] Marine and brackish water species are omitted from the table as these habitats do not occur in Morris County.

[b] Federally listed species included are limited to those identified for the municipalities and townships that may be crossed by the project (USFWS, 2010a).

Animal species occurrences from NJDFW, 2011a and USFWS, 2010a. Plant species list from NJDEP, 2008b and USFWS, 2010a.

Plant habitat information from Rhoads and Block, 2007; Gleason and Cronquist, 1991; Landscope America, 2011.

Animal habitat information from NJDFW, 2011a; NJDFW, 2011b; NJDFW, 2011c.

Table 9.3-22— Potential Occurrence of State and Federal Threatened and Endangered Species that May Forage or live in the Delaware River in Northampton County, Pennsylvania [a]

Scientific Name	Common Name	Habitat	Martins Creek Intake Structure
Haliaeetus leucocephalus	Bald Eagle	Forage over large bodies of water and large rivers	Could forage along river in vicinity of outfall structure. May be displaced during construction of intake structure and would be unaffected by operations. Impacts from potential temporary displacement would be SMALL.
Notropis chalybaeus	Ironcolor Shiner	Pools and slow runs of low gradient, small acidic creeks and small rivers with sandy substrate. In clear well-vegetated water.	Delaware River does not provide suitable habitat for this species at the project location. Species would not occur and no impacts would be expected.
Pandion haliaetus	Osprey	Forage over large bodies of water and large rivers	Could forage along river in vicinity of outfall structure. May be displaced during construction of intake structure and would be unaffected by operations. Impacts from potential temporary displacement would be SMALL.
Potamogeton praelongus[b]	White-stemmed Pondweed	Neutral to alkaline waters of lakes, rivers, and streams	Could occur in vicinity of outfall structure and be disturbed by construction of intake structure. Would be unaffected by operations. Impacts from disturbance during construction would be SMALL.
Potamogeton pulcher	Spotted Pondweed	Shallow, acidic streams, vernal ponds, in swamps and on muddy shores	Species is not known from the Delaware River in this part of Northampton County as the habitat is unsuitable along this stretch of river. Species is unlikely to occur and no impacts are expected.
Ranunculus flabellaris[c]	Yellow Water-crowfoot	Shallow water and muddy shores	Habitat is unsuitable at the water intake site. Species would not occur and no impacts would be expected.

[a] Facility would be across Delaware River in New Jersey and only those species that may occur or forage in the Delaware River would have potential to be impacted. Therefore, other species potentially occurring in Northampton County, Pennsylvania are not addressed.

Plant species list from PNHP, 2011d. Plant habitat information from Rhoads and Block, 2007; Gleason and Cronquist, 1991.

[b] Pennsylvania Biological Survey Suggested Status of PE Animal species list from PNHP, 2011d. Animal habitat information from Cornell Laboratory of Ornithology, 2009; NatureServe, 2011a; NJDFW, 2011a; NJDFW, 2011b; NJDFW, 2011c.

[c] Pennsylvania Biological Survey Suggested Status of PT

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 1 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
Energy Projects					
1	Susquehanna Steam Electric Station	PPL/Alleghany Electric Coop-owned 2,451-megawatt (MW) nuclear power plant adjacent to BBNPP site, PPL owns 90% of the station (2,219 MW), Allegheny Electric Cooperative, Inc. owns the remaining 10% (232 MW)	Adjacent to BBNPP site, Berwick, Salem Township, Luzerne County (Montour, Humboldt, and Seedco sites)	Operational; 20-year power plant operating license renewal for Units 1 and 2 (2009)	NRC, 2010a; NRC, 2010b; PPL, 2010a; USEPA, 2010a
2	Three Mile Island Nuclear Generating Station	Exelon-owned, 786-MW nuclear power plant, 20-year power plant operating license renewal for Units 1 and 2 (2008)	10 miles south of Harrisburg on island in Susquehanna River (Seedco site)	Operational 1974	Exelon Corporation, 2010; NRC, 2010c; USEPA, 2010a
132	Brunner Island Generation Station	PPL-owned 1,483 MW coal-fired plant	15 miles south of Harrisburg on west bank of Susquehanna River, East Manchester Township, York County (Seedco site)	Operational; innovative facility with scrubbers and environmental controls for reduction of sulfur dioxide and mercury emissions; and innovative cooling towers for reducing water discharge temperature	PPL, 2010b
3	Intelliwatt Renewable Energy LLC,	13-MW bio-mass energy facility located within the Seedco Industrial Park	Northumberland County, Coal Township (Montour, Humboldt, and Seedco sites)	Secured a $4.9 million state loan to build in 2008; FY2011 Congressional Appropriations requests	Keystone Energy Technology Enterprise Center, Inc. (KETEC), 2010; Senator Arlen Specter, 2010b; The News Item, 2010a
4	Bear Creek Wind Towers	24-MW facility (12 utility scale wind turbines) owned by PPL	Luzerne County (All 4 sites)	Operational 2006	PA Wind Energy Now, 2010; Penn Future, 2010; The Wind Power, 2010; The Wind Power, 2011
6	Humboldt Industrial Park Wind Farm	0.13-MW facility (2 turbines) within an existing Humboldt Industrial Park	Luzerne County (All 4 sites)	Operational 1999	Fraser, 2007; The Wind Power, 2010; The Wind Power, 2011

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 2 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
7	Locust Ridge Wind Farm	26-MW (13 2.0 MW turbines) wind farm	Mahanoy Township, Schuylkill County (Montour, Humboldt, and Seedco sites)	Operational 2006	Fraser, 2007; Renewable Energy World, 2007; Penn Future, 2010; The Wind Power, 2010
8	Locust Ridge II Wind Farm	102-MW (512.0 MW turbines) wind farm, 7 of 51 turbines in Columbia County	Conyngham Township, Columbia County Mahanoy Township Schuylkill County (Montour, Humboldt, and Seedco sites)	Operational 2010; FY2011 ARRA Appropriations request	Fraser, 2007; IEEE Spectrum, 2009; ARRA, 2010; Penn Future, 2010; The Wind Power, 2010
9	Mt Carmel Cogeneration, LLC	47.3 MW waste-coal-fired power plant	Northumberland County (Montour, Humboldt, and Seedco sites)	Operational	Midlantic Machinery Inc., 2007; USEPA, 2010b
10	John B. Rich Memorial Power Station (Gilberton Cogeneration Plant)	80 MW waste-coal-fired cogeneration power plant that generates 400,000 lb/hr steam (50,000 to adjacent steam host)	West Mahanoy Township, Schuylkill County (Montour, Humboldt, and Seedco sites)	Operational	Gilberton Power, 2010
11	Wheelabrator Frackville Energy	56.5 MW waste-coal-fired power plant that generates approximately 410,000 lb/hr steam	Borough of Frackville, Schuylkill County (Montour, Humboldt, and Seedco sites)	Operational	Wheelabrator, 2010
12	Hunlock Power Station	49.9 MW waste-coal-fired power plant	Hunlock Creek, Berwick, Luzerne County (Montour, Humboldt, and Seedco sites)	Operational	USEPA, 2010c; SourceWatch, 2011a
13	Viking Energy of Northumberland Cogeneration Plant	18-MW wood waste and solids fired power plant	Borough of Northumberland, Northumberland County (Montour, Humboldt, and Seedco sites)	Operational	USEPA, 2010d
14	St. Nicholas Cogeneration Project	99.2 MW waste-coal-fired power plant	Town of Shenandoah, Schuylkill County (Montour, Humboldt, and Seedco sites)	Operational	SourceWatch, 2011e
15	Cherokee Pharmaceutical Plant	Merck-owned steam generation (natural gas)facility for pharmaceutical production facility	Borough of Riverside, Danville, Northumberland County (Montour, Humboldt, and Seedco sites)	Operational	PADEP, 1996

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 3 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
16	Williams Cogeneration-Hazleton	171.5-MW natural gas-fired peaking generation unit	City of Hazleton, Luzerne County (Montour, Humboldt and Seedco sites)	Operational	Williams Energy Services, 2001
17	Future Fuels LLC	Integrated Gasification Combined Cycle Clean Coal technology	Northumberland County, Coal Township (Montour, Humboldt and Seedco sites)	Unknown	The News Item, 2010d
18a	PPL Montour Power Plant	1,552-MW coal-fired power plant	Montour County, Derry Township (Montour, Humboldt, and Seedco sites)	Operational	PPL, 2010c
18b	PPL Montour LLC/ Enhancement Activities and 12-Mile Pipeline Corridor	Upgrade existing coal-fired power plant by retrofitting the two Flue Gas Desulphurization (FGD) scrubbers for the removal of sulfur dioxide emissions. A new 12-mile water pipeline will be constructed to carry water removed from the residuum back to the West Branch of the Susquehanna River.	Montour County, Derry Township (Montour, Humboldt, and Seedco sites)	100 percent complete	USACE, 2006a; USACE, 2007a
130	TRANSCO -Trans-continental Gas Pipe Line - Leidy to Long Island expansion project	Pipeline expansion to provide additional natural gas service to northeast includes: installation of approximately 3.4 miles of new 42-inch diameter pipe in Lycoming County, Pennsylvania (Hughesville Loop) and approximately 5.23 miles of new 42-inch-diameter pipe in Luzerne County, Pennsylvania (Berwick Loop).	Columbia, Luzerne and Lackawanna Counties (Montour, Humboldt, and Seedco sites)	100 percent complete	USACE, 2006c; Williams Energy Services, 2009

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 4 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
19	York Haven Hydroelectric Project	Dam construction for hydro power on Susquehanna River	Lancaster and York Counties (Seedco site)	Ongoing	FERC, 2009a
20	Beltzville Hydroelectric Project	Dam construction for hydro power on Lehigh River	Carbon County (Humboldt, Seedco, and Martins Creek sites)	License issued in 2008; FY2011 ARRA Appropriations request	FERC, 2008a; ARRA, 2010; USACE, 2010b
21	Alternative and Clean Energy Technology Commercialization Initiative	Initiative to develop and commercialize clean and alternative energy technologies	City of Harrisburg (Seedco site)	FY2010 and FY2011 Congressional Appropriations request	Senator Arlen Specter, 2010a; Senator Arlen Specter, 2010b;
22	Perfect Catalytic Thermal Oxidation Technology	Waste to energy project	City of Allentown (Humboldt and Martins Creek sites)	FY2010 and FY2011 Congressional Appropriations request	Senator Arlen Specter, 2010a; Senator Arlen Specter, 2010b;
23-30	Pennsylvania Landfill Methane Projects	Landfill methane to electricity projects	Dauphin (candidate), Lackawanna, Lebanon, Lycoming, and Schuylkill counties (Montour, Humboldt, and Seedco sites)	Ongoing and candidate projects	Commonwealth of Pennsylvania, 2008a; Governors Center for Local Government Services, 2010; PADEP, 2010b
129	Texas Eastern Transmission TEMAX and TIME III Projects	Expansion of Texas Eastern Natural Gas Pipeline System	Marietta Extension in Lancaster County (Seedco site)	Under Construction	Spectra Energy, 2007; FERC, 2009b; Office of the Federal Register, 2009
200	Limerick Generating Station	Exelon Generation Co., LLC owns 2 unit 2,345-megawatt (MW) boiling water reactor nuclear power plant	Pottstown, PA (Martins Creek site)	Operational; 20-year licensing renewal to be submitted in mid-2011; Unit 1 operating license expires October 26, 2024; Unit 2 operating license expires June 33, 2029	Exelon Corporation, 2011a; Exelon Corporation, 2011b; NRC, 2011a; NRC, 2011b
201	The Mercer Generating Station	PSEG Power LLC owned coal, gas, distillate oil 753-MW plant	Hamilton Township, NJ (Martins Creek site)	Operational	PSEG, 2011; USEPA, 2010e
202	Portland Generating Station	GenOn Energy owned 570-MW coal-, natural gas-, oil-fired plant	Mount Bethel, PA (Martins Creek site)	Operational	GenOn Energy, 2010; USEPA, 2011b; Environmental News Network (ENN), 2011

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 5 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
203	Martins Creek Power Station	PPL Corporation-owned 1690-MW oil or natural gas plant	Bangor, PA (Martins Creek site)	Operational	PPL, 2011a
204	Northampton Generating Plant	134-MW waste-coal fired power plant	Northampton, PA (Humboldt and Martins Creek sites)	Operational	SourceWatch, 2011c
205	Panther Creek Energy Facility	94-MW waste-coal fired power plant	Nesquehoning, PA (Humboldt, Seedco, and Martins Creek sites)	Operational	SourceWatch, 2011d
206	Kline Cogeneration Facility	57.5-MW waste-coal fired plant	McAdoo, PA (Humboldt, Seedco, and Martins Creek sites)	Operational	SourceWatch, 2011b
207	White Township Solar Farm	~12-MW, 78-acre solar farm, approximately $40-50 million costs for slightly more than 50,000 solar panels by Clean Jersey Solar LLC	Warren County, White Township, NJ (Martins Creek site)	Approved by Township (2010)	Lehigh Valley Live, 2010
208	PPL Solar Farm	~2 MW solar farm, approximately $12-15 million costs for 11,000 solar panels by PPL Renewable Energy, LLC	Warren County, White Township, NJ (Martins Creek site)	Approved by Township (2011)	WFMZ News, 2011
209	Lower Mount Bethel Energy Plant	623 MW natural-gas-fired power plant by PPL Renewable Energy, LLC	Bangor, Northampton County, PA (Martins Creek site)	Operational (2004)	PPL, 2011d
211	Yards Creek Pumped Storage Project	Reservoir and dam construction; dam with generating capacity of 140 MW	Yards Creek, Warren County, New Jersey (Martins Creek site)	Pending; application under review	FERC, 2011a
212	Spruce Run & Round Valley Hydroelectric Project	Dam construction for hydro power on Spruce Run reservoir (7- kW capacity)	Clinton Township, Hunterdon County, NJ (Martins Creek site)	Ongoing	FERC, 2010b

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 6 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
213	Boonton Reservoir Dam	Dam construction for hydro power from 2 units for combined 1.8 MW capacity by Renew Hydro, LLC	Parsippany-Troy Hills, NJ (Martins Creek site)	Feasibility Study underway as of Feb. 2011	FERC, 2011b
214	Wallenpaupack Hydroelectric Project	Hydroplant with operating capacity of 44 MW	Near Hawley, PA (Martins Creek site)	Operational	FERC, 2006; PPL, 2011c
215	Rockaway Pumped Storage Hydroelectric Project	Reservoirs created to be used in the generation of 1,000-MW of hydro power	Rockaway Township, NJ (Martins Creek site)	Application filed March, 8, 2011	FERC, 2011d
216	Avidan Management Solar Project	Avidan Management, LLC added a 4.26-MW solar facility on its 17-acre rooftop in Edison, NJ	Edison, NJ (Martins Creek site)	Construction completed May 2011, ongoing power generation	eSolar Energy News, 2011; Congressman Frank Pallone, Jr., 2011
217	Sussex County Solar Project	Approximately 2 to 5 MW from a possible 60 sites for solar panels to provide direct power to local units	Sussex County, NJ (Martins Creek site)	Developing; by October a developer could be chosen	NJ Herald, 2011
252	300 Line Project	Tennessee Gas Pipeline Company to extend its natural gas piping system through PA and NJ	Within 50-mile radius (Martins Creek site)	Under construction	FERC, 2010a; El Paso Corporation, 2010
253	Line 1278 - Line K Expansion Project	Construction and operation of facilities by Columbia Gas Transmission, LLC	Within 50-mile radius (Martins Creek site)	Ongoing; authorized for construction and operations	FERC, 2011c
254	Susquehanna-Roseland Project	Power line that runs through PA and NJ crossing through the Delaware Water Gap National Recreation Area, owned by PPL, Electric Utilities	Within 50-mile radius (All 4 sites)	Approved but under review by the National Park Service	PPL, 2011b

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 7 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
Mining Projects					
NA[a]	Marcellus Shale natural gas well construction	Water use and wastewater disposal requirements associated with extracting natural gas from the Marcellus Shale formation using large volumes of water for hydraulic fracturing.	Within 50-mile region (Montour, Humboldt, and Seedco sites)	Ongoing; FY2011 Congressional Appropriations requests	Marcellus Shale Formation Information Site, 2008; SRBC, 2009c; Governors Center for Local Government Services, 2010; OilShaleGas.com, 2010; PA Environment Digest, 2010; Senator Robert P. Casey, 2010a
46	Hazleton Acid Mine Reclamation	Improve water quality by reducing the amount of water entering the abandoned coal mines.	Luzerne County, City of Hazleton (All 4 sites)	Original project is not viable, but another project site could be established, but an interested cost-sharing sponsor must be identified	USACE, 2010g
67; 68; 101-114	Assorted Abandoned Mine Reclamation Projects	Projects awarded in 2006, 2007, and 2008	Within 50 mile region (All 4 sites)	Ongoing; FY2010 and FY2011 Congressional Appropriations requests	Commonwealth of Pennsylvania, 2008a; Congressman Christopher P. Carney, 2010; Governors Center for Local Government Services, 2010; Senator Robert P. Casey, 2010b; Senator Arlen Specter, 2010d; SRBC, 2010a
218	Freeland South - Office of Surface Mines (OSM) 40(1381)101.1	Abandoned Mine Land (AML) surface mine reclamation - 15 acre, total cost $317,982; excavation by Brdaric Excavating, Inc.	Freeland, Luzerne County, PA (All 4 sites)	Funded in 2007	PDCED, 2011c
219	Drifton - OSM 40(3217)101.1	AML surface mine reclamation - 15 acres, total cost $178,879; excavation by Earthmovers Unlimited, Inc.	Drifton, Luzerne County, PA (All 4 sites)	Funded in 2007	PDCED, 2011c
220	Nesquehoning Southwest, OSM 13(4653)101.1	AML surface mine reclamation - 19 acres, total cost: $373,852	Carbon County, PA (All 4 sites)	Funded in 2007	PDCED, 2011b

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 8 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
Transportation					
47	Eighth Street Bridge Replacement	Discharge of dredge or fill material into waters of U.S. associated with replacement of functionally obsolete and structurally deficient State Road 1021, Section 370 (Eighth Street Bridge), spanning the North Branch of Susquehanna River.	Luzerne County, Wyoming Borough (Montour and Humboldt sites)	Project ongoing	USACE, 2008
48	Susquehanna River Bridges Replacement Projects	Discharge of dredge or fill material associated with replacement of existing State Road 0080, Section 078 east and west bound bridges, spanning the North Branch of Susquehanna River.	Columbia County, South Centre and Mifflin Townships, (Montour, Humboldt, and Seedco sites)	Projects ongoing; FY2011 Congressional Appropriations requests	USACE, 2009d; USACE, 2009e; Congressman Paul E. Kanjorski, 2010b
NA[b]	PennDOT	Regional roadway improvements	Lackawanna, Lehigh, Lycoming, Northumberland, Snyder, and Union Counties (All 4 sites)	Ongoing and planned; FY2011 ARRA Appropriations request; FY2010 and FY2011 Congressional Appropriations requests	USACE, 2007b; PennDOT, 2010c; Congressman Christopher P. Carney, 2010; Congressman Paul E. Kanjorski, 2010a; Congressman Paul E. Kanjorski, 2010b; Senator Robert P. Casey, 2010c; Senator Arlen Specter, 2010c
NA[b]	Various Airport Improvement Projects	PennDOT and FAA airport improvement projects	Luzerne (Hazleton Municipal and Wilkes-Barre/Wyoming Valley airports), Northumberland (County Airport), Schuylkill (County Airport), Snyder (Penn Valley Airport) County, (Montour, Humboldt, and Seedco sites)	Ongoing and planned; FY2011 ARRA Appropriations request; FY2010 and FY2011 Congressional Appropriations requests	ARRA, 2010; Congressman Christopher P. Carney, 2010; Governors Center for Local Government Services, 2010; GovMonitor Newsletter, 2010; Senator Robert P. Casey, 2010c; Senator Arlen Specter, 2010c

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 9 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
NA[b]	Regional Rail Improvements	Various rail (freight and passenger) line improvement	Within 50-mile region (All 4 sites)	Ongoing and planned; FY2011 ARRA Appropriations request; FY2010 and FY2011 Congressional Appropriations requests	The News Item, 2009; ARRA, 2010; Congressman Christopher P. Carney, 2010; Governors Center for Local Government Services, 2010; NorthcentralPA.com, 2010PennDOT, 2007; PennDOT, 2008a; PennDOT, 2008b; PennDOT, 2009; PennDOT, 2010b; Senator Robert P. Casey, 2010c; Senator Arlen Specter, 2010c
115	Lackawanna Cut-Off Passenger Rail Restoration Project				
	Funding would be used to continue efforts to restore passenger rail service between Scranton, PA and the New York City Metropolitan area. This project is designed to alleviate congestion on Interstate 80 and promote economic development.	Luzerne and Lackawanna Counties (Humboldt and Martins Creek sites)	FY2011 ARRA Appropriations request; FY2010 and FY2011 Congressional Appropriations requests	New Jersey Transit, 2005; Congressman Christopher P. Carney, 2010; Congressman Paul E. Kanjorski, 2010a; Congressman Paul E. Kanjorski, 2010b; Senator Robert P. Casey, 2010c; Senator Arlen Specter, 2010c	
116	I-80 Exits 298/299 Improvements, Monroe County Pennsylvania Project				
	For resign & reconstruction of interchanges 298 and 299 in Monroe County, Pennsylvania. This project is designed to reduce traffic and improve mobility. (This request is moving funding from a previously secured project).	Monroe County (Humboldt and Martins Creek sites)	FY2011 ARRA Appropriations request	Congressman Paul E. Kanjorski, 2010a	

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 10 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
117	SR 924 Extension Project				
	For the SR 924 Extension Project in Hazle Township. This project is designed to reduce traffic and improve access to the Humboldt Industrial Park in an effort to help spur job creation. (This request is moving previously secured funding).	Luzerne County, Township of Hazle (All 4 sites)	FY2011 ARRA Appropriations request; FY2011 Congressional Appropriations request	Congressman Paul E. Kanjorski, 2010a; Congressman Paul E. Kanjorski, 2010b	
221	Pohopoco and Lehigh Bridge Reconstruction	Work on the Pennsylvania Turnpike bridges at Pohopoco and Lehigh as well as road widening	Within 50-mile radius (Humboldt, Seedco, and Martins Creek sites)	Ongoing until November 2012	Pennsylvania Turnpike, 2009
222	Interstate 80 16M	I-80 ramp improvements, roadway patching, milling, paving, updating guide rail, shoulder upgrades, etc.	Interstate 80 east and west between Exit 299 (PA 715) and the New Jersey state line (Martins Creek sites)	Estimated completion in July 2011	PennDOT, 2005
223	Various Transportation Projects	Improvement to transportation infrastructure: new signals, improved roads, signs, etc.	Multiple counties within 50-mile radius (All 4 sites)	$8.4 Million funded in grants	Governor Tom Corbett, 2011a
224	Sumneytown Pike Widening	Change the single lane pike into a two lane road with middle turning lane to decrease congestion.	Sumneytown Pike, Montgomery, PA (Martins Creek site)	Phase I construction until August 2013, depending on funding phase II will begin as phase I finishes	Sumneytown Pike Connector, 2009; Montgomery County, 2009c
225	Highway and Bridge Improvements in Montgomery County	$68.5 million in interstate, highway, and bridge improvements throughout Montgomery County	Montgomery County, PA (Martins Creek site)	Funded and Ongoing	Montgomery County, 2009a
226	Route 1, Forrestal Road to Aaron Road	Study into how traffic congestion can be reduced on Route 1 from Forrestal Road to Aaron Road	North and South Brunswick, NJ (Martins Creek site)	Preliminary engineering and environmental studies phase through Fall 2012, design and construction phases to come	NJDOT, 2009

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 11 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
227	Route 21 Newark Needs Analysis	Aesthetic enhancements as well as improved safety and operation of general traffic	Newark, NJ (Martins Creek site)	Needs analysis	NJDOT, 2006
228	Route 46/Route 3/Valley Road Interchange	Operational and safety improvements to two interchanges that have become bottlenecks in peak hours	Passaic County, NJ (Martins Creek site)	Final design phase to be completed in Summer 2011, construction schedule to be determined	NJDOT, 2010a
229	Route 1 Bridge Replacement	Replacement of Route 1 bridge over abandoned Sayreville Railway and local roads, $24.1 million project	North Brunswick Township, Middlesex County, NJ (Martins Creek site)	Under construction, estimated completion Winter of 2011	NJDOT, 2010b
230	NJ Turnpike Interchange 6 to 9 Widening Program	Addition of 170 new lane miles of roadway added to the New Jersey Turnpike as well as new toll plaza	Burlington, Mercer, and Middlesex Counties, NJ (Martins Creek site)	Construction began in June 2009, completion expected in 2014	New Jersey Turnpike Authority (NJTA), 2011
231	Tremley Point Connector Road Construction	This project will construct a 1.1-mile, four-lane, predominantly pile-supported roadway/ bridge between Industrial Highway in Carteret and Tremley Point Road in Linden on the New Jersey Turnpike	Middlesex and Union Counties, NJ (Martins Creek site)	Planned	NJTA, 2011
232	Newark Bay-Hudson County Extension Bridge Deck Reconstruction	The bridge deck is being replaced in two phases between Interchanges 14 and 14A. If necessary, the ramps connecting the mainline of the Turnpike to the extension will be redecked in a third phase	Essex and Hudson Counties, NJ (Martins Creek site)	First phase construction began in 2010 expected completion in 2013, phase two expected to begin in March 2013 and completed by late 2015, phase three if necessary would be built 2016 to 2017	NJTA, 2011

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 12 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
233	I-287 Rehabilitation Project	$40 million, 5.9-mile rehabilitation to I-287 from NJ Turnpike in Edison Township to Exit 5 at Stelton Road in South Plainfield Borough	Middlesex County, NJ (Martins Creek site)	Completed	NJDOT, 2010c
234	Route 35 over Cheesequake Creek Bridge Rehabilitation	Work on the roadway and bridge on Route 35 and the Cheesequake Creek Bridge	Borough of Sayreville & Township of Old Bridge, Middlesex County, NJ (Martins Creek site)	Ongoing; awaiting construction contractor. Bid date revised to July 14, 2011.	NJDOT, 2011a; NJDOT, 2011b
235	Liberty Water Gap Trail	Construction of beam guide rail, sidewalk, and curb	Newark, NJ (Martins Creek site)	Ongoing; awaiting construction contractor	NJDOT, 2011a; NJDOT, 2011c
236	Carnegie Road Bridge	Bridge over Assunpink Creek will be demolished and replaced with a new bridge with travel lanes, shoulder and sidewalk, ~$1.3 million project	Trenton, NJ (Martins Creek site)	Began July 1 to go through October 2011	Mercer County, 2011
Parks					
49	Sunbury Airport Campground Shoreline Stabilization	Rip-rap construction for shoreline stabilization along Susquehanna River to slow stream bank erosion.	Northumberland County, City of Sunbury (Montour, Humboldt, and Seedco sites)	Project in planning stages; Public comment period until June 18, 2010	USACE, 2010p
50	Sunbury Riverfront Reconstruction	Plan for riverbank stabilization and aesthetically pleasing riverfront improvements that combine flood protection with quality park and recreation services & facilities and be a catalyst for economic development.	Northumberland County, City of Sunbury (Montour, Humboldt, and Seedco sites)	Final Master Plan developed in 2006; Project ongoing pending USACE permitting; FY2010 Congressional Appropriations requests	City of Sunbury, 2005; Congressman Christopher P. Carney, 2010; Senator Arlen Specter, 2010a; USACE, 2009c;

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 13 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
51	Shikellamy State Park - Sunbury Fabridam	Construct a state-of-the-art fish passage facility at the last remaining impediment to upstream migration of American Shad on the Susquehanna River.	Northumberland County, City of Sunbury (Montour, Humboldt, and Seedco sites)	Project is in planning stage	USACE, 2006d; USACE, 2009b
118	Cherry Valley National Wildlife Refuge (Nature Conservancy Project)	Funding would be used to purchase conservation easements on about 400 acres of land. This project is designed to protect the over 90 species and natural communities within the Cherry Valley National Wildlife Refuge boundary.	Monroe County, Tunkhannock Township, Long Pond (Humboldt and Martins Creek sites)	FY2011 ARRA Appropriations request	Congressman Paul E. Kanjorski, 2010a
119	Appalachian National Scenic Trail Acquisition - Hauser Tract (AMC)	Funding would be used to acquire adjacent to the Appalachian National Scenic Trail in Carbon County, Pennsylvania. This project is designed to enhance the trail, protect wildlife and natural resources	Carbon County (Humboldt, Seedco, and Martins Creek sites)	FY2011 ARRA Appropriations request	Congressman Paul E. Kanjorski, 2010a
31-42; 45; 52-55	Assorted Community and Park Projects	Projects awarded in 2006, 2007, and 2008	Within 50-mile region (All 4 sites)	Ongoing; FY2011 ARRA Appropriations request; FY2011 Congressional Appropriations request	Commonwealth of Pennsylvania, 2008a; ARRA, 2010; Congressman Paul E. Kanjorski, 2010a; Governors Center for Local Government Services, 2010; Senator Arlen Specter, 2010d; SRBC, 2010n; USACE, 2010d;
237	Tobyhanna Artillery Range	Former artillery range; unexploded ordinances and munitions response sites must be cleaned up	Tobyhanna Artillery Range (TOAR), Monroe County, PA (Humboldt and Martins Creek sites)	Time-critical removal actions performed 1998 and 2005, Remedial Investigation/ Feasibility Study (RI/FS) in Progress, through 2011	USACE, 2011a

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 14 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
238	Grover's Mill Pond	Pond restoration; restoration of fisheries habitat by sediment removal, physical habitat improvements and re-stocking	West Windsor Township, Mercer County, NJ (Martins Creek site)	Ongoing, FY2010 depended on funds; FY2011 unknown	USACE, 2010v
239	Delaware Water Gap National Recreation Area (DEWA)	Various projects affecting DEWA including the Susquehanna to Roseland transmission line, Tennessee Gas Pipeline, PennDOT road improvement, and various park maintenance projects	Along the Delaware River between PA and NJ, from Port Jervis to Stroudsburg (Martins Creek site)	Ongoing	National Park Service (NPS), 2010
240	Veterans Memorial Park	Expansion of the 1.5-acre park providing parking and serving as a trail head for the township's trail network	Lower Gwynedd, Montgomery, PA (Martins Creek site)	Ongoing	Montgomery County, 2009b; Lower Gwynedd-Ambler-Whitpain Patch, 2011
241	Gouldsboro State Park	Dam repairs and concrete spillway construction	Gouldsboro State Park, Monroe and Wayne County, PA (Humboldt and Martins Creek sites)	Completed in 2007	PDCED, 2011e; PA DCNR 2008b
242	Promised Land State Park	Work on sewage lines, storm and groundwater system, construction of a 10-kW wind turbine facility	Pike County, PA (Martins Creek site)	Began in 2006	PDCED, 2011d
243	Hickory Run State Park	Construction, repair, and modification of buildings within the state park; sewage treatment plant to be replaced	Hickory Run State Park, Carbon County, PA (Humboldt, Seedco, and Martins Creek sites)	Construction began in 2008	PDCED, 2011b
Other Actions/Projects					
56	Mount Carmel Municipal Authority (MCMA) sewage pump station	Construction of a $1.8 million sewage pump station	Northumberland County, Coal Township (Montour, Humboldt, and Seedco sites)	Unknown	The News Item, 2010b

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 15 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
120	Wyoming Valley Sanitary Authority Combined Sewer Overflow Project	Funding would be used to fix combined sewer overflows at the Sanitary Authority. This project is designed to reduce wastewater & stormwater discharges in the Susquehanna River, which ultimately flows into the Chesapeake Bay.	Luzerne County, City of Wilkes-Barre (Montour, Humboldt, and Seedco sites)	FY2011 ARRA Appropriations request; FY2010 Congressional Appropriations request	Congressman Christopher P. Carney, 2010; Congressman Paul E. Kanjorski, 2010a
123	Pocono Township Sewer Project	Funding would be used to construct & install sewer lines and pumping stations in Pocono & Hamilton Townships to meet expanding needs. This project is designed to expand capacity for residential & industrial use, including use by Sanofi Pasteur - a major vaccine supplier in the nation that the U.S. Department of Homeland Security recently designated as "Critical Infrastructure."	Monroe County, Pocono Township, Village of Tannersville (Humboldt and Martins Creek sites)	FY2011 ARRA Appropriations request	Congressman Paul E. Kanjorski, 2010a
57	Amazon	Warehouse with expected employee count of 1,000 people.	Luzerne County (Montour, Humboldt, and Seedco sites)	Unknown	All Business, 2008; Site Selection Magazine, 2008; Trade & Industry Development, 2010; Commonwealth of Pennsylvania, 2008b
58	Chesapeake Gardens	25,000 square-foot plant for manufacturing of soup, sauce, gravy and frozen casseroles.	Northumberland County, Coal Township (Montour, Humboldt, and Seedco sites)	Unknown	The News Item, 2010c

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 16 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
121	Tobyhanna Armed Forces Reserve Center	This request would authorize funding for the design and construction of an Armed Forces Reserve Center at the Tobyhanna Army Depot. The Center would provide a technology exchange, training opportunities and joint emergency resource capabilities to increase mission readiness in support of the Army Campaign Plan and for improved Homeland Security operations.	Monroe County, 11 Hap Arnold Boulevard, Tobyhanna, PA 18466 (Humboldt and Martins Creek sites)	FY2011 ARRA Appropriations request	Congressman Paul E. Kanjorski, 2010a; USACE, 2010e; USACE, 2011d
122	Valley View Business Park Access Road, (Scranton Lackawanna Industrial Building Company)	Funding would be used to construct a new access road to the Valley View Business Park. This project would provide access for commercial development, therefore creating jobs in Northeastern Pennsylvania.	Lackawanna County, 222 Mulberry Street, PO Box 431, Scranton, PA 18503 (Humboldt site)	FY2010 ARRA Appropriations request; FY2010 and FY2011 Congressional Appropriations requests	Congressman Christopher P. Carney, 2010; Congressman Paul E. Kanjorski, 2010a; Congressman Paul E. Kanjorski, 2010b; Senator Robert P. Casey, 2010c; Senator Arlen Specter, 2010c
131	Freight Shipping and Trucking Improvements	Small expansions to trucking and shipping infrastructure serving US Gypsum.	Within 50-mile region (Montour, Humboldt, and Seedco sites)	In progress	PA Bulletin, 2007; ARRA, 2010; Governors Center for Local Government Services, 2010; PennDOT, 2010b
59	US Gypsum/Ancillary Improvements	660,000 ft2 Wallboard manufacturing facility. Use synthetic gypsum generated as FGD byproduct at the adjacent Montour plant.	Montour County (Montour, Humboldt, and Seedco sites)	In production since 2009; Funding for new railroad track awarded in 2010	USACE, 2007a

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 17 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
60; 125	Wyoming Valley Levee Raising and Solomon Creek Flood Protection	Flood control projects	Luzerne County (Montour, Humboldt, and Seedco sites)	FY2010 and FY2011 Congressional Appropriations request	Congressman Christopher P. Carney, 2010; Senator Arlen Specter, 2010a; Senator Arlen Specter, 2010b; Senator Robert P. Casey, 2010a; USACE, 2010q; USEPA, 2010a
61; 126	Bloomsburg Area Flood Damage Reduction Project	Flood control project	Columbia County, Town of Bloomsburg (Montour, Humboldt, and Seedco sites)	FY2010 and FY2011 Congressional Appropriations request	Senator Arlen Specter, 2010a; Senator Arlen Specter, 2010b; Senator Robert P. Casey, 2010a; USEPA, 2010a
62; 127	Lackawanna River Flood Protection	Flood control project	Lackawanna and Luzerne Counties, City of Scranton (Montour and Humboldt sites)	FY2010 ARRA Appropriations request; FY2010 and FY2011 Congressional Appropriations request	Office of the Governor, 2009; Congressman Paul E. Kanjorski, 2010a; Senator Robert P. Casey, 2010a; Senator Robert P. Casey, 2010b; Senator Arlen Specter, 2010a; Senator Arlen Specter, 2010b; USACE 2010a; USACE, 2010i; USACE, 2010j
NA[b]	Assorted Flood Control Projects	Projects include approximately construction of levees, floodwalls, closure structures, and interior drainage structures to meet Federal Emergency Management Agency (FEMA) requirements.	Within 50-mile region (Montour, Humboldt, and Seedco sites)	Projects are planned and construction would occur in future dependent on funding; FY2010 ARRA Appropriations request; FY2010 and FY2011 Congressional Appropriations requests	USACE, 2006d; Office of the Governor, 2009; Congressman Christopher P. Carney, 2010; Congressman Paul E. Kanjorski, 2010a; Senator Robert P. Casey, 2010b; Senator Robert P. Casey, 2010d; Senator Arlen Specter, 2010c; SRBC, 2010a; SRBC, 2010c; USACE 2010a; USACE, 2010i; USACE, 2010j; USACE, 2010k

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 18 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
NA[a]	Susquehanna River Low Flow Study	To gain an understanding of how the range of flows affects the aquatic ecosystem within the sub-watersheds of the Susquehanna River Basin, with particular emphasis on low flow conditions.	Within 50-mile region (Montour, Humboldt, and Seedco sites)	Project agreement between the US Army Corps and Susquehanna River Basin Commission established in 2008. Project funded through end of FY2011; FY2010 and FY2011 Congressional Appropriations requests	SRBC, 2009a; SRBC, 2009b; Congressman Christopher P. Carney, 2010; SRBC, 2010a; USACE, 2010l
NA[a]	Lower West Branch Susquehanna River Conservation Plan	River Conservation Plan	Northumberland, Union, Lycoming and Clinton Counties (Montour, Humboldt, and Seedco sites)	Ongoing	NPC, 2003; SRBC, 2009a; SRBC, 2010a; SRBC, 2010b
NA[a]	Migratory Fish Management and Restoration Plan for the Susquehanna River Basin	Plan to address migratory fish	Within 50-mile region (Montour, Humboldt, and Seedco sites)	Draft report issued in March 2010	Susquehanna River Anadromous Fish Restoration Cooperative (SRAFRC), 2010; SRBC, 2009a; SRBC, 2010b
NA[a]	Susquehanna River Heartland Coalition Project	Solve environmental problems in the Middle and Upper Susquehanna River Watershed	Within 50-mile region (Montour, Humboldt, and Seedco sites)	Ongoing	SRHCES, 2007; SRHCES, 2008
63	Safety Light Corporation (SLC) Superfund Site	Superfund Hazard Toxic Radioactive Waste (HTRW) Emergency Removal Action and Non Time Critical Removal Action for the USEPA Region III.	Columbia County, Town of Bloomsburg (Montour, Humboldt, and Seedco sites)	Final action is waiting additional funding by the USEPA	USACE, 2010c
65	Delong Green Acres Personal Care Home	Install a new drinking water treatment system to eliminate contamination from dissolved solids and sulfate in the water.	Montour County, Washingtonville (Montour, Humboldt, and Seedco sites)	Received a $50,000 loan from state for planning	Office of the Governor, 2009

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 19 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
66	Hazleton City Water Authority	Replace more than a mile of deteriorated water distribution mains, construct a new 88,000 gallon water storage tank and new water treatment facilities, all of which will eliminate leaks and water loss and improve facility efficiency.	Luzerne County, City of Hazleton (All 4 sites)	Received a $2.8 million grant from state; planning stages	Office of the Governor, 2009
64	Lycoming County Landfill - Phase II	County landfill improvement	Lycoming County, Borough of Montoursville (Montour, Humboldt, and Seedco sites)	Ongoing	USACE, 2009e
69-74; 77-84; 90	Watershed Protection	Watershed improvement and restoration projects and studies	Within 50-mile region (All 4 sites)	Ongoing; FY2011 ARRA Appropriations request; FY2010 and FY2011 Congressional Appropriations requests	USACE, 2006b; Commonwealth of Pennsylvania, 2008a; Office of the Governor, 2009; USACE, 2009a; ARRA, 2010; Congressman Christopher P. Carney, 2010; Congressman Paul E. Kanjorski, 2010a; Governors Center for Local Government Services, 2010; Senator Robert P. Casey, 2010d; Senator Arlen Specter, 2010d; SRBC, 2010a; SRBC, 2010c; USACE, 2010a; USACE, 2010f; USACE, 2010g; USACE, 2010h; USACE, 2010l; USACE, 2010n

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 20 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
85; 87-89; 91-93	Future Urbanization (generic)	Construction of housing units and associated commercial buildings; roads, bridges, and rail; and water and/or wastewater treatment and distribution facilities and associated pipelines as described in local land use planning documents.	Within 50-mile region (All 4 sites)	Construction would occur in the future, as described in USACE Continuing Authorities Program Section 14 funding, State and local land-use plans; FY2011 ARRA Appropriations request; FY2010 and FY2011 Congressional Appropriations requests	Commonwealth of Pennsylvania, 2008a; Office of the Governor, 2009; ARRA, 2010; Congressman Christopher P. Carney, 2010; Congressman Paul E. Kanjorski, 2010a; Congressman Paul E. Kanjorski, 2010b; Governors Center for Local Government Services, 2010; GovMonitor Newsletter, 2010; Senator Robert P. Casey, 2010b; Senator Robert P. Casey, 2010c; Senator Arlen Specter, 2010a; Senator Arlen Specter, 2010b; Senator Arlen Specter, 2010c; Senator Arlen Specter, 2010d; USACE, 2010a; USACE, 2010d; USACE, 2010m
NA[b]	Various Hospitals and Industrial Facilities that Use Radioactive Materials	Medical and other isotopes	Within 50-mile region (All 4 sites)	Operational in nearby cities and towns; FY2011 ARRA Appropriations request; FY2010 and FY2011 Congressional Appropriations requests	Commonwealth of Pennsylvania, 2008a; Congressman Christopher P. Carney, 2010; ARRA, 2010; Congressman Paul E. Kanjorski, 2010a;Governors Center for Local Government Services, 2010; Senator Arlen Specter, 2010c
244	Sandy-Longs Run	Restoration for aquatic life in the 6,893-acre mine: alkaline treatment, surface grading, limestone spoil drain installation, etc.	Sandy Run, PA (All 4 sites)	Planning	USACE, 2011e

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 21 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
246	Delaware River Basin Watershed Flood Management Plan	Flood control, watershed management, and flood warning system project	Delaware River Basin, within 50-mile radius (Martins Creek site)	Prior work done in FY2008, FY2009 and planned work in FY2010; FY2011 unknown	USACE, 2010t
247	Musconetcong River Dam Removal	Removal of dams along the Musconetcong River to connect 13 miles of water for aquatic life re-growth and for "waterway trail"	Musconetcong River near Bloomsbury, NJ (Martins Creek site)	No funding since FY2009. FY2011 status unknown	USACE, 2010w
248	Delaware River Basin interim Feasibility Study	Flood control project; analyzing possibility of federal assistance in flood scenarios	Delaware River Basin, within 50- mile radius (Martins Creek site)	QA/QC of work to date and establishing future direction in FY2011, with funding FY2012 to collect more in depth data	USACE, 2011b
249	Assunpink Creek Flood Control	Flood control project by increasing flow in Assunpink Creek	Trenton, NJ (Martins Creek site)	Pending due to finances. Funding proposed through FY2011.	USACE, 2010r
250	Francis E. Walter Dam	Work on dam: altering spillway, height of dam, outlet tunnel and dikes	White Haven, PA (All 4 sites)	Completed FY2010	USACE, 2010u; USACE, 2011f
251	Beltzville Lake	Equipment replacement and gate rehabilitation for the dam	Beltzville, PA (Humboldt, Seedco, and Martins Creek sites)	FY2010 used funding to work on rehabilitation. FY 2011 Unknown	USACE, 2010s
255	Palram Facility Expansion	$3.6 million facility expansion for new line of production equipment to create 40 new jobs	Lehigh Valley, PA (Humboldt and Martins Creek sites)	Approved and funded	Governor Tom Corbett, 2011c
256	Water Infrastructure Projects	$134 million in improvements to drinking water and wastewater projects in 21 PA counties	Multiple counties within 50-mile radius (All 4 sites)	Ongoing, funded	Governor Tom Corbett, 2011b
257	Northampton County Community Development	Federal funding enabling community development: housing upgrades, sewage projects, stormwater, street improvements, etc.	Northampton County, PA (Humboldt and Martins Creek sites)	Ongoing, funded through September 2011	Northampton County, 2010

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 22 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
258	Lehigh County Community Development	Federal funding for community development: street repairs, sewage projects, housing projects, etc.	Lehigh County, PA (Humboldt, Seedco, and Martins Creek sites)	Ongoing, funded through 2011	Lehigh County Department of Community and Economic Development (LCDCED), 2010
259	Bucks County Community Development	Residential, commercial and land development as well as bridge infrastructure improvements.	Bucks County, PA (Martins Creek site)	Completed	Bucks County Planning Commission, 2010
260	Ambler Boiler House Brownfield Development	$14 million project to develop the Ambler Boiler House into an LEED certified office building	Ambler, Montgomery County, PA (Martins Creek site)	Funded	Montgomery County, 2011b; PhillyBurbs, 2011.
261	Montgomery County Correctional Facility	Improvements to infrastructure in order to reduce water and energy consumption; estimated 380 tonne (metric ton) CO2 emission reduction after implementation, 10 year contract	Eagleville, Montgomery County, PA (Martins Creek site)	10 year funding and partnership with Honeywell	Montgomery County, 2011a; Honeywell, 2011
262	USM National Headquarters construction	Renovation and construction of the former Logan Square Shopping Center into the USM national headquarters	Norristown, Montgomery, PA (Martins Creek site)	Construction began in 2009 and continues as of January 11, 2011	Norristown Patch, 2011
263	Antietam Dam	Dam repairs to the existing structure paid for by the county	Berks County, PA (Humboldt, and Seedco sites)	Ongoing, expected to be completed by end of summer 2011	PDCED, 2011a; Reading Eagle, 2011

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 23 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
264	Delaware River Basin Commission (DRBC) Water Resources Program	Various projects throughout the Delaware River Basin covering water availability and demand, multi-objective flow management, water quality, flood warning and loss reduction, aquatic life and wildlife habitat improvement, etc.	Delaware River Basin through PA and NJ (Martins Creek site)	Most projects ongoing or planned from FY 2010-2015	DRBC, 2010a
265	Trenton Brownfield Cleanups	EPA funding for $1 million awarded for five different cleanup projects in the city of Trenton, NJ. Two of the five are identified as the Clinton Commerce Center and the Pattern Machine and Foundry property	Trenton, NJ (Martins Creek site)	Funded in 2011	City of Trenton, 2011; MercerSpace, 2011
266	Lower Passaic River Restoration Project (LPRRP)	The cleanup of hazardous substances, including dioxin, PCBs, mercury, DDT, pesticides and heavy metals along the Passaic River from the Dundee Dam to Newark Bay (17 Miles)	Passaic River near Newark, NJ (Martins Creek site)	Lower Passaic River has been designated as an Operable Unit of the Diamond Alkali Superfund Site RI/FS. Construction activities begin summer 2011, work through end of 2012 for Phase I	USACE, 2011h; USEPA, 2011c; USEPA, 2011e; LPRRP, 2011
267	Hudson-Raritan Estuary	Identification of water resource problems to develop solution towards ecosystem restoration and an FS within a 25-mile radius of the Statue of Liberty	25-mile radius of Statue of Liberty (Newark Bay, Hackensack River, Passaic River, etc.) (Martins Creek site)	Public consensus-building scheduled through Spring 2011	USACE, 2011g
268	Peckman River Basin	Flood damage reduction and ecosystem restoration project	Essex and Passaic Counties, NJ (Martins Creek site)	FY 2011 funds used for planning, engineering, economic and environmental analyses and technical reviews	USACE, 2011o

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 24 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
269	Rahway River	Ecosystem restoration study - loss of habitat and wetlands due to levee, restoration to the ecosystem is desired	Rahway, NJ (Martins Creek site)	Feasibility study began in Jan 2001, but stopped due to funding; funds will not be available FY2011	USACE, 2011q
270	Rahway River Basin	Flood risk management and ecosystem restoration study	Greater New York Area - Rahway, NJ (Martins Creek site)	Feasibility study began in March 2002, current funding for the formation of alternatives and coordination with locals	USACE, 2011p
271	South River	Flood damage reduction and ecosystem restoration for the South River as a part of the Raritan River Basin in New Jersey	Middlesex County, NJ (Martins Creek site)	FY 2011 - Focus on the engineering design report, cultural resource investigation, and wetlands delineations	USACE, 2011r
272	Dredged Material Management Plan (DMMP) for NY & NJ Harbor	A DMMP was created identifying a wide array of management options needed to meet dredging requirements in the NY & NJ Harbor through the year 2065.	NY & NJ Harbor (25-mile radius of Statue of Liberty) (Martins Creek site)	FY 2011 - Implementation of the DMMP	USACE, 2011s
273	Raritan River and Arthur Kill Cut-Off Channel	Preliminary engineering and design to determine the condition of the Raritan River and Arthur Kill Cut-Off Channel	Raritan River and Arthur Kill Cut-Off Channel (Martins Creek site)	Ongoing: FY 2011 - preliminary engineering and design including environmental coordination	USACE, 2011i
274	Elizabeth River Flood Management	Various flood control projects and stream bank restoration on a 4,000 linear-foot section of the Elizabeth River.	Elizabeth River, Hillside, NJ (Martins Creek site)	Flood control projects have completed construction while stream bank restoration awaits project approval and funding	USACE, 2011j; USACE, 2011t
275	Jackson Brook Flood Management	Flood management plan along the Jackson Brook watershed, a 4.7-square mile area	Townships of Randolph and Mine Hill, Borough of Wharton and the Town of Dover, NJ (Martins Creek site)	FY 2011 - In design phase, construction phase to follow	USACE, 2011u

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 25 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
276	Malapardis Brook Flood Management	Emergency stream bank restoration project due to continual erosion from high stream velocities	Hanover, NJ (Martins Creek site)	Design phase scheduled for completion in FY 2009, construction would follow in FY2010 if funding obtained	USACE, 2009f
277	Mill Brook at Highland Park Flood Management	Installation of a 175-foot long, 10-foot diameter, reinforced concrete culvert and 320-foot long by 10 foot diameter concrete lined open channel to alleviate flooding of Mill Brook	Highland Park, NJ (Martins Creek site)	Requires substantial federal funding	USACE, 2011k
278	Passaic River Flood Management	Various flood damage reduction and restoration projects along the Passaic River	Passaic River Basin, NJ (Martins Creek site)	Ongoing	USACE, 2011m; USACE, 2011n; USACE, 2011v; USACE, 2011l; USACE, 2011c
279	Former Raritan Arsenal	Indoor air monitoring, vapor intrusion, munitions clearance groundwater, soil investigation investigations at the former munitions storage site	Edison, NJ (Martins Creek site)	Ongoing as of June 2010	USACE, 2010x; USACE 2010y
280	Wayne Interim Storage Site	Former DOE storage site contaminated with thorium, radium, uranium and other metals	Wayne township, Passaic, NJ (Martins Creek site)	Draft construction close out report submitted March 29, 2011 for review and comment; continued review of all field findings by EPA, USACE, and NJDEP	USEPA, 2011d; USACE, 2010o

Table 9.3-23— Past, Present, and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Impact Analysis for the BBNPP Alternate Sites
(Page 26 of 26)

Project ID Number (on Figure 9.3-35)	Project Name	Summary Description of Project	Location (Applicable Alternative Sites)	Current Status	Source
281	Middlesex Sampling Plant	9.6-acre Superfund Site previously used as a part of the Atomic Energy Commission; current radiological and chemical contamination from thorium, uranium, and beryllium ores project is to clean up the site and for groundwater remediation	Middlesex, NJ (Martins Creek site)	Ongoing; supplemental RI Report was expected in May 2011 to EPA per Record of Decision and Federal Facility Agreement	USEPA, 2011a; USACE, 2010z

NA = Not applicable

Notes:

a. A specific project location was not identified on Figure 9.3-23 because of the extensive geographic and spatial coverage for project under this category.

b. Because of the extent of small, medium, and large projects under this heading, a specific project location was not identified on Figure 9.3-23.

Table 9.3-24— Census Block Groups within 50 mi (80 km) of the Martins Creek Site with Minority and Low-Income Populations
(Page 1 of 2)

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										
Bergen	23	0	0	0	0	0	0	0	0	0
Burlington	25	2	0	0	0	0	0	2	0	0
Essex	695	331	0	5	0	45	2	377	96	22
Hudson	34	0	0	2	0	3	0	3	20	0
Hunterdon	78	1	0	0	0	0	0	1	0	0
Mercer	237	67	0	4	0	12	0	74	27	2
Middlesex	574	17	0	88	0	38	0	136	60	4
Monmouth	4	0	0	0	0	0	0	0	0	0
Morris	299	2	0	5	0	3	0	7	22	0
Passaic	258	27	0	2	0	50	0	71	75	5
Somerset	159	11	0	0	0	1	0	20	20	0
Sussex	116	0	0	0	0	0	0	0	0	0
Union	453	109	0	2	0	20	2	142	97	2
Warren	82	0	0	0	0	0	0	0	0	0
New York										
Orange	32	0	0	0	0	0	0	0	0	0
Richmond	22	1	1	0	0	0	1	3	1	0
Sullivan	5	0	0	0	0	0	0	0	0	0
Pennsylvania										
Berks	71	0	0	0	0	0	0	0	0	0
Bucks	372	7	0	2	0	0	0	8	2	0
Carbon	48	0	0	0	0	0	0	0	0	0
Chester	17	0	0	0	0	0	0	0	0	0
Lackawanna	23	0	0	0	0	0	0	0	0	0
Lehigh	236	0	0	1	0	14	0	16	30	3
Luzerne	85	0	0	0	0	0	0	0	0	0
Monroe	71	0	0	0	0	0	0	0	0	0
Montgomery	462	35	0	0	0	0	0	33	1	0
Northampton	192	0	0	0	0	7	0	8	9	2

Table 9.3-24— Census Block Groups within 50 mi (80 km) of the Martins Creek Site with Minority and Low-Income Populations

(Page 2 of 2)

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
Philadelphia	126	29	0	1	0	0	0	29	0	0
Pike	28	0	0	0	0	0	0	0	0	1
Schuylkill	31	0	0	0	0	0	0	0	0	0
Wayne	19	0	0	0	0	0	0	0	0	0
GRAND TOTAL	**4877**	**639**	**1**	**112**	**0**	**193**	**5**	**930**	**460**	**41**

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.