9.0 ALTERNATIVES TO THE PROPOSED ACTION

This chapter assesses alternatives to the proposed siting and construction of a new nuclear plant at the existing Nine Mile Point Nuclear Power Plant Unit 3 (NMP3NPP) site.

Chapter 9 describes the alternatives to construction and operation of a new nuclear unit with closed cycle cooling adjacent to the NMP3NPP site 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.

As stated in NUREG-1555, Standard Review Plans for Environmental Reviews of Nuclear Power Plants (U.S. Nuclear Regulatory Commission [NRC], 2007):

> The no-action alternative would result in the facility not being built, and no other facility would be built or other strategy implemented to take its place. This would mean that the electrical capacity to be provided by the project would not become available.

The most significant effect of the No-Action alternative would be the loss of the potential 1,600 megawatts electric (MWe) additional generating capacity that NMP3NPP 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 an approximate 1.2% annual increase in electricity demand in New York over the next 10 years. Under the No-Action alternative, this increased need for power would need to be met by means that involve no new generating capacity.

As discussed in Chapter 8, NMP3NPP would be developed as a merchant facility, which is a facility that sells electricity anywhere within the New York Independent System Operator (NYISO) wholesale market area. Therefore, the relevant market area for the proposed nuclear station is the region served by NYISO, or in geographic terms, the entire state of New York (Figure 8.0-1).

In addition, Chapter 8 indicates that there is a growing need for power largely located in the southeastern region of the state, near the load centers of New York City and Long Island. The need for resources (power generation and transmission improvements) is expected to become acute by 2017 if expected increases in electricity demand are not met with additional resources. NMP3NPP would provide a significant quantity of power production from a non-fossil fuel source. Without NMP3NPP, the market area would not likely recognize the role of fuel diversity in the power system. The market area would likely become increasingly dependent on fossil-fuel generation and other alternatives if the No-Action alternative is implemented.

Additionally, as discussed in Section 8.2.2, the New York State Energy Plan calls for a reduction of greenhouse gases (GHGs) to 5% below 1990 levels by 2010 and 10 percent below those levels by 2020 (New York State Energy Planning Board, 2002). The Regional Greenhouse Gas Initiative (RGGI) is an agreement among 10 northeastern and mid-Atlantic states, including New York, to reduce GHG emissions from power plants. The participating states have committed to cap and then reduce the amount of carbon dioxide (CO2) that certain power plants are allowed to emit, limiting the region's total contribution to atmospheric GHG levels. The participating states have also agreed to implement RGGI through a regional cap-and-trade program using uniform quarterly auctions to sell nearly the entire annual regional emissions budget of approximately 188 million allowances per year.

Under the No-Action alternative, New York would not be able to satisfy its climate change policy objectives that include the reduction of GHG emissions while at the same time maintaining a strong economy, reducing dependence on foreign energy sources, and providing reliable electricity supply and infrastructure. Also, national goals to advance the use of nuclear energy, as established in the Energy Policy Act (EPACT) of 2005, would not be supported.

In addition to the benefits described in Section 10.4, additional benefits of the construction and operation of the NMP3NPP include economic and tax impacts to the surrounding region that are described in Sections 4.4.2, 4.4.3, 5.8.2.3, and 5.8.2.4. Under the No-Action alternative, none of the benefits of the proposed action as described in this Environmental Report 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, but not be limited to, land use, terrestrial and aquatic ecology, socioeconomic, and water-related impacts, as summarized in Table 4.6-1. Based on existing site conditions at NMP Unit 1 and Unit 2, as well as the measures and controls proposed, the potential adverse impacts identified from the construction of NMP3NPP are anticipated to be SMALL, if any, for all categories evaluated except traffic and equatic ecology which are expected to be MODERATE, but manageable with mitigation. Surface water and wetland impacts are expected to be LARGE. However, after implementation of mitigation measures, construction surface water and wetland impacts are anticipated to be MODERATE. The benefits of implementing the No-Action alternative would include avoiding the construction and operation impacts, as described in the sections referenced above. The benefit of implementing the No-Action alternative would include avoiding adverse construction and operation impacts as summarized in Tables 4.6-1 and 5.10-1.

Under the No-Action alternative, none of the benefits of the proposed project, including economic and tax benefits to the surrounding vicinity and region, as described in Sections 4.4.2, 4.4.3, 5.8.2.1, and 5.8.2.2, and those benefits summarized in Section 10.4, would be realized.

As discussed in Chapter 8 and Section 9.2.1, New York is forecasted to purchase more power than it will sell over the period of 2008 through 2018, so the ability to import additional power is limited, particularly during periods of grid congestion. 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

NRC, 2007. Standard Review Plans for Environmental Reviews for Nuclear Power Plants (NUREG-1555), Draft Revision 1, U.S. Nuclear Regulatory Commission, July 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 NMP3NPP site. These alternatives include: purchasing electric power from other sources to replace power that would have been generated by a new unit at the NMP3NPP site, a combination of new generating capacity and conservation measures, and other generation alternatives that were deemed not to be viable replacements for a new unit at the NMP3NPP site.

Alternatives that do not require new power generating capacity were considered, including energy conservation and 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 and discussion 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 THAT DO NOT REQUIRE 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 NMP3NPP market area is not feasible due to the insufficient capacity of purchasing power from other utilities or power generators or inability to transport available power to key load centers in the ROI during periods of grid congestion. Even maximizing power imports from outside the region would not supply the equivalent baseload power provided by NMP3NPP (approximately 1,600 MWe). 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. 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 Sections 8.1, 8.2, and 8.3, respectively, and include discussions regarding peak load, reserve margins, and intertie information.

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 power generating facilities 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 dwellings and small businesses that 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 for 2006 and up to $250 million for 2010. This new legislation was enacted in the hope that homeowner and small business owners would become more aware of energy-efficient technologies, lessening energy usage in the future. (Energy Information Administration [EIA], 2006b)

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 U.S. Department of Energy (DOE)/Energy Information Administration (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).

The following DSM programs can be used to directly reduce summer or winter peak loads when needed:

- Large load curtailment - This program provides a source of load that may be curtailed at the Company's request in order to meet system load requirements. Customers who participate in this program receive a credit on their bill.

- Voltage control - This procedure involves reducing distribution voltage by up to 5% during periods of capacity constraints. This level of reduction does not adversely affect customer equipment or operations.

Although DSM has shown great potential in reducing peak-load usage, it does not satisfy the baseload need as does NMP3NPP. Additional information regarding energy efficiency and substitutions is provided in Section 8.2.2.2, and the assessment of need for power is discussed in more detail in Section 8.4.

Conservation Programs

As noted in Section 8.2.2, the NYISO also considers energy efficiency and substitution measures, such as DSM, as methods to reduce customer demand for power (that is, a way of gaining extra kilowatt hours [kWh]), which in turn can somewhat alleviate the demand on supply-side and transmission resources. Environmental concerns about emissions and the high cost of fuel prices have led to the creation of a variety of state, regional, and national initiatives that promote energy efficiency.

The NYISO operates three demand response programs: (1) the Emergency Demand Response Program (EDRP); (2) the Installed Capacity Special Case Resources (ICAP-SCR) program; and (3) the Day-Ahead Demand Response Program (DADRP). The two reliability demand response programs, EDRP and ICAP-SCR, are controlled by NYISO and are intended to provide system operators with additional resources that can be deployed in the event of energy shortages to maintain the reliability of the system. The economic demand response program, DADRP, is controlled by customers and allows energy users to bid their load reductions, or "negawatts", into the day-ahead energy market just as generators do. Offers that are determined to be economic are paid the market clearing price. DADRP allows flexible loads to effectively increase the amount of supply in the market and thereby moderate prices. (NYISO, 2005) Additional information regarding existing power supply is presented in Section 8.1.

Energy-efficiency and DSM programs result in estimated load drops that reduce the demand for energy. There has been a substantial increase in DSM programs in recent years. While beneficial, these programs do not meaningfully affect the supply or demand side of the market and cannot be reasonably expected to substitute for necessary power upgrade projects. DSM measures are generally considered the cheapest possible compliance option and are often projected to provide a positive cash flow to the customer or utility implementing those measures. These measures can include such measures as rebates or other incentives for residential customers to update inefficient appliances with Energy Star® replacements. Customers could also receive credits on their bills for allowing a utility to control, or intermittently turn off, their central air conditioning or heat pumps when wholesale electricity prices are high.

Load forecasts for the New York Control Area (NYCA) are presented in the NYISO 2008 Load and Capacity Data "Gold Book." The NYCA baseline peak demand forecast shows a compound growth rate of 0.94% for the 10-year period of 2008 through 2018, a modest decrease from 1.18% for the period of 2007 through 2017. For the period of 2008 through 2018, the net energy forecast shows a compound growth rate of 1.18%, a decrease from 1.34% for the period of 2007 through 2017. The 2008 forecast for Zone K (Long Island) is virtually unchanged; the forecast for Zone J (New York City) is lower primarily due to new planned conservation activities. The changes in the remaining zones reflect new economic forecasts and updates of actual and weather-normalized energy usage trends. (NYISO, 2008) Table 8.2-1 shows the long-term forecasts for the NYCA.

As a practical matter, it would be impossible to increase the energy savings through these conservation programs by an additional 1,600 MWe to replace the NMP3NPP generating capability. For these reasons, energy conservation does not represent a reasonable alternative to NMP3NPP.

9.2.1.2 Reactivating or Extending Service Life of Existing Facilities

As stated in Chapter 8, electric generating facility retirements is one of three main factors driving the state's reliability need for power in the period from 2012 through 2017. As shown in Table 8.3-8, a total of 537 MW of electric generating capability (summer) in New York was retired between April 1, 2007, and February 15, 2008, with an additional 1,396 MW of electric generating capability (summer) scheduled or planned for retirement in 2008 through 2013. Retired fossil fuel plants and fossil fuel plants slated for retirement tend to be those old enough to have difficulty in economically meeting today's restrictions on air contaminant emissions. Most of the retirements in 2007 and 2008 were due to environmental restrictions.

In the face of increasingly stringent environmental restrictions, delaying retirement or reactivating plants in order to forestall closure of a large baseload generating facility would require extensive construction to upgrade or replace plant components.

CEG has three nuclear power plants in the State of New York. Two units are located on the southeastern shore of Lake Ontario in the Town of Scriba, New York, at the NMPNS site. The operating license for NMP Unit 1 has been extended to August 22, 2029, and the operating license for NMP Unit 2 has been extended to October 31, 2046. The other plant is the R.E. Ginna Nuclear Power Plant (Ginna) located in the Town of Ontario in the northwest corner of Wayne County, New York, on the south shore of Lake Ontario. The operating license for Ginna has been extended to September 18, 2029. CEG does not own any other plants in New York; therefore, there are no plants that can be reactivated.

Additional generating capability of 345 MW is anticipated through planned upgrades of existing facilities in New York in 2008 through 2012, including the NMP Unit 2, as shown in Table 8.3-7. However, upgrading existing plants does not alleviate the growing regional need for additional baseload generation capacity. A new baseload facility would allow for the generation of needed power and would meet future power needs within the ROI. Therefore, extending the service life of existing fossil fuel plants or reactivating old plants is not a feasible alternative to NMP3NPP.

9.2.1.3 Purchasing Power from Other Utilities or Power Generators

As shown in Table 8.3-1, the forecasted New York Control Area (NYCA) resource capability is expected to remain at similar levels from 2009 to 2018. (NYISO, 2008) Based on the information in the table and considering such data as the NYCA Resource Capability, Peak Demand Forecasts, and Expected Reserve, the NYCA is not forecasted to have large amounts of excess generating capacity available. This is further supported by the fact that purchases and sales in the NYCA are forecasted to increase, as shown in Table 8.3-1. The table shows that from 2008 to 2018, the NYCA is forecasted to purchase more power than it will sell. In fact, Table 8.3-1 demonstrates that resource additions are necessary to maintain generally consistent levels of reserve margins and expected reserves. Due to the lack of excess capacity in the NYCA, purchasing power from other power generators in the NYCA is not a feasible alternative.

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 listed below.

- Wind
- Geothermal
- Hydropower
- Solar Power
    - Concentrating Solar Power Systems
    - PV Cells
- Wood Waste
- MSW
- Energy Crops
- Petroleum Liquids (Oil)
- Fuel Cells
- Coal
- Natural Gas

- IGCC

Based on the installed capacity of 1,600 MWe that NMP3NPP will 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 energy, natural gas, and wind energy. As renewable resources, solar and wind energies, alone or in combination with one another, have gained increasing popularity over the years in part due to increasing concerns for greenhouse gas emissions. Air emissions from solar and wind power generating facilities are much smaller than fossil fuel air emissions. Coal and natural gas are still the two most widely used fuels for producing electricity.

The current mix of power generation options in New York is one indicator of the feasible choices for electric power generation technology within the state. This section identifies alternatives that UniStar has determined are not reasonable and the basis for this determination. This Combined License Application (COLA) is premised on the installation of a facility that would serve as a baseload resource and that any feasible alternative would also need to be able to generate equivalent baseload power. In performing this evaluation, UniStar relied heavily upon 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 (American Wind Energy Association [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.

For any large, baseload wind power generating facility, the land use could be significant. 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 acres (ac) (0.10 hectares [ha]) of dedicated land for the actual 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 (Alliant Energy [AE], 2008).

The land area throughout the NMP3NPP site is characterized as a Class 3 site with a Class 4 site immediately to the north; therefore, the NMP3NPP site does have sufficient wind power density and speed to accommodate a wind farm on or near the site (NREL, 2008). A wind facility could also be located in other areas within the ROI where sufficient wind resources are available. However, wind power by itself is not suitable for large baseload capacity.

Although wind technology is considered mature, technological advances may make wind a more economic choice for developers than other renewable sources (California Energy Commission [CEC], 2003). Technological improvements in wind turbines have helped reduce capital and operating costs. In 2000, wind power was able to be 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 (Environmental Law and Policy Center [ELPC], 2001).

The following information can provide some unique insights into the viability of the wind resource:

- Any 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.

- Another consideration on the integration of wind capacity into the electric utility system is the variability 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 that 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 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 NMP3NPP; however, wind can be used in combination with other resources. This is discussed further in Section 9.2.3.3.

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

- Large-scale commercial wind farms can be an aesthetic problem, obstructing viewsheds and initiating conflict with local residents.
- High-speed wind turbine blades can be noisy, although technological advancements continue to lessen this problem.
- Wind power generating facilities sited in areas of high bird use can expect to have fatality rates higher than those expected if the facility were not there.

The Center for Biological Diversity (CBD) supports wind energy as an alternative energy source and as a way to reduce environmental degradation. However, wind power generating facilities, such as the Altamont Pass Wind Resource Area (APWRA) in California, are causing mortality rates in raptor populations to increase, as a result of turbine collisions and electrocution on power lines. The APWRA kills an estimated 880 to 1,300 birds of prey each year (CBD, 2004).

Many renewable resources like wind are intermittent. Storing energy from renewable resources allow 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 projected land use impacts of development of 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 NMP3NPP and, therefore, is not carried forward for further analysis.

Wind resource studies along the east and west coasts of the United States indicate large areas of strong winds (greater than 7.5 meters per second). Additional resources are available in the Great Lakes regions, but these have yet to be fully characterized. Because of the legal, technical and regulatory uncertainties, Off-shore wind farms are not considered to be a feasible alternative to a nuclear power generating facility at the NMP3NPP site; therefore, they are not carried forward for further analysis (Energy Efficiency and Renewable Energy (EERE), 2005).

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, geothermal resources do not exist in New York (NRC, 1996).

Based on the hottest known geothermal regions of the United States, New York is not a candidate for geothermal energy and could not produce the proposed 1,600 MWe of baseload energy (Geothermal Education Office [GEO], 2000). New York has low to moderate geothermal resources that can be utilized for direct heat or for geothermal heat pumps. It is not possible to generate electricity from these resources. (EERE, 2008a). Therefore, a geothermal energy source is not available in the ROI, and a geothermal power generating facility is not a feasible alternative to a nuclear power generating facility at the NMP3NPP site. 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, a hydropower generating facility 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. Further, operation of a hydropower generating facility would alter aquatic habitats above and below the dam, which would impact existing aquatic species.

The Federal Energy Regulatory Commission (FERC) is required to take environmental issues into consideration when renewing or granting licenses for hydropower. Many environmentalists oppose hydropower dams due to the constraint it puts on migrating fish species in the area. Also, new dams receive opposition from local communities who may be displaced by flooding the new reservoir or whose use of the current river system for recreational activities may be affected.

New York has a total of 352 hydropower sites on rivers with the potential for 2,119 MW of electricity. There are 212 sites that have been developed but are without power and have a potential for 754 MWe. There are 96 sites that are undeveloped with a potential for 1,079 MWe and 44 of the sites have been developed with power with the potential for 286 MWe. In order to produce the 1,600 MWe of baseload capacity that will be supplied by NMP3NPP, numerous hydropower plants would need to be developed and in operation. (Idaho National Engineering and Environmental Laboratory [INEEL], 1998) Therefore, a hydropower generating facility is not a feasible alternative to a nuclear power generating facility at the NMP3NPP site and 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 NMP3NPP site. Such facilities would also have higher costs than a new nuclear facility.

Construction of solar power generating facilities has substantial impacts on 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 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 and 22,400 ac (9,100 ha) for solar thermal systems to produce a 1,600-MWe baseload capacity. The large land area required does not fit with the objectives of NMP3NPP.

In order to discuss the availability of solar resources in New York, two collector types must be 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 New York, approximately 3,000 to 3,500 watt hours per square meter per day (W[hr]/m^2/day) can be collected using concentrating collectors. 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 New York, approximately 4,000 to 4,500 W(hr)/m^2/day can be collected using flat-plate collectors (EERE, 2008a).

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, Public Interest Energy Research Program [PIER], and Electric Power Research Institute [EPRI], 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. (Real, et al., 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). Current concentrating solar collection technologies cost $0.09 to $0.12/kWh. In contrast, nuclear plants are anticipated to produce power in the range of $0.031 to $0.046/kWh (DOE, 2002). While concentrating solar power technologies currently offer the lowest-cost solar electricity for large-scale electricity generation, these technologies are still in the demonstration phase of development and cannot be considered competitive with fossil- or nuclear-based technologies (CEC, 2003).

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 NMP3NPP 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 determining the cost of solar power generating facilities, 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 of modules (dollars per peak watt) increased from $3.42 in 2001 to $3.74 in 2002. The average price of PV cells decreased from $2.46 in 2001 to $2.12 in 2002 (EIA, 2003). Costs of PV cells in the future may be expected to decrease with improvements in technology and increased production. Optimistic estimates are that costs of grid-connected PV systems could drop to $2,275/kWe and to $0.15 to $0.20/kWh by 2020 (ELPC, 2001). The module price, however, does not include the design costs, land, support structure, batteries, an inverter, wiring, and lights/appliances. These costs would still be substantially in excess of the costs of power from a nuclear power generating facility. Therefore, a PV solar power generating facility is non-competitive with a nuclear power generating facility at the NMP3NPP site.

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 and are not competitive with nuclear-based technologies. PV cell technologies are increasing in popularity as costs slowly decrease; however, a supplemental energy source would be needed to meet the NMP3NPP baseload capacity, and the large estimate of land required would make this alternative infeasible.

Therefore, based on the lack of information regarding large-scale systems able to produce the proposed 1,600-MWe baseload capacity and the large land area footprint needed for construction, “flat plate” PV cell and concentrating solar power generating facilities are non-competitive with a nuclear power generating facility at the NMP3NPP site. As this alternative technology is non-competitive in the ROI and not carried forward for further analysis.

9.2.2.5 Wood Waste and Other Biomass

The use of wood waste to generate electricity is largely limited to those states with significant wood resources, such as California, Maine, Georgia, Minnesota, Oregon, Washington, and Michigan. Approximately 1,000 wood-fired power generating facilities operate in the United States; however, only one-third of these sell electricity. Major industrial firms (such as the pulp and paper industry) own and operate the remaining two-thirds. The largest wood waste power generating facilities are 40 to 50 MWe in size. (EIA, 1995) This would not meet the proposed 1,600-MWe baseload capacity.

As stated in the GEIS, in the United States, nearly all of the wood waste power-generating facilities use steam turbine conversion technology. The technology is easy to operate and can accept various biomass fuels. However, the technology is limited to applications where there is an available supply of low, zero, or negative cost-delivered feedstocks. At the scale appropriate for biomass, the technology is costly and inefficient (NRC, 1996).

The GEIS states that construction of a wood waste power generating facility would have an environmental impact similar to that of a coal power generating facility, although facilities using wood waste for fuel would be built on smaller scales. Like coal power generating facilities, wood-waste power generating facilities require large areas for fuel storage, processing, and waste (ash) disposal. Additionally, operation of wood waste power generating facilities has environmental impacts on the aquatic environment and air (NRC, 1996).

Biomass fuel can be used to co-fire with a coal power generating facility, decreasing cost from $0.023 to $0.021/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 generating facilities, generation costs are approximately $0.09/kWh (EERE, 2008b).

Because of the lack of resources and size of current wood waste power generating facilities, wood waste and biomass power generating facilities are non-competitive with a nuclear power generating facility at the NMP3NPP site, and thus 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.

According to the GEIS, the initial capital costs for MSW power generating facilities are greater than those of comparable steam turbine technology at wood waste power generating facilities. This is due to the need for specialized waste separation and handling equipment (NRC, 1996).

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 future; however, it is unlikely that many landfills will begin converting waste to energy due to 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 power generating facilities.

GEIS estimates suggest that the overall level of construction impacts from an MSW power generating facility should be approximately the same as that for a coal power generating facility. Additionally, MSW power generating facilities have the same or greater operational impacts, including impacts on the aquatic environment, air, and waste disposal (NRC, 1996).

Incineration can be implemented as an MSW- reduction method, generating energy and reducing the amount of waste by up to 90% in volume and 75% in weight (U.S. Environmental Protection Agency [USEPA], 2008).

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 (USEPA, 2007). However, economic factors have limited new construction. This comes to approximately 28 MWe per MSW-fired power generation plant, which would not meet the proposed 1,600 MWe baseload capacity. Burning MSW produces nitrogen oxides (NO_x) and sulfur dioxide (SO_2) 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, 2007).

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 $0.119per kWh in the case with low MSW disposal fees, and from $0.037 to $0.055/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/kWh) (DOE, 2002). Therefore, MSW is non-competitive with a new nuclear unit at the NMP3NPP site because the energy source cannot provide the baseload electricity needs compared to a new nuclear unit. As a result, 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 2007, New York corn production was forecasted at 66.4 million bushels (2,340 million liters) with acreage for harvest to total 540,000 ac (218,531 ha). (USDA, 2007) Currently in New York, corn is used for grain products and silage. The availability of corn grown for ethanol as an energy crop is dependent upon weather and feed demands. Surrounding states 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 NMP3NPP 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, 2006b). From January 2007 to January 2008, petroleum costs more than doubled, increasing by approximately 104%. (EIA, 2008a) As a result of the increase in the cost of petroleum, New York has experienced a decrease in production of electricity by power generating facilities fueled by oil. From January 2007 to January 2008, net generation from petroleum liquids decreased by 60.5% (EIA, 2008b). 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 (Parliamentary Office of Science and Technology [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 NMP3NPP 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 NMP3NPP 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 NMP3NPP 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 April 2008, only 1,372 MWh of the net electricity generation in New York (0.9% in the U.S.) came from coal-fired generation because the state does not produce coal. (EIA, 2008d) 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, such as the Clean Air Act and Amendments (CAAA). Although newer technology has improved emissions quality from coal-fired facilities, health concerns remain. Air quality would be degraded by the release of regulated pollutants such as nitrogen and sulfur oxides ,and radionuclides. Coal plants also emit as significant amount of carbon dioxide. 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, this option is a competitive alternative within the ROI and is therefore discussed further in Section 9.2.3. However, there may not be sufficient area available at the NMP3NPP to construct of this type of plant (NRC, 2006).

9.2.2.11 Natural Gas

Approximately 110 ac (45 ha) would be required for a new facility at the NMP3NPP site, and up to approximately 25 mi (40.2 km) of pipeline would need to be built to connect to an existing pipeline corridor (NRC, 2006). As of 2006, there were 5,985 natural gas producing wells in New York State and the state marketed about 55,980 cubic feet of natural gas (a 0.3% share of the U.S supply). As of April 2008, about 3,042 MWh of the net electricity generation in New York (5.0% of the U.S.) came from natural gas-fired generation (EIA, 2008d).

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, 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 co-locating 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 and to construct than other plants (NRC, 1996).

Based on the well-known technology, fuel availability, and generally understood environmental impacts associated with constructing and operating a natural gas power generating facility, this option is 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, IGCC reliability is still slightly lower than conventional pulverized coal power generating facilities. Problems occur with the integration between gasification and power production. If there is a problem with gas cleaning, unclean gas can cause damage to the gas turbine (Center for Coal Technology Research [CCTR], 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/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 NMP3NPP 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 NMP3NPP and is not carried forward for further analysis.

9.2.3 ASSESSMENT OF REASONABLE ALTERNATIVE ENERGY SOURCES AND SYSTEMS

For the viable alterative 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 Code of Federal Regulations (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-Fired Generation

The environmental impacts from coal-fired generation alternatives were evaluated in the GEIS (NRC, 1996) and the GEIS for License Renewal for Nuclear Plants for NMP Unit 1 and Unit 2 (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 mi2 (4.25 km^2) would be needed at the NMP3NPP for a new 1,600-MWe coal-fired facility, including power block, coal storage, and waste management (NRC, 1996)), 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.

As identified in Table 9.2-1, overall impacts for this alternative on a greenfield site within the ROI range from SMALL to LARGE. Because of the use of an unknown greenfield within the ROI as the potential site for the coal-fired power plant, impacts were not differentiated between plant construction and operation phases.

SMALL impacts would be anticipated for the impact categories of surface water use and quality, human health, historic and archaeological resources, and accidents (NRC, 2006). SMALL to MODERATE impacts were designated for ecology and groundwater use and quality. MODERATE impacts were estimated in the areas of air quality and waste. MODERATE to LARGE impacts were anticipated for land use. Impacts on socioeconomics, aesthetics, and environmental justice would be SMALL to LARGE (NRC, 2006).

Adverse off-site impacts to surface water quality (acidic runoff), aesthetics, ecology, threatened and endangered resources, and historic and cultural resources from coal mining and acid rain and global warming from combustion emissions were not included in the impact comparisons.

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 (SO_2, as SO_x surrogate), oxides of nitrogen (NO_x), 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 regulated pollutants and radionuclides. In addition, CO_2 emissions have 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 also be produced and would require constant management. Losses of aquatic biota due to cooling water withdrawals and discharges would also occur.

As mentioned in Section 9.1, New York State through the New York State Department of Environmental Conservation (NYSDEC), and the Energy Research and Development Authority have adopted the RGGI CO_2 Budget Trading Program within the state through a new rule (6 NYCRR Part 242) and the revision of a current rule (6 NYCRR Part 200, General Provisions) (NYSDEC, 2008).

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 so 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). The NRC notes that human health effects from coal combustion are also greater based on the health effects from air emissions (NRC, 2006). 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, an estimated 621,000 metric tons/year of coal/fly ash and scrubber sludge, would be produced and would require constant management (NRC, 2006).

Approximately 560 ac (226 ha) would be required over a 40-year period of a coal-fired facility at the ROI greenfield site for waste disposal. (NRC, 2006) 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 committed to supporting 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 NMP3NPP 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 a coal power generating facility could affect as much as 1,700 ac (688 ha) of land and associated terrestrial habitat for a 1,000-MWe facility, and additional land would be needed for waste disposal. The impacts of a 1600 MWe facility would be proportionally larger. As a result, land use impacts on a greenfield within the ROI would be MODERATE to LARGE.

Impacts on water quality and use would be dependent upon the volume of water withdrawn and discharged and the characteristics of the surface water bodies and aquifers at the greenfield site. Surface water impacts are estimated to be SMALL, and groundwater impacts are estimated to be SMALL to MODERATE. (NRC, 2006) Coal pile runoff that could affect surface water quality, water resources and quality, and surface water near mine sites was not considered in operation-related impacts.

New power generating facility structures and tall stacks potentially visible for 40 miles (mi) (64 kilometers [km]) in a relatively non-industrialized area would need to be constructed, along with a possible cooling tower and its associated plumes. Impacts may be lessened by the choice of a greenfield site near an industrialized area. As a result, aesthetic impacts could be SMALL to LARGE.

Impacts on ecological resources, including threatened and endangered resources, would be SMALL to MODERATE, depending upon the location and the amount of disturbance from previous activities. Transmission and rail line paths and disturbances would be part of the impacts on these categories (NRC, 2006).

Cultural resources impacts would be SMALL as the alternative site would require a cultural resource evaluation and impacts to these resources could be addressed and mitigated (NRC, 2006).

Construction and operation employment impacts would be dependent upon location, but could be LARGE if the plant was located in an area more rural than the area around the NMP3NPP site. Oswego County could experience a loss of tax base and employment. Transportation impacts would be SMALL to LARGE. Overall impacts would be SMALL to LARGE. (NRC, 2006) Several hundred mining, construction, and operation jobs, as well as additional tax revenues, would be associated with the coal mining (NRC, 1996).

As a result of increased safety technologies, accident impacts would be SMALL.

As a result of increased air emissions and public health risks, human health impacts would be MODERATE (NRC, 1996).

The impacts on environmental justice would depend upon the alternative site location and the nearby population distribution and makeup. Therefore, impacts would be SMALL to LARGE.

9.2.3.1.5 Summary

In order for a coal power generating facility to be competitive with a nuclear power generating facility, the coal power generating facility would need to generate power in excess of 1,600 MWe. The nuclear power generating facility requires a dry-land footprint of 494 ac (200 ha). whereas the coal facility would require a dry-land footprint of 1,700 ac (688 ha). Therefore, a 1,600-MWe coal power generating facility would not be consistent with the land use objectives of NMP3NPP, but could potentially be located within the ROI at a greenfield location.

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) and the GEIS for License Renewal for Nuclear Plants for NMP Unit 1 and Unit 2 (NRC, 2006).

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

Overall impacts from operations would be SMALL to MODERATE. Impacts would be SMALL for water use and quality, ecology, waste management, socioeconomics, historic and cultural resources, environmental justice, aesthetics, and accidents. MODERATE impacts are anticipated for air quality and human health. Adverse off-site environmental impacts from natural gas well fields 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 NO_x emissions.

Human health effects are SMALL based on decreased air quality impacts. 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). Similar to coal-fired plants, gas plants could potentially co-fire gasified 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, 1996). 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. 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 NMP3NPP 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. 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 1,000-MWe natural gas power generating facility could affect as much as 110 ac (45 ha) of land. 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. There are potential impacts to aquatic biota through impingement and entrainment and increased water temperatures in receiving water bodies. Water consumption is likely to be less for gas turbine power generating facilities. (NRC, 1996) As a result, water quality impacts would be SMALL.

A new turbine building and exhaust stacks would need to be constructed. A closed-cycle cooling alternative could also introduce plumes. As a result, aesthetic impacts during construction and operation would be SMALL, as these structures would be added to an already-impacted viewscape.

Ecological resources impacts during construction would be SMALL to LARGE as a result of impacts on wetlands within the proposed project footprint. Impacts on the terrestrial ecosystem at the NMP3NPP site are anticipated to result in permanent loss of affected wetlands and wetland buffer habitats during construction of the site that will require substantial mitigation to reduce the impacts to a small level prior to issuance of permits by NYSDEC and U.S. Army Corps of Engineers. Considering the wetland mitigation measures that will be implemented, impacts from construction activities on terrestrial and aquatic ecology will be SMALL. Operation-related impacts on terrestrial and aquatic ecology would be SMALL.

As stated in Section 4.3.1.2, one state-listed threatened species, the Pied-billed Grebe, is known to be present in the area. No threatened or endangered plant species have been identified in the area. Therefore, threatened and endangered species impacts from construction and operation of the NMP3NPP would be SMALL.

Cultural resources impacts would be SMALL. There are no known archaeological sites within the NMP3NPP site area; however, the New York SHPO considers the NMP3NPP site area "sensitive for cultural resources because of its environmental setting."

Socioeconomic impacts during construction would result in about 1,200 additional jobs over a 2-year period and then decrease to approximately 50 people needed to operate a natural gas power generating facility (NRC, 2006). As a result, socioeconomic impacts during construction and operation would be MODERATE.

Due to increased safety technologies, accidents would be SMALL.

As a result of increased air emissions and public health risks, human health impacts would be MODERATE.

Construction and operation activities would offer new employment possibilities, but could have negative impacts on the availability and cost of housing, which could disproportionately affect minority and low-income populations. Overall, negative environmental justice impacts would be SMALL.

9.2.3.2.5 Summary

A power generating facility fueled by natural gas would require less land area than a facility fueled by coal, but more land area than a nuclear power generating facility. The natural gas power generation alternative alone would require 110 ac (45 ha) of land for a 1,000-MWe generating capacity. An additional 3,600 ac (1,500 ha) of land would be required for wells, collection stations, and pipelines to bring the natural gas to the power generating facility.Fuel costs at a gas fired facility are considerably higher than for nuclear generated electricity. The estimated cost for construction and operation of a gas-fired facility is higher than that of a nuclear facility. Therefore, constructing a natural gas power generating facility would not be viable.

9.2.3.3 Combination of Alternatives

NMP3NPP 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 NMP3NPP, as discussed in Sections 9.2.2.1 and 9.2.2.4. As noted in Sections 9.2.3.1 and 9.2.3.2, fossil fuel-fired technology generates baseload capacity, but the associated environmental impacts are greater than those for a nuclear facility, especially if this type of generation plant must be located somewhere other than the NMP3NPP site.

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 satisfy the baseload capacity requirements of the NMP3NPP 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 NMP3NPP facility. In combination with fossil fuel-fired power generation; however, wind and solar may be a reasonable alternative to nuclear energy produced by the NMP3NPP 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 NMP3NPP. 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.

NMP3NPP 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 NMP3NPP. 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 NMP3NPP.

When examining a combination of alternatives that would meet business objectives similar to that for NMP3NPP, any combination that includes a renewable power source (either all or part of the capacity of NMP3NPP) must be combined with a fossil-fueled facility equivalent to the generating capacity of NMP3NPP. 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 NMP3NPP 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 NMP3NPP. Based on the comparative impacts of these two technologies, as shown in Table 9.2-1, 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 NMP3NPP, a natural gas power baseload generating facility equivalent to the NMP3NPP 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 NMP3NPP when such resources were available.

This combination of renewable energy and natural gas fired generation represents a 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 NMP3NPP site. Similarly, wind and solar facilities in combination with fossil-fuel facilities would have costs higher than a new nuclear facility at the NMP3NPP site. Therefore, wind and solar facilities in combination with fossil fuel facilities are non-competitive with a new nuclear unit at the NMP3NPP site.

9.2.3.3.2 Environmental Impacts

The environmental impacts associated with a natural gas power generating facility sized to produce power equivalent to NMP3NPPare discussed in Section 9.2.3.2 and subsequent sections. Depending on the level of potential renewable output included in the combination alternative, the level of impact of the natural gas portion will be comparably lower during the periods that the renewable resource is available. If the renewable portion of the combination alternative were not enough to displace 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. Alternatively, 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 eliminated, thereby eliminating its operational impacts. Determination of the types of environmental impacts of these types of “hybrid” power generating facilities or combination of facilities can be surmised from analysis of past projects.

For instance, in 1984, Luz International, Ltd. built the Solar Electric Generating System (SEGS) plant in the California Mojave Desert. The new technology consists of modular parabolic-trough solar collector systems. SEGS I was installed at a total cost of $62 million (approximately $4,500/kW) and generates power at $0.24/kWh (in 1988 real levelized dollars). The improvements dedicated to the new SEGS III-VI plants (approximately $3,400/kW) reduced generation costs to approximately $0.12/kWh, and the third-generation technology decreased power costs even further from $0.08 to $0.10/kWh. Because solar energy is not a concentrated source, the dedicated land requirement for the Luz plants (2 ha/MWe [5 ac/MWe]) was too large for a baseload generator at NMP3NPP (NREL, 1993).

The environmental impacts associated with solar and wind power generating facilities equivalent to NMP3NPP are discussed in Sections 9.2.2.1 and 9.2.2.4. It is reasonable to expect that the impacts associated with an individual unit of a smaller size would be similarly scaled. If the renewable portion of the combination alternative is unable to generate an equal amount of power as NMP3NPP, then the combination alternative would have to rely on the natural gas portion to meet the equivalent capacity of NMP3NPP. Consequently, if the renewable portion of the combination alternative has a potential output that is equal to that of NMP3NPP, then the impacts associated with the natural gas portion of the combination alternative would be lower, but the impacts associated with the renewable portion would be greater. 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 NMP3NPP. The natural gas power generating facility alone has impacts that are larger than NMP3NPP; some environmental impacts of renewable sources are also greater than or equal to NMP3NPP. The combination of a natural gas power generating facility and wind and/or solar power generating facilities would have environmental impacts that are equal to or greater than those of a nuclear power generating facility.

Potential environmental impacts from a nuclear power generating facility at the NMP3NPP site would be SMALL, with the exception of surface water use, aquatic ecology, and socioeconomic. Surface water use, aquatic ecology, and socioeconomic impacts would be MODERATE. Potential impacts from a natural gas power generating facility would be SMALL, with the following exceptions. Air quality and human health impacts would be MODERATE, ecological impacts would be SMALL to LARGE based on the amount of wetland and stream impacts, and socioeconomics impacts would be SMALL to MODERATE. Potential air quality impacts from the use of wind and/or solar power generating facilities in combination with a natural gas power generating facility would be SMALL, and therefore, would be equivalent to the air quality impacts from a nuclear power generating facility.

All of the potential environmental impacts from wind and/or solar power generating facilities would be SMALL, except for land use, ecology, and aesthetic impacts, depending upon the locations chosen for the facilities. These impacts could be MODERATE to LARGE. The use of a natural gas power generating facility in combination with wind and/or solar power generating facilities would reduce the land usage and aesthetic impacts from the wind and solar facilities. However, at best, those impacts would be SMALL, and therefore would be equivalent to the land use and aesthetic impacts from a nuclear power generating facility.

Therefore, the combination of wind and/or solar power generating facilities with a natural gas power generating facility is not competitive to a nuclear power generating facility at the NMP3NPP site.

9.2.3.3.3 Economic Comparison

As noted earlier, the combination alternative must generate power equivalent to the capacity of NMP3NPP. The DOE has estimated the cost of generating electricity from a gas-fired facility ($0.047 per kWh), a biomass facility ($0.09 per KWh), a coal facility ($0.049 per kWh), a wind facility ($0.057 per kWh), and a solar facility ($0.04 to $0.05 per kWh). The cost for a 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.

As a result, the capital costs and fixed operating costs of the 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 power generating station similar to NMP3NPP 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 NMP3NPP. 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.

9.2.3.3.4 Summary

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 NMP3NPP. However, this combination would have equivalent or greater environmental impacts than a nuclear power generating facility at the NMP3NPP site. Additionally, this combination would have higher costs and larger land requirements than a nuclear power generating facility at the NMP3NPP site. Therefore, wind and/or solar facilities in combination with a natural gas power generating facility is not competitive to a nuclear power generating facility at the NMP3NPP site.

9.2.4 CONCLUSION

UniStar has determined that initiating conservation programs, reactivating or extending the service life of existing facilities, or purchasing power from other utilities or power generators do not meet the objectives of NMP3NPP. Furthermore, MSW, solar power, wind power, and energy crops, could not feasibly supply the baseload power required for NMP3NPP. Also, wood waste and geothermal facilities do not provide enough resources to adequately provide the required electrical power and an IGCC unit requires much more research to provide a reliable energy source, therefore, they are also not preferable. UniStar has also 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 a nuclear power generating facility. Furthermore, each of these types of alternatives 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, however, a MODERATE to LARGE impact on land use would result. Therefore, UniStar 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 NMP3NPP site. Furthermore, these alternatives would have higher economic costs and, therefore, are not economically preferable to a nuclear power generating facility.

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Table 9.2-1—Impacts Comparison Table
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Impact Category	Proposed Action (NMP3NPP)	Coal-Fired Generation (Greenfield site)	Gas-Fired Generation	Combinations (wind and solar with natural gas)
Land Use	The NMPNS is approximately 900 ac (364 ha) in size. The NMP3NPP and supporting facilities would consist of approximately 494 ac (200 ha). Some site land use would change because the new plant footprint would be located in forest or wetland areas, as well as on previously altered land. Land use impacts would be SMALL (NRC, 2006) Federal, state, and local requirements will be followed to limit impacts. Therefore, the impacts will be minimized for the proposed project.	This alternative would require approximately 740 ac (300 ha) for the power block and coal storage. About 560 ac (226 ha) of this would be needed for waste management during the 40 years of plant life. Additional land would be needed for on-site and peripheral buffers and transmission and rail line routing (NRC, 2006). Therefore, land use impacts for an undetermined greenfield location would be MODERATE to LARGE. Mining impacts were not included within the impact determination.	Approximately 110 ac (45 ha) would be required for the facility. (NRC, 2006) Approximately 25 mi of gas line connections would be needed. (NRC, 2006) Land use impacts would be SMALL.	Wind facilities would require about 200 ac (81 ha) for a 1,600-MWe facility (about 0.25 ac for each 2-MWe generation. (AE, 2008) Solar facilities require 56,000 ac (22,662 ha) per 1,600 MWe generation for PV 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 MODERATE 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. 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. Impacts would be mitigated and would be SMALL. All air emission sources associated with NMP3NPP will be managed in accordance with federal, state, and local air quality control laws and regulations. Therefore, operation-related impacts on air quality would be SMALL. (Section 5.5.1.3) (NRC, 2008) CO_2 equivalent 56,064 tons/yr	Construction activities would be similar to the proposed action; therefore, impacts would be SMALL. Based on the following calculated estimates, air quality impacts during operations would be MODERATE (NRC, 2006): SO_2 4934 metric tons/yr NO_2 1161 metric tons/yr CO 1161 metric tons/yr PM 164 metric tons/yr PM (less than 10 microns) 37 tons/yr CO_2 equivalent 11,212,800 tons/yr	Construction activities would be similar to the proposed action; therefore, impacts would be SMALL. Based on the following calculated estimates, air quality impacts during operations would be MODERATE (NRC, 2006): SO_2 91 metric tons/yr NO_2 291 metric tons/yr CO 177 metric tons/yr PM 37 tons/yr PM (less than 10 microns) 336 metric tons/yr CO_2 equivalent 5,606,400 tons/yr	Construction activities would be similar to the proposed action; therefore, impacts would be SMALL. No air emissions would result from wind or solar facilities during operations. If natural gas is used in this combination, based on the following calculated estimates, air quality impacts during operations would be MODERATE (NRC, 2006): 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

Table 9.2-1—Impacts Comparison Table
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Impact Category	Proposed Action (NMP3NPP)	Coal-Fired Generation (Greenfield site)	Gas-Fired Generation	Combinations (wind and solar with natural gas)
Water Use and Quality	Construction activities would cause hydrologic surface water impacts primarily due to the loss of wetlands and wetland buffers, and will require mitigation as described in Section 4.3.1.4. The overall impact to hydrologic alterations from construction activities is anticipated to be MODERATE. Surface water use impacts associated with operation activities are anticipated to be SMALL. The local aquifer systems could be impacted during construction depending upon stormwater impoundment and discharge system design. Impacts to groundwater are likely to be SMALL. During operation, no groundwater will be used; therefore, the impacts would be SMALL.	Impacts will depend upon the volume of water withdrawn and discharged and the characteristics of the surface water bodies and aquifer at the greenfield site. Surface water impacts are estimated to be SMALL and groundwater impacts would be SMALL to MODERATE. (NRC, 2006) Coal pile runoff that could affect surface water quality, water resources and quality, and surface water near mine sites was not considered in operation-related impacts.	The local aquifer systems could be impacted during construction depending upon stormwater impoundment and discharge system design. Impacts to groundwater are likely to be SMALL. No measurable impact on surface water of consumptive use would be discernible during operations. Water consumption is likely to be less for gas turbine power generating facilities during operations. (NRC, 1996) As a result, water quality impacts would be SMALL. During operation, no groundwater will be used; therefore, the impacts would be SMALL. (NRC, 2008)	The local aquifer systems could be impacted during construction depending upon stormwater impoundment and discharge system design. Impacts to groundwater are likely to be SMALL. No measurable impact on surface water of consumptive use would be discernible during operations. Water consumption is likely to be less for gas turbine power generating facilities during operations. (NRC, 1996) As a result, water quality impacts would be SMALL. During operation, no groundwater will be used; therefore, the impacts would be SMALL. (NRC, 2008)

Table 9.2-1—Impacts Comparison Table
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Impact Category	Proposed Action (NMP3NPP)	Coal-Fired Generation (Greenfield site)	Gas-Fired Generation	Combinations (wind and solar with natural gas)
Ecology	Considering the wetland mitigation measures to be implemented (described in Sections 4.3.1 and 4.6), the level of unavoidable adverse impacts on terrestrial ecology from construction of NMP3NPP is expected to be SMALL. Terrestrial impacts from operation would be SMALL. Anticipated impacts to aquatic ecology from construction activities will be MODERATE in on-site impoundments and streams, and SMALL in the transmission corridor and Lake Ontario. Anticipated aquatic ecology impacts from operation activities would be SMALL. Impacts to aquatic ecology would be minimized through implementation of BMPs and good engineering practices.	Impacts to a greenfield site would be dependent upon the site location and whether this location, as well as proposed transmission and rail lines, had been previously disturbed. Impacts are, therefore, estimated to be SMALL to MODERATE. (NRC, 2006)	Impacts on the terrestrial ecosystem at the NMP3NPP site are anticipated to result in unavoidable permanent loss of affected wetland and wetland buffer habitats during construction of the NMP3NPP; however, considering the mitigation measures for the wetland impacts that will be implemented (see Section 4.3.1), the level of unavoidable adverse impacts on terrestrial and aquatic ecology from construction of NMP3NPP is expected to be SMALL. Impacts to terrestrial and aquatic ecology would be SMALL to LARGE during construction. Operation-related impacts on the aquatic ecosystem through the transmission, cooling water intake, and discharge systems and thermal, chemical, and physical effects are anticipated to be SMALL. Operation-related impacts on the terrestrial ecosystem would be SMALL.	Impacts on the terrestrial ecosystem at the NMP3NPP site are anticipated to result in unavoidable permanent loss of affected wetland and wetland buffer habitats during construction of the NMP3NPP; however, considering the mitigation measures for the wetland impacts that will be implemented (see Section 4.3.1), the level of unavoidable adverse impacts on terrestrial and aquatic ecology from construction of NMP3NPP is expected to be SMALL. Impacts to terrestrial and aquatic ecology would be SMALL to LARGE during construction. Operation-related impacts on the aquatic ecosystem through the transmission, cooling water intake, and discharge systems and thermal, chemical, and physical effects are anticipated to be SMALL. Operation-related impacts on the terrestrial ecosystem would be SMALL.

Table 9.2-1—Impacts Comparison Table

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Impact Category	Proposed Action (NMP3NPP)	Coal-Fired Generation (Greenfield site)	Gas-Fired Generation	Combinations (wind and solar with natural gas)
Waste Management	Construction wastes (land clearing and solid wastes) would be minimal because of regulatory control and the small quantities generated during construction. Therefore, impacts would be SMALL. Solid and hazardous wastes would be managed according to federal, state, and local laws, regulations, and permits for the operation phase of the proposed plant; therefore, impacts would be SMALL. Relatively small quantities of mixed waste would be generated during operation. This waste would be stored temporarily on-site and then shipped to an off-site facility for treatment (NRC, 1996). Therefore, impacts would be SMALL.	Construction waste impacts would be minimal because of regulatory control and the small quantities generated. Therefore, impacts would be SMALL. Solid and hazardous wastes would be managed according to federal, state, and local laws, regulations, and permits for the operation phase of the proposed plant; therefore, impacts would be SMALL. Approximately 621,000 metric tons of coal ash and scrubber sludge would be generated annually from operations and would require 560 ac for disposal over a 40-year renewal term. (NRC, 2006) These impacts would, therefore, be MODERATE. Effects of tailing spoils from mining operations were not considered in operation-related impacts.	Construction wastes (land clearing and solid wastes) would be minimal because of regulatory control and the small quantities generated. Therefore, impacts would be SMALL. Solid and hazardous wastes would be managed according to federal, state, and local laws, regulations, and permits for the operation phase of the proposed plant; therefore, impacts will be SMALL. Approximately 1,500 cubic feet spent selective catalytic reduction (SCR) catalyst per year would be required for a 2,400-MWe plant. It is assumed that 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 impacts from waste generated during the construction and operation of the solar and wind facilities would be SMALL. Approximately 1,500 cubic feet spent SCR catalyst per year would be required for a 2,400-MWe plant. It is assumed that this waste volume would be less for a 1,600-MWe plant. Therefore, waste management impacts would be SMALL.
Socioeconomics	Beneficial impacts during the construction phase of the proposed plant, such as ROI population levels, housing availability, employment and income, tax revenue, land value, public services, transportation, and recreational facilities use, would be SMALL to MODERATE. Impacts that would need mitigation to offset negative MODERATE impacts during construction include school systems and traffic congestion. Overall beneficial impacts from operation of the proposed plant would be SMALL in all socioeconomic areas. No negative impacts are noted.	Construction- and operation-related employment impacts would be dependent upon location, but could be LARGE if the plant was located in an area more rural than that around the NMP3NPP site. Oswego County could experience a loss of tax base and employment. Transportation impacts could be SMALL to LARGE. Overall impacts would be SMALL to LARGE. (NRC, 2006) Several hundred mining, construction, and operation jobs, as well as additional tax revenues, would be associated with the coal mining. (NRC, 1996)	Construction-related employment impacts would be MODERATE. Operation-related employment impacts would decrease and would be SMALL. (NRC, 1996)	Construction-related employment impacts would be MODERATE. Operation-related employment impacts would decrease and would be SMALL. (NRC, 1996).

Table 9.2-1—Impacts Comparison Table
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Impact Category	Proposed Action (NMP3NPP)	Coal-Fired Generation (Greenfield site)	Gas-Fired Generation	Combinations (wind and solar with natural gas)
Human Health	During construction, human health impacts would be SMALL. During operations, impacts on the public from thermophilic microorganisms associated with fresh water, noise, and air emissions would be SMALL. (NRC, 2006)	During construction, human health impacts would be SMALL. During operations, as a result of increased air emissions and associated public health risks, human health impacts would be MODERATE. (NRC, 1996)	During construction, human health impacts would be SMALL. During operations, as a result of increased air emissions and associated public health risks, human health impacts would be MODERATE. (NRC, 1996)	It is assumed that construction and operational impacts from solar and wind technologies would be SMALL. During construction, human health impacts would be SMALL for a gas-fired plant. During operations, as a result of increased air emissions and associated public health risks, human health impacts would be MODERATE. (NRC, 1996)
Historic and Cultural Resources	No previously recorded archaeological or historic architectural resources have been located around the NMP3NPP site; therefore, impacts during construction and operation of the plant would be SMALL.	An alternate location to NMP3NPP would require a cultural and historical resource evaluation; however, impacts to there resources can generally be effectively managed. Impacts are estimated to be SMALL.	No previously recorded archaeological or historic architectural resources have been located around the NMP3NPP site; therefore, impacts during construction and operation of the plant would be SMALL.	No previously recorded archaeological or historic architectural resources have been located around the NMP3NPP site; therefore, impacts during construction and operation of a gas-fired plant would be SMALL. The wind and solar facilities would be located off-site, but in the ROI; therefore, impacts to historic and cultural resources would be SMALL to LARGE, but could be mitigated.
Environmental Justice	Beneficial construction impacts, such as new employment opportunities, increased income for low income and minority populations, new indirect employment opportunities, and subsistence activities, would be SMALL. No negative impacts are noted. Beneficial environmental justice impacts for all categories during the operation of the proposed plant would be SMALL. No negative impacts are noted.	Impacts would be dependent upon the population distribution and makeup at the site. Therefore, the impacts could be SMALL to LARGE.	Beneficial construction impacts, such as new employment opportunities, increased income for low income and minority populations, new indirect employment opportunities, and subsistence activities, would be SMALL to MODERATE. No negative impacts are noted. Beneficial environmental justice impacts for all categories during the operation of the proposed plant would be SMALL. No negative impacts are noted.	Beneficial construction impacts, such as new employment opportunities, increased income for low income and minority populations, new indirect employment opportunities, and subsistence activities, would be SMALL to MODERATE. No negative impacts are noted. Beneficial environmental justice impacts for all categories during the operation of the proposed plant would be SMALL. No negative impacts are noted.

Table 9.2-1—Impacts Comparison Table
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Impact Category	Proposed Action (NMP3NPP)	Coal-Fired Generation (Greenfield site)	Gas-Fired Generation	Combinations (wind and solar with natural gas)
Aesthetics	Because the NMPNS site is already aesthetically altered, the aesthetic impacts from construction and operation of the proposed new NMP3NPP cooling towers and plumes are expected to be SMALL. (NRC, 2006)	Aesthetic impacts are dependent upon the greenfield site location and could, therefore, be SMALL to LARGE. These impacts could be lessened by the choice of a site near an industrialized area. (NRC, 2006)	Because the NMPNS site is already aesthetically altered, the aesthetic impacts of construction and operation of the proposed new gas-fired plant would represent only an incremental addition to the existing plant; therefore, the impacts would be SMALL. (NRC, 2006)	Because of their size and visual impact, solar arrays and wind turbines constructed at other locations within the ROI would have MODERATE to LARGE aesthetic impacts. Because the NMPNS site is already aesthetically altered, the aesthetic impacts of construction and operation of a new gas-fired plant would represent only an incremental addition to the existing plant; therefore, the impacts would be SMALL. (NRC, 2006)
Threatened and Endangered Resources	One state-listed threatened fauna species (Pied-billed Grebe) is present east of the transmission line ROW. No federal or state threatened or endangered plant species were identified on the NMP3NPP site. Impacts would, therefore, be SMALL. (NRC, 2006)	Impacts to a greenfield site would be dependent upon the site location and whether this location, as well as proposed transmission and rail lines, had been previously disturbed. Therefore, impacts would be SMALL to MODERATE. (NRC, 2006)	One state-listed threatened fauna species (Pied-billed Grebe) is present east of the transmission line ROW. No federal or state threatened or endangered plant species were identified on the NMP3NPP site. Impacts would, therefore, be SMALL. (NRC, 2006)	One state-listed threatened fauna species (Pied-billed Grebe) is present east of the transmission line ROW. No federal or state threatened or endangered plant species were identified on the NMP3NPP site. (NRC, 2006) Impacts would, therefore, be SMALL for the siting of the natural-gas plant; however, this could be SMALL to LARGE depending upon the location of the solar and wind facilities.
Accidents	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.	As a result of increased safety technologies, accident impacts would be SMALL.

Table 9.2-1—Impacts Comparison Table
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Impact Category	Proposed Action (NMP3NPP)	Coal-Fired Generation (Greenfield site)	Gas-Fired Generation	Combinations (wind and solar with natural gas)
Facility Footprint	265 ac per 1,000-MWe generation (424 ac for 1,600 MWe generation) would be required.	1,700 ac per 1,000-MWe generation would be required.	110 ac per 1,000-MWe generation (excludes well fields) would be required.	Wind facility footprint would be approximately 125 ac for 1,000 MWe (about 0.25 ac for each 2-MWe generation. (AE, 2008) Solar facility footprint would be approximately 35,000 ac per 1,000 MWe generation for photovoltaic and 14,000 ac per 1,000 MWe for solar thermal systems (NRC, 1996). Gas-fired facility footprint would be 110 ac per 1,000 MWe generation (excludes well fields).
Costs	The projected cost associated with operating a new nuclear facility similar to the NMP3NPP is in the range of $0.031 to $0.046/kWh. (DOE, 2002)	The estimated cost of generating electricity from a coal facility to be approximately $0.049/kWh. (DOE, 2002)	The estimated cost of generating electricity from a gas-fired facility to be $0.047/kWh. (DOE, 2002)	In 2000, wind power was produced at a cost between $0.03 and $0.06/kWh, depending on wind speeds. By 2020, production costs are projected to be between $0.03 and $0.04/kWh. 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, 2006). The estimated cost of generating electricity from a gas-fired facility to be $0.047/kWh. (DOE, 2002)

Notes:
SMALL = Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
MEDIUM = Environmental effects are sufficient to alter noticeably, but not destabilize, any important attribute of the resource.
LARGE = Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

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 MW	1,600 MW
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)
Particulate Matter less than 10 microns - PM_{10}	15 (17)	24 (26)
Carbon Dioxide Equivalent - CO_2e	1,731,000 (1,908,000)	565,000 (623,000)

Notes:

FBC = fluidized bed combustor
GTG = gas turbine generator
MW = megawatt

9.3 ALTERNATIVE SITES

This section identifies and evaluates a set of alternative site locations to the NMP3NPP site. The object of this evaluation is to verify that there are no "obviously superior" sites to build and operate the NMP3NPP facility.

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 Nuclear Regulatory Commission (NRC) has already found them to be acceptable relative to other undeveloped sites in the region of interest. The NRC recognizes (in NUREG-1555 [NRC, 2007], Section 9.3) 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 [National Environmental Policy Act] review and/or demonstrated to be environmentally satisfactorily on the basis of operating experience. 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 (NRC, 2007), Section 9.3. This section identifies and discusses the evaluation of a set of alternative locations for the proposed plant and compares the suitability of these alternative sites with the suitability of the proposed site. The objective of this assessment is to verify that no site is "environmentally preferable" (and thus, no site is "obviously superior") for the siting of a new nuclear plant. This section evaluates the siting characteristics of existing nuclear power generating stations, other existing power generating stations (coal, hydroelectric), brownfield sites, and greenfield sites located adjacent to power generating stations. The sites were evaluated based on building and operating a merchant U.S. Evolutionary Power Reactor (EPR). This assumption 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 alternative site selection process focuses on identifying and evaluating locations that represent a range of reasonable alternative sites for the proposed project. The primary objective of the site selection process is to determine if any alternative site is "obviously superior" to the preferred site for eventual construction and operation of the proposed nuclear unit. The preferred site was chosen based on geographic location of existing Constellation nuclear units and other UniStar proposed new units. The preferred site was compared with the remaining candidate sites to demonstrate that none are "environmentally preferable." 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.

9.3.1.1 Region of Interest and Candidate Areas

The first step in the siting process was to define and identify the Region of Interest (ROI). As defined in ESRP 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. The basis for an ROI can be the state in which the proposed site is located or the relevant service area for the proposed facility. The site selection process contains a description of the ROI, including the following elements identified in the ESRP 9.3 (NRC, 2007):

- 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 stations
- 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 discussed in Chapter 8, NMP3NPP would be developed as a merchant facility, which is a facility that sells electricity anywhere within the identified primary market area, here, the New York Independent System Operator (NYISO) wholesale market area. Therefore, the relevant primary market area for the proposed nuclear power generating station is the region served by NYISO, or in geographic terms, New York State (Figure 9.3-1), which is also the ROI.

The ROI covers the entire state of New York (approximately 47,214 mi^2 [122,284 km^2]) and encompasses the major cities of Buffalo, Rochester, Syracuse, New York, and Albany. Water bodies available as a source of cooling water for the proposed nuclear power generating station include Erie Canal, St Lawrence River, Lake Ontario, Lake Erie, Lake Champlain, Hudson River, Susquehanna River, Delaware River, and the Atlantic Ocean. Major highways within the ROI include Interstate 90 (I-90), I-390, I-84, I-86, I-88, I-87, I-90, I-95, I-287, I-495, and I-684. There are more than 35 railroads in the state of New York, including Amtrak, the Buffalo and Pittsburgh Railroad, the Central New York Railroad, and the New York and Atlantic Railroad. 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, utilities, government special designation, and education. 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. There are several military installations in the ROI, including the U.S. Military Academy located in West Point, New York.

The next step in the alternative 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 criteria used in the screening of the ROI are listed below and are consistent with those identified in ESRP 9.3 (NRC, 2007) and the EPRI siting guide (EPRI, 2002):

- Distance from major population centers (that is, identifying sites that are located in an area with less than 300 persons per square mile [ppsm]).
- Proximity to adequate transmission lines (that is, identifying sites that are located within approximately 30 mi [48.3 km] of 345- or 500- kilovolt (kV) transmission lines). In accordance with the EPR standard grid connection design, 345- or 500-kV transmission lines are needed.
- Proximity to a suitable source for cooling water (that is, identifying sites that are located within 15 mi [24.1 km] of an adequate source for cooling water).
- Non-dedicated land (that is, identifying sites that are not located within areas such as national and state parks, historic sites, and tribal lands).

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. The information presented in 10 CFR 100 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, but adds the following specific criterion:

> *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. A reactor should not be located at a site whose population density is well in excess of the above value.*

The EPRI siting guide contains the most conservative criterion with regard to population density and recommends that a new reactor not be located in an area with greater than or equal to 300 ppsm [or 300 persons per 2.6 km^2]) (EPRI, 2002). Consistent with the current industry guidance as detailed in the EPRI document, this siting evaluation used the conservative population criterion (300 ppsm) as an exclusionary criterion in indentifying candidate areas.

Figure 9.3-2 identifies the areas eliminated during screening of the ROI because they did not satisfy the exclusionary criteria. (It should be noted some of the identified excluded areas overlap.)

Information gathered from the initial screening was used to identify areas that satisfied the exclusionary screening criteria. The results of screening the ROI for areas that satisfied the exclusionary screening criteria yielded those candidate areas identified on Figure 9.3-3.

9.3.1.2 Candidate Sites

The next step in the alternative site selection process was to screen and evaluate the candidate areas using refined discretionary criteria in order to identify potential geographic locations for the placement of the proposed nuclear station. Information used in the screening and evaluation of the candidate areas was obtained from GoogleEarth™ images, publicly held information on geographic information system (GIS) database Web sites that generally included electric power-producing plants and brownfield sites, topographic maps showing roads, urban areas, wetlands, parks, and other dedicated lands. Information on electric power plants in New York was obtained from the DOE/EIA website that listed the major electrical plants in New York (EIA, 2008). Data on brownfield sites in New York were obtained from the New York State Department of Environmental Conservation (NYSDEC), Environmental Remediation Databases (NYSDEC, 2008b). Compiling the information resulted in more than 3,000 remediation sites, 12 hydroelectric sites, 14 natural gas sites, 10 other power-generating stations (for example, coal, wood, and oil), 4 nuclear sites, and federal (DOE, Department of Defense) sites being considered for redevelopment that needed to be screened.

The screening process used to identify the potential alternative sites considered discretionary criteria consistent with those identified in ESRP 9.3 (NRC, 2007). These criterion (i.e., distance of a site from population centers, proximity of transmission lines, proximity to suitable source of cooling water) were used in the process of identifying the candidate areas. However, identifying potential sites required a more detailed review of available information. The criteria used in screening the candidate areas to identify potential alternative sites included:

- Proximity of a site to either existing 345- or 500-kV transmission lines. Closer proximity to an existing transmission system infrastructure may result in fewer environmental impacts associated with constructing transmission corridors to join the new nuclear facility with the existing transmission system.
- Location in an area with less than 300 ppsm within a 10-mi (32-km) radius.
- Proximity to existing power generating facility infrastructure.
- Proximity to suitable water supply sources (rivers, lakes, and coastal areas).
- Avoidance of areas that contain land use restrictions.
- Ownership and/or availability of adequate land area.

The screening process also included consideration of existing site conditions, including whether the site was improved or potentially contained wetlands or floodplains.

Aerial screening was used to identify areas within which potential alternative sites were identified. The screening of the potential sites was conducted as an iterative process by applying refined criteria until an appropriate number of potential sites were identified. The goal of the screening process was to use a logical process that produced a list of the best potential sites located within the candidate areas.

As identified in Figure 9.3-4, the results of the candidate area screening identified potential sites within New York that included sites collocated with Constellation Energy Group, Inc. (CEG)-owned nuclear stations (NMP3NPP and R.E. Ginna Nuclear Plant [Ginna]), a nuclear station owned by Entergy (James A. Fitzpatrick Nuclear Power Plant (JAFNPP)), other electric power stations (coal and hydroelectric), greenfield sites located adjacent to power generating stations, and suitable brownfield/industrial development sites.

Identifying the candidate sites was performed by conducting a technical evaluation of the potential alternative sites using a two-step process. The first step of the process involved identifying criteria to evaluate each of the potential sites. The criteria used to evaluate the potential alternative sites were selected to be appropriate: (1) to the ROI; (2) to the status of the proposed applicant's nuclear power generating facility being a merchant nuclear power generating facility; and (3) to the technology involved with constructing and operating the proposed nuclear facility.

ESRP 9.3 provides the following information about candidate site qualification criteria (NRC, 2007):

- Consumptive use of water should not cause significant adverse effects on other users.
- The proposed action should not jeopardize Federal, State, and affected Native American tribal listed threatened, endangered, or candidates species or result in the destruction or adverse modification of critical habitat.
- There should not be any potential significant impacts to spawning grounds or nursery areas of populations of important aquatic species on Federal, State, 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 affect efforts to meet water-quality objectives.
- There should 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.
- There are no other significant issues that preclude the use of the site.

Criteria used in the evaluation and scoring of the potential alternative sites are identified in Table 9.3-1 and described as follows:

- Available land, 420 ac (170 ha): This is an exclusionary criterion based on the availability of the identified site and adjoining available area to support an EPR footprint (240 ac [97 ha]) plus approximately 180 ac (73 ha) of additional land needed for ancillary structures, construction buildings, construction laydown areas, and parking areas.
- Distance to cooling water supply was scored based on the distance in miles from the potential site to its closest cooling water supply.

- Flooding data were gathered from Federal Emergency Management Agency (FEMA) maps and scored based on the site's proximity to 100-year or 500-year floodplains.

- Distance to population centers was scored based on the site's proximity to a population center (defined as a census tract [CT] with more than 300 ppsm [or 300 persons per 2.6 km^2]). The regional population density analysis was based on the population density within a 10-mi (16.1-km) radius of the site, based on data for CTs.

- Wetland data were gathered from National Wetland Inventory (NWI) maps. Each site was evaluated based on the presence or absence of wetlands at or surrounding the site. Site area was defined as an approximate 0.5-mi (0.8-km) radius around site.

- Railroad access was evaluated according to each site's proximity (within 5 mi [8 km]) to an active rail line.

- Transmission access was evaluated according to each site's proximity (within 15 mi [24.1 km]) to a 230 kV or higher transmission line, and the existing transmission corridor was scored based on theavailable capacity and voltage of the existing transmission connections. It is noted that the Distance to Transmission Access and Existing Transmission Corridor criteria only refer to direct grid access requirements.

- Ecological evaluations of the sites were based upon the number of state rare, threatened, and endangered species in the county (aquatic and terrestrial). The site was characterized by its location (county) and was then scored according to the county species data (from 0 to over 100 species).

- The need for additional land acquisition also was evaluated for each site. This criterion was based on whether or not additional surrounding land (other than the minimum land needed for the EPR footprint) would be needed and likely could be acquired for construction laydown areas and the appurtenant structures of the proposed nuclear power generating station. Scoring of this criterion was evaluated based on whether additional land acquisition would be required. The rating was broken down further by characterizing the readily available land surrounding the site as low-density development or high-density development.

- An expansion potential criterion was based on the site's availability of additional land to accommodate the potential for the expansion of the plant for a second unit. This criterion was measured by evaluating the amount of land potentially available adjacent to the potential site up to 840 ac (340 ha). This evaluation was done by locating the sites on GoogleEarth™ and measuring or assessing the site and the surrounding land using a radius of approximately 0.9 to 1 mi (1.4 to 1.6 km). A score of 5 indicated that the site and surrounding land was sufficient for expansion potential. A score of 3 indicated that the site's surrounding land was expected to be readily available for sale/purchase such as land described as low-density development (rural, few residences within the 840 ac [340 ha]). A score of 1 indicated that the land would not be readily available for sale/purchase based on the other uses of the land such as industrial, commercial, major transportation corridors, or high-density developments (residential).

- An ownership criterion was based on the site's ownership status. A score of 5 was assigned to any properties currently owned by UniStar or affiliates, a score of 3 was assigned to privately owned properties such as landfills or other companies not within the power sector, and a score of 1 was assigned to competitor-owned properties. A competitor was defined as any company within the power sector (coal, nuclear, hydroelectric) that could be a direct competitor to UniStar.

- Environmental remediation was evaluated based upon the site's need for environmental remediation or cleanup of hazardous materials. The purpose of this criterion was to identify remediation that might be necessary at a site so as to preclude the site from being considered for development of a nuclear facility. The sites were characterized based upon their land use and then scored based on if the site would need remediation performed and the type and amount of remediation (for example, landfill – cleanup required; coal/oil or other brownfields – unknown if cleanup is necessary; nuclear or hydroelectric plants – no anticipated cleanup necessary).

The second step of the potential site evaluation involved scoring and ranking each potential site. Readily available reconnaissance-level information sources, which included publicly available data, information available from UniStar files and personnel, and GoogleEarth™ images was used in the evaluation of the potential sites. Each discretionary criterion was scored based on a point scale of suitability using the rating rationale and evaluation metrics identified in Table 9.3-1. GIS analysis was performed for the majority of the discretionary criteria, with the exception of ecology (threatened and endangered species), additional land acquisition, and environmental remediation. A preliminary score with amplifying remarks reflecting the overall suitability of each potential site was assigned based on the information collected by the evaluation team members. The scores and remarks developed by the evaluation team were subsequently challenged and adjusted in a collaborative fashion where necessary. The potential sites were ranked according to their raw scores and average scores. The raw score was based on the sum of all the scores for the site, while the average score was based upon the sum of the scores divided by the number of discretionary criteria available.

The results of the potential site evaluation scoring process are as follows. The exclusionary criterion for site size (420 total ac [170 ha]) was applied to the list of potential sites and those sites that failed to meet this criterion were not considered for further evaluation. Next, discretionary criteria were applied to the remaining potential sites and the sites were scored and ranked accordingly.

The highest scoring potential sites included three nuclear power generating stations, four electric power generating stations (coal and hydroelectric), and two brownfield sites. One of the nuclear power generating stations, the JAFNPP in Oswego County, New York, was not considered for further evaluation as a candidate site because the site is so geographically close to the NMPNS. One of the hydroelectric power generating stations, one of the coal power generating stations, and the two brownfield sites were not considered for further evaluation as candidate sites primarily because of proximity to population centers.

The three highest-scoring potential alternative sites were chosen for further evaluation as candidate sites and are identified on Figure 9.3-5:

- The Ginna Site, Wayne County, New York
- The AES Somerset Site, Niagara County, New York
- The Blenheim-Gilboa Site, Schoharie County, New York

The three alternative sites were among the best sites that could reasonably be found for the siting of a nuclear power station. As identified in ESRP 9.3, an adequate number of candidate sites include at least three to five alternative sites in addition to the proposed site (NRC, 2007). The selected candidate sites were chosen in order of having the least environmental impacts, while satisfying the requirements of an EPR nuclear plant site. Finally, the candidate sites are expected to be licensable (that is, able to obtain applicable NRC licenses and state and local permits).

After the candidate sites were identified, the next step in the siting process was a screening and evaluation that involved a two-part sequential test to determine if any candidate site can be judged as environmentally preferable, and obviously superior, to the proposed site. The first stage of the test determines whether there are environmentally preferred sites among the alternative sites. During this first stage, the standard is one of “reasonableness,” considering whether the applicant has performed the following:

- Identified reasonable alternative sites
- Evaluated the likely environmental impacts of construction and operation at these sites
- Used a logical means of comparing sites that led to the applicant’s selection of the proposed site

Evaluation factors used in comparing the proposed site to the alternative sites to determine if there are environmentally preferred sites among the alternative sites are presented below and are consistent with those identified in ESRP 9.3 (NRC, 2007):

- Environmental: Aesthetics, demography, ecological, geology, hydrology, socioeconomics, archaeological and historic preservation, environmental justice, and transportation access
- Land use
- Water use: Accessibility, availability, and quality
- Institutional: Federal, state, local, regional, and tribal restrictions
- Construction workforce availability and accessibility, and workforce housing
- Cost: Construction costs
- Transmission: Access to existing network and new corridors

The second stage of the test considers economics, technology, and institutional factors among the environmentally preferred site(s) to see if any are obviously superior to the proposed site. As indicated in ESRP 9.3 (NRC, 2007):

> *The criterion for making this determination is that one or more important aspects, either singly or in combination, of a reasonably available alternative site are obviously superior to the corresponding aspects of the applicant’s proposed site, and the alternative site does not have offsetting deficiencies.*

If there is no environmentally preferred or obviously superior alternative site(s), the proposed site prevails and becomes the site that is submitted to the NRC by the applicant as the proposed location for a nuclear power station. If an alternative site is determined to be obviously superior to the applicant's proposed site, the application may be denied.

Readily available reconnaissance-level information sources were used for the evaluation so as to be consistent with Regulatory Guide 4.2, Rev. 2 (NRC, 1976) which states:

> *The applicant is not expected to conduct detailed environmental studies at alternative sites; only preliminary reconnaissance-type investigations need be conducted.*

The information sources included publicly available data, information available from UniStar files and personnel, GoogleEarth™ images, and the Environmental Data Resources, Inc. (EDR) database in order to evaluate, score, and rank the candidate sites. Additional information and clarification of map and literature data were supplemented with site investigations as needed.

In order to determine the overall suitability of each of the sites, the relative importance of each criterion (environmental and safety) was scored based on a 10-point scale of suitability. A score of 10 corresponded to a location with the most positive characteristics with respect to the criterion of interest. A mid-range score of 5 represented a neutral score. A score of 1 corresponded to a location with the most significant issues/challenges and/or significant impacts with respect to the criterion of interest. The scores and remarks were subsequently challenged and adjusted in a collaborative fashion, where necessary, and are presented in Table 9.3-2.

To further determine the overall suitability of a site, the functional evaluation elements on Table 9.3-3 were identified and assigned weights. The functional evaluation elements included: Construction/ Operation Requirements (Land Area, Transportation, Construction Mitigation, Transmission System, Heat Sink (Primary Water Source), Geology/Seismology, and Climate/Meteorology); Socioeconomic (Local Infrastructure, Support of the Project, and Workforce); Health and Safety (Operation/Transportation and Security/Emergency Planning); and Environmental (Special Areas, Air Quality, and Permits). Consensus on the weighting was achieved through an iterative process. Each criterion (environmental and safety) listed under the functional evaluation elements was assigned a primary weight. Next, each criterion was scored based on the 10-point scale of suitability discussed above. Each criterion was assigned a weighted score by multiplying the primary weight and the score. In addition, an average weighted score was calculated for each of the weighted functional evaluation elements. Finally, the scores for each criterion were totaled, and the average weighted scores were totaled for the proposed site and each of the alternative sites. The scoring results are presented in the candidate site evaluation matrix summary (Table 9.3-3) and discussed in detail in Section 9.3.2.

9.3.2 PROPOSED SITE AND ALTERNATIVE SITE EVALUATION

As noted in Section 9.3.1.2, an evaluation was conducted to compare the alternative sites to the proposed site and determine if any of the alternative sites were environmentally preferable to the proposed site for the location of a nuclear power generating facility. The siting process discussed in Section 9.3.1 was used to conduct the evaluation of the proposed site and alternative sites.

The evaluation consisted of assessing the environmental impacts of constructing and operating a nuclear power generating facility at the proposed site and alternative sites using the NRC three-level standard of significance: SMALL, MODERATE, or LARGE. This standard of significance is defined in Section 9.2.2.

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 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 Proposed NMP3NPP Site

The NMP3NPP site will be collocated with the existing NMPNS. The NMPNS is located in Scriba, Oswego County, New York, on the south shore of Lake Ontario. Figure 9.3-6 contains a vicinity map showing the 6-mi (9.7-km) radius surrounding the NMP3NPP site. Because the aspects listed below have been discussed in detail in previous chapters of the, the discussions for the NMP3NPP site in the following sections consist of summary statements with predicted impact levels and references to the sections containing the basis for these impacts.

9.3.2.1.1 Land Use

Land use impacts associated with the construction and operation of the NMP3NPP are discussed in 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

Air quality impacts associated with the construction and operation of the NMP3NPP are discussed in Sections 4.4.1 and 5.8.1, respectively. Air quality impacts are anticipated to be SMALL for both construction and operation activities.

9.3.2.1.3 Water

NMP3NPP water use impacts from construction and operation activities and associated mitigation measures are discussed in Sections 4.2.1, 4.2.2, 4.6, 5.2.1, and 5.2.2. Construction activities would cause hydrologic surface water impacts primarily due to the loss of wetlands and wetland buffers, and will require mitigation as described in Section 4.3.1.4. The overall impact to hydrologic alterations from construction activities is anticipated to be MODERATE. Water use impacts associated with operation activities will be SMALL.

9.3.2.1.4 Terrestrial Ecology and Selective Species

Terrestrial ecology impacts at the NMP3NPP site from the construction and operation and associated mitigation measures are discussed in Sections 4.3.1, 4.6, 5.3.3.2, and 5.6.1, respectively. Considering the mitigation measures described in the referenced sections, the level of unavoidable adverse impacts on terrestrial ecology from construction of NMP3NPP is expected to be SMALL. Terrestrial ecology impacts from operation activities would be SMALL.

9.3.2.1.5 Aquatic Ecology and Selective Species

Aquatic ecology impacts at the NMP3NPP site from construction and operation activities and associated mitigation measures are discussed in Sections 4.3.2, 4.6, 5.3.1.2, 5.3.2.2, and 5.6.2. Anticipated impacts to aquatic ecology from construction activities will be MODERATE in on-site impoundments and streams, and SMALL in the transmission corridor and Lake Ontario. Aquatic ecology impacts from operation activities would be SMALL. Impacts to aquatic ecology would be minimized through implementation of BMPs and good engineering practices.

9.3.2.1.6 Socioeconomics

Socioeconomic beneficial and adverse impacts associated with the construction and operation of the NMP3NPP and associated mitigation measures are discussed in Sections 4.4 and 5.8. Socioeconomic adverse impacts associated with construction and operation activities would be SMALL. Beneficial impacts associated with construction and operation activities would be SMALL to LARGE.

9.3.2.1.7 Transportation

The impacts on transportation from the construction and operation of the NMP3NPP and associated mitigation measures are discussed in Sections 4.4.1 and 5.8.1. Transportation impacts are anticipated to be MODERATE during construction activities and SMALL during operation of the proposed nuclear station.

9.3.2.1.8 Historic, Cultural, and Archeological Resources

A discussion of potential impacts to historic, cultural, and archeological resources from the construction and operation of the NMP3NPP and associated mitigation measures are provided in Sections 4.1.3 and 5.1.3. Historic, cultural, and archeological resources impacts associated with construction and operation activities would be SMALL.

9.3.2.1.9 Environmental Justice

Environmental justice impacts from the construction and operation of the NMP3NPP and associated mitigation measures are discussed in Sections 4.4.3 and 5.8.3. Environmental justice impacts associated with construction and operation activities would be SMALL.

9.3.2.1.10 Transmission Corridors

Transmission system environmental impacts from the construction and operation of the NMP3NPP and associated mitigation measures are discussed in Sections 4.1.2 and 5.6. Transmission system impacts associated with construction and operation activities would be SMALL.

9.3.2.2 Ginna Site

The Ginna site is collocated with the existing CEG's R.E. Ginna Nuclear Plant, which is located in Wayne County, New York, on the south shore of Lake Ontario. Figure 9.3-7 contains a vicinity map showing the 6-mi (9.7-km) radius surrounding the Ginna site.

9.3.2.2.1 Land Use

Agriculture plays a large and important role in Wayne County. The existing R.E. Ginna Nuclear site encompasses 488 ac (197 ha), approximately one quarter of which is used to support the existing nuclear plant and its ancillary structures. The majority of the land surrounding the existing R.E. Ginna Nuclear site is leased for agricultural uses, such as growing apples, cherries, grapes, and field crops. For a new nuclear station at the Ginna site, approximately 370 ac (150 ha) would available for the nuclear plant; 240 ac (97 ha) to support the EPR footprint and 130 ac (53 ha) to support ancillary plant structures. Some of the exiting nuclear plant infrastructure and property could be used for construction staging and laydown areas.

The Ginna site and the transmission ROWs are zoned industrial, and the majority of the surrounding land is zoned for large lot residential use. Nearby Monroe County is home to Rochester and is much more urbanized than Wayne County. None of the Wayne County towns along the Lake Ontario shoreline have overly restrictive growth ordinances, so it is likely that construction will continue to increase in these areas in the foreseeable future. Despite this expected growth, the impacts to land use at this site would still be expected to be SMALL because the proposed nuclear power generating station would be placed near existing nuclear facilities on land currently appropriately zoned for power generation.

Sufficient land area is available at the Ginna site to support an additional unit; therefore, impacts associated with construction of the proposed nuclear power generating station would be anticipated to be SMALL in relation to operation of the existing Ginna facility. Appropriate controls and monitoring during operation of the proposed nuclear power generating station would minimize any cumulative impacts associated with the ongoing operation at Ginna. Therefore, overall cumulative land use impacts would be anticipated to be SMALL.

9.3.2.2.2 Air Quality

Air quality in the vicinity of Ginna exceeds national standards for all measured parameters. There are no nearby areas designated as areas of nonattainment or maintenance. Emissions from plant activities are below state and federal thresholds; therefore, operations at Ginna do not require any air quality permits. Based on the design of the proposed nuclear power generating station and the actions that will be taken to comply with permit requirements for emissions, it is expected that siting a new unit at this location would have a SMALL impact on air quality.

The public and occupational radiological doses resulting from operation of Ginna are well below regulatory limits. The radiological exposure limits for protection of the public and for occupational exposures have been developed assuming long-term exposures, and therefore incorporate cumulative impacts. The recent Annual Radioactive Effluent Release Report, covering the period from January 1, 2006, through December 31, 2006, indicates all gaseous and liquid effluents discharged during the reporting period were in compliance with the limits of the R.E. Ginna Technical Specifications, as defined in the Off-site Dose Calculation Manual (R.E. Ginna Nuclear Power Plant, LLC, 2007). As described in the Ginna Generic Environmental Impact Statement (GEIS) for License Renewal of Nuclear Plants (NRC, 2004), the cumulative radiological impacts of continued operation of Ginna will be SMALL, additional mitigation is not warranted, and the NRC would regulate any reasonably foreseeable future actions in the vicinity of the Ginna site that could contribute to cumulative radiological impacts. Because operation of the proposed nuclear power generating station at Ginna and the existing unit would be in compliance with applicable regulatory dose limits, cumulative radiological impacts would be SMALL.

9.3.2.2.3 Water

Lake Ontario is 193 mi (310 km) long, 53 mi (85 km) wide, and has a surface area of approximately 7,340 mi^2 (19,010 km^2). The average depth is 283 ft (86m) with a maximum depth of 802 ft (244m). The Niagara River separates Lake Ontario from Lake Erie and supplies approximately 80% of the water that flows into Lake Ontario, while the rest comes from small tributaries and runoff from precipitation. In addition to Lake Ontario, surface water features at the Ginna site include Mill Creek, which enters the site from the south, and Deer Creek, which enters the site from the west. Mill Creek has a continuous yield, while Deer Creek dries up during the summer months. Ginna does not use groundwater resources for plant operations or domestic purposes (Rochester Gas and Electric Corporation [RG&E], 2002).

The cooling water system for the proposed nuclear power generating station would include a CWS and a service water system. The CWS circulates cool water through the main condensers to condense steam after it passes through the turbine. The service water system circulates cooling water through heat exchangers that serve various plant components. The proposed nuclear power generating station would have a once-through service water system and a closed-cycle CWS system that uses a cooling tower. Some of the discharge from the service water system will be added to the CWS to make up for losses due to evaporation and drift from the cooling tower. The proposed nuclear power generating station would have separate intake and discharge structures located offshore in Lake Ontario, and a screenwell and pumphouse structure located onshore.

Hydrologic impacts associated with construction activities 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 other 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); and increased erosion and sedimentation. Water used for construction activities may be supplied from Lake Ontario, supplied from the local municipality's water system, or trucked to the construction site.

A specific quantity of water usage is not known at this time; however, proper mitigation and management methods implemented during construction will limit the potential water quantity and quality effects to surface water and groundwater.

Construction-related water use impacts will be minimized through the implementation of 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. Overall construction-related water use impacts would be SMALL.

The main source of water for the existing R.E. Ginna Nuclear site and the proposed new nuclear unit would be Lake Ontario. Given the volume of water contained in Lake Ontario, surface water supply is adequate for station needs, and addition of a new nuclear power generating station at the site would not cause a significant impact to water resources (RG&E, 2002). In addition, Ginna is not a direct user of groundwater, and there are no plans for direct groundwater use in the future (NRC, 2004). For the proposed new unit, it is anticipated that there would be a site-specific water treatment system or the use of a municipal system, if available.

The impacts associated with operating the proposed nuclear power generating station's CWS and intake and discharge systems are anticipated to be similar to those impacts associated with the operation of the existing R.E. Ginna nuclear facility, which are described in detail in both the R.E. Ginna license renewal document (RG&E, 2002) and the R.E. Ginna GEIS (NRC, 2004). Operation impacts discussed in those two documents indicate that the thermal discharge is in compliance with applicable permit requirements; the plant operates in accordance with applicable local, state, and federal discharge limitations; there are no impacts related to scouring caused by discharged cooling water; there are no impacts related to discharge of chlorine or other biocides; there are no impacts related to discharges of sanitary wastes or other metals in wastewater; there are no impacts related to altered current patterns at the intake and discharge systems; there are no impacts related to altered thermal stratification of the lake; there are no impacts related to temperature effects on sediment transport capacity; there are no impacts related to thermal plume barriers to migrating fish; and there are no impacts related to stimulation of nuisance organisms. Regarding potential impacts related to the impingement and entrainment of fish and shellfish in early life stages, the proposed new nuclear unit will have less of an impact to the impingement and entrainment of fish and shellfish in Lake Ontario because the proposed nuclear power generating station would use a cooling tower based system compared to the once-through condenser cooling system used for the existing nuclear unit.

Ensuring permitted limits for water withdrawal and discharge are met through operational controls and monitoring would minimize the potential for adverse impacts to water availability and water quality. Therefore, it is anticipated that overall water use impacts from operation activities would be SMALL.

Cumulative water impacts were addressed for the continued operation of the existing R.E. Ginna nuclear facility in the R.E. Ginna GEIS (NRC, 2004). In that document, it was determined that there would be SMALL cumulative impacts on water use, water quality, and groundwater withdrawals because there are no groundwater withdrawals at the existing R.E. Ginna nor the new Ginna nuclear site, and there are none anticipated in the future. Water use and water quality impacts associated with the intake of water from, and the discharge of water to, Lake Ontario for the existing R.E. Ginna Nuclear site would continue to be regulated by the State of New York and other agencies. Water use (intake and discharge) for the proposed nuclear power generating station at the Ginna site would also be regulated by applicable state and other agencies. Therefore, cumulative water impacts would be SMALL.

9.3.2.2.4 Terrestrial Ecology and Selective Species

The Ginna site is surrounded by a variety of habitat types, such as mature woodlands, meadows, and abandoned farm fields, all typical of central and western New York. There are no federally or state-regulated wetlands at the Ginna site, and no federally or state-listed threatened or endangered terrestrial species are known to occur at the site (RG&E, 2002).

Impacts on the terrestrial ecosystem associated with construction of the proposed nuclear power generating station include noise, clearing and grading, and potential collisions of birds with new structures. Construction of the proposed nuclear power generating station would result in direct mortality for certain wildlife and would reduce the available habitat area 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 nuclear plant 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 proposed nuclear power generating station, water pipeline, and transmission line corridors are anticipated to be MODERATE, but would be minimized by searching for sensitive species and complying with permit and mitigation requirements before beginning construction activities. Because no land will be disturbed once construction is complete, the impacts of operation would be SMALL.

Cumulative impacts to threatened and endangered species were addressed for the continued operation of the existing R.E. Ginna facility in the Ginna GEIS (NRC, 2004). In that document, it was determined that the cumulative impacts to threatened and endangered species due to continued operation of the R.E. Ginna facility would be SMALL and that additional mitigation would not be warranted primarily because none are known to occur near the Ginna site. Therefore, it is anticipated that the addition of another unit at the Ginna site would not impact threatened or endangered species at the site.

9.3.2.2.5 Aquatic Ecology and Selective Species

Although the Ginna site is situated on the south shore of Lake Ontario, there are no aquatic federal- or state-listed threatened or endangered species at the site (RG&E, 2002).

Construction-related impacts on the aquatic ecology would include loss of wetlands, temporary loss of habitat, and short-term degradation of water quality in isolated areas due to in-water and shoreline construction of the CWIS and other appurtenant structures (such as blowdown and discharge pipelines).

While much of the supporting CWIS structure will be located onshore, a portion 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 lake. The blowdown and discharge pipeline would extend into the lake. The dredging of sediment during construction of the CWIS and pipeline 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 period of 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 activities 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 in-water construction activities. BMPs and compliance with permit requirements will be used to minimize runoff volumes and impacts. The use of a cofferdam to facilitate construction of the in-water 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.

CWIS and pipeline 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.

Construction activities would have a SMALL to MODERATE impact on the aquatic ecology at the Ginna site depending on the proximity of the proposed nuclear power generating station to on-site streams and the impacts associated with construction of the CWIS and other appurtenant structures (such as blowdown and discharge pipelines).

Operating a new nuclear power generating station at Ginna would have a SMALL impact on the aquatic ecology in the area because no sensitive species are known to occur in the vicinity, and operation of the proposed nuclear power generating station is expected to have a similar impact on aquatic resources as the existing reactor.

Cumulative impacts to threatened or endangered species were addressed for the continued operation of the existing R. E. Ginna facility in the Ginna GEIS (NRC, 2004). In that document, it was determined that the cumulative impacts on threatened or endangered species due to continued operation of the R. E. Ginna facility would be SMALL and that additional mitigation would not be warranted primarily because none are known to occur near the Ginna site. Therefore, it is anticipated that the operation of another unit at the Ginna site would not adversely impact threatened or endangered species.

9.3.2.2.6 Socioeconomics

U.S. Census Bureau information was used to determine the socioeconomic makeup of the Ginna site and surrounding area. The Ginna site is located in Wayne County, New York. In 2000, Wayne County had a population of approximately 93,765, and Monroe County had a population of 735,343 (U.S. Census Bureau, 2000). Monroe County is more developed and industrialized than Wayne County and is home to Rochester, the third largest city in New York State.

The Ginna site is located within CT 20101 and Block Group (BG) 1. A census tract is a particular community defined for the purpose of taking a census by the U.S. Census Bureau. Usually these coincide with the limits of cities, towns, or other administrative areas. Several tracts commonly exist within a county. Census tracts are subdivided into block groups and census blocks. A block group is a geographical unit between the census tract and census block. The block group is the smallest geographical unit for which the U.S. Census Bureau publishes sample data; that is, data which is only collected from a fraction of all households. A census block is the smallest geographic unit used by the U.S. Census Bureau for tabulation of 100% data (data collected from all houses, rather than a sample of houses). Several census blocks make up block groups, which again make up census tracts. There are on average about 39 census blocks per block group, but there are variations. Census blocks typically have a four-digit number, where the first number indicates which block group the census block is in; for example, Census Block 3019 would be in Block Group 3.

In 2000, the population within CT 20101 BG 1 was 4,712. The population density for CT 21501 BG 1 in 2000 was 217 ppsm. The population density of Wayne County in 2000 was 155 ppsm. The CT data from 2000 were reviewed to determine the average population density within a 20-mi (32-km) radius of the Ginna site. Based on these data, there are 284 ppsm, including seasonal transient populations, within this area (U.S. Census Bureau, 2000). When using population data from the year 2000 as a baseline, Wayne County is estimated to experience a population decrease of 0.6% by 2010, 0.9% by 2015, and 1.9% by 2020 (Cornell University, 2008). Monroe County is estimated to experience no population change by 2010 and a 1.0% increase in population by 2020 (NRC, 2004).

Approximately 92% of the existing R.E. Ginna Nuclear facility employees live in Wayne and Monroe counties (NRC, 2004). Currently, the unemployment rate in Wayne County is 5.4%. Of the 47,000 people employed in Wayne County, 4,500 are in construction. The economy of the Finger Lakes region is presently in transition. The local economic base, which was once dependent upon a few large manufacturing firms, has become much more diverse in recent years. A mix of small manufacturers and firms in a variety of service-producing industries are adding jobs, a trend that will likely continue. Among the region's most important economic assets are its post-secondary educational institutions. (New York Loves Business [NYLB], 2008a)

The Greater Rochester International Airport is located in southwest Rochester, approximately 20 mi (32 km) from the Ginna site. A primary passenger railway, operated by Amtrak, runs east-west approximately 13.5 mi (21.6 km) south of the Ginna site. In addition, the Ontario Midland Railroad, a local privately owned "shortline" that feeds into the CSX Transportation lines, operates both passenger and freight service. The east-west portion of the "T" runs approximately 3 mi (5 km) south of the Ginna site from Webster to Wolcott. The north-south portion of the track runs from Sodus to Newark, 16 mi (26 km) east of the Ginna site. The Port of

Rochester, located on Lake Ontario at the mouth of the Genesee River, was decommissioned as a commercial port in 1980. It now is used by only two cruise ships in the summer. (NRC, 2004)

In addition to lower taxes, New York offers a variety of incentives to companies expanding or relocating to New York. These include exemptions (NYLB, 2008b):

- Investment Tax Credit (ITC): Businesses that create new jobs and make new investments in production property and equipment may qualify for tax credits of up to 10 percent of their eligible investment. New businesses may elect to receive a refund of certain credits, and all unused credits can be carried forward for 15 years.
- Research and Development (R&D) Tax Credit: Investments in research and development facilities are eligible for a 9% corporate tax credit. Additional credits are available to encourage the creation and expansion of emerging technology businesses, including a 3-year job creation credit and a capital credit for investments in emerging technologies.
- Sales Tax Exemptions: The State of New York offers exemptions for purchases of production machinery and equipment, research and development property, and fuels/utilities used in manufacturing and R&D. Other exemptions may be available through local Industrial Development Agencies (IDAs).
- Real Property Tax Abatement: To encourage development, expansion, and improvement of commercial property, a 10-year property tax abatement is available to offset increased assessments due to improvements to business and commercial property.
- No Personal Property Tax: Unlike many other states that tax both real property and personal property, property taxes in New York are imposed on real property only. Personal property, whether tangible or intangible, is exempt from state and local taxes.
- Economic Development Zone/Empire Zone Tax Credits: The State of New York has designated 72 zones as Economic Development Zones/Empire Zones, which offer a host of benefits. These include discounts on electricity, enhanced tax credits for investment and job creation, and additional sales and property tax.

For the period from 1995 to 2001, the existing R.E. Ginna Nuclear facility's tax payments for the Town of Ontario, New York, averaged 13.2% of the total revenue collected and 37.2% of the total property taxes (NRC, 2004). For the same time period, taxes paid by the existing R.E. Ginna Nuclear facility accounted for an average of 2.0% of the total revenue and 6.4% of the total property taxes for Wayne County, New York. Finally, the R.E. Ginna Nuclear facility accounted for an average of 11.7% of the total revenue and 26.1% of the total school levy amount for the Wayne Central School District (NRC, 2004).

Due to the low number of retail centers within Wayne County, there is relatively little tax revenue generation from sales tax. Therefore, the tax revenue generated by property taxes makes up a significant portion of the overall revenue generated by Wayne County and the town of Ontario. Most of the property tax revenue within the county comes from the residential sector (nearly 70%). The tax revenue generated by the R.E. Ginna Nuclear facility alone makes up about 6% of property tax revenues, while all other commercial properties generate approximately 10% of the property revenues for the county (NRC, 2004).

Based on 2000 Census data, approximately 3,859 housing units are currently vacant, representing approximately 10% of the total housing units within the Wayne County. Monroe County, which has a larger population base and a relatively stronger employment market, had a vacancy rate of approximately 6% in 2000 based on a housing stock of approximately 304,400 units (U.S. Census Bureau, 2000).

The cooling tower plume from the proposed nuclear power generating station would likely be visible at a considerable distance; however, a limited alteration of the aesthetics in the area would occur due to the existing R.E. Ginna Nuclear facility. Overall impacts to the area's population from construction and operation of a new nuclear power generating station would be SMALL. The construction and operation of the new nuclear station would have a SMALL beneficial economic impact to the surrounding area and region.

9.3.2.2.7 Transportation

There are 13 counties wholly or partially within the 50-mi (80-km) radius of the Ginna site. The 13-county area is served by a network of interstate freeways, including Interstate 90 (I-90), I-390, I-490, and I-81. In addition to interstate freeways, the region's transportation network includes the Greater Rochester International Airport in southwest Rochester and a train network. The Port of Rochester, at the mouth of the Genesee River, is also available to a limited number of cargo ships and passenger ferries. (NRC, 2004)

The main east-west transportation routes providing access to the Ginna site are County Route 101 (Lake Road) and State Route 104. Lake Road, a two-lane road, provides direct access to Ginna along much of the southern border of the site. State Route 104, the predominant east-west corridor near the plant, runs parallel to Lake Road approximately 3.6 mi (5.8 km) south of Ginna. Ontario Center Road in the town of Ontario runs north-south, connecting State Route 104 to Lake Road immediately south of Ginna. Several other secondary roads run north-south providing access to Lake Road from State Route 104.

Employees commuting from Monroe County and other points west of the Ginna site are likely to use State Route 104, Route 441, or Route 286 to access Lake Road. Employees commuting from the south and east are likely to use north-south corridors State Route 21 and Route 350 to reach State Route 104, and then use Ontario Center Road to Lake Road.

There are several ways to mitigate the potential transportation impacts during construction such as developing a construction traffic management plan prior to construction to address potential impacts on local roadways. If necessary, coordinating with local planning authorities for the upgrading of local roads, intersections, and signals to handle increased traffic loads could be considered.

Schedules during workforce shift changes and for the delivery of larger pieces of equipment or structures could be coordinated to limit impacts on local roads. In addition the use of shared (for example, carpooling) and multi-person transport (for example, buses) during construction and/or operation of the facility could be encouraged.

By implementing the appropriate measures, it is expected that there would be MODERATE impacts on transportation during construction activities, and SMALL impacts during operation of the facility.

9.3.2.2.8 Historic, Cultural, and Archeological Resources

The area surrounding the Ginna site was historically occupied by Native American tribes. No significant Native American artifacts or evidence of villages has been found or identified on or in close proximity to the Ginna site. In addition, no archeological sites are known to exist in the vicinity of the plant. However, because archeological sites have been found along the creeks and lakeshore, the New York SHPO considers the area surrounding Ginna an archeologically sensitive area (NRC, 2004).

It is reasonable to expect that, because no historic sites are known to occur at the Ginna site, construction- and operation-related impacts on historical, cultural, and archeological resources at this site would be SMALL, but investigations of the site would be needed before siting a new nuclear power generating station at this location.

9.3.2.2.9 Environmental Justice

The demographic characteristics surrounding the Ginna site were evaluated to determine the potential for environmental justice issues based on disproportionately high and adverse impacts to minority or low-income population. Demographic information used for this study was obtained from the 2000 U.S. Census. Demographics of the adjoining CTs/BGs on and around the site within the county were examined and compared with the demographics of Wayne County and the State of New York. Table 9.3-4 (U.S. Census Bureau, 2000) presents this demographic information.

The Ginna site is located in CT 20101 BG 1. Adjacent CTs include 20102 (BG 2), 20401 (BG 2), and 20402 (BG 1). CT 20101 BG 1 has a 2.7% minority population, which is lower than all adjacent CTs within the county (CT 20102 BG 1 [4.3%], CT 20401 BG 2 [4.0%], and CT 20402 BG 1 [8.6%]). The Hispanic population for the proposed action CT/BG is 1.3% and is comparable to the adjacent CTs and BGs, which range from 1.2 to 2.5%.

CT 20101 BG 1 (2.7%) has a lower percentage of minority residents compared to Wayne County (6.2%) and the State of New York (31.2%). The Hispanic population of CT 20101 BG 1 (1.3%) is lower than Wayne County (1.3%) and the State of New York (15.1%).

Approximately 2.5% of the CT 20101 BG 1 population is below the poverty level, which is lower than all of the adjacent CTs/BGs. The percent of population classified as below the poverty level in CT 20101 BG 1 (2.5%) is lower than that in Wayne County (14.0%) and the State of New York (14.6%).

In 2000, the median household income for Wayne County was $44,157, compared to an average of $43,393 for the State of New York (U.S. Census Bureau, 2000).

Based on the data presented in Table 9.3-4 (U.S. Census Bureau, 2000), no disproportionately high percentage of minority or low-income residents would be directly impacted by construction and operation of the proposed nuclear power generating station. The economic benefits of the facility to the county would likely also benefit the minority populations to some degree, either directly by offering new jobs or indirectly through secondary job creation and increased services from the increased tax revenue.

The proposed nuclear power generating station would be a positive economic stimulus to Wayne County and the local economy. Any adverse human health and environmental consequences from the proposed nuclear power generating station would not be borne disproportionately by minority or low-income groups. Furthermore, this site has been operating as a nuclear power generating facility for a number of years. Therefore, it is anticipated that environmental justice impacts would be SMALL.

9.3.2.2.10 Transmission Corridors

Currently, no ROWs capable of supporting the necessary 345-kV transmission lines exist. No current ROWs exist for transmission expansion. The nearest 345-kV substation is near the State throughway, approximately 20 mi (32 km) from the plant. The tie-in with the existing 345-kV transmission corridor would require 20 mi (32 km) of new transmission lines and ROW.

Most transmission corridors would pass through land that is primarily agricultural and forest land, and would result in some ecological impacts. The areas are mostly rural and remote with low population densities. The impact of these corridors on land usage would be minimal; farmlands that have corridors passing through them would generally continue to be used as farmland. Specific monitoring requirements for new transmission lines and corridors and associated switchyards would be designed to satisfy conditions of applicable federal, state, and local permits, to minimize adverse environmental impacts. Because new ROWs would need to be constructed to accommodate the new transmission lines, it is anticipated that construction impacts from the development of new transmission corridors would be MODERATE due to the commitment of land and construction impacts on ecological resources.

Operational activities within the transmission corridors might include visual inspection and appropriate maintenance of transmission line ROWs. Maintenance activities might include reclearing vegetation, tree trimming/removal, and encroachment licensing/removal. For maintenance purposes, wooded sections of the ROW would be recleared to the full width through mechanical clearing, hand cutting, or herbicide application. Overall operation transmission impacts are anticipated to be SMALL.

9.3.2.3 AES Somerset Site

The AES Somerset site is collocated with an existing electric power plant, the AES Somerset LLC Coal Power Station, which is located approximately 2.4 mi (3.8 km) west of the Town of Somerset, New York, and 3 mi (4.8 km) northwest of the Town of Baker, New York, in Niagara County, on the southern border of Lake Ontario. The site is also located approximately 7 mi (11.2 km) west of the Golden Hill State Park, which is situated on the south shore of Lake Ontario, near Thirty-Mile Point Lighthouse, a regional tourist attraction. The closest metropolitan area is the Buffalo-Niagara area. The AES Somerset LLC Coal Power Station site encompasses approximately 1,800 ac (728.4 ha) and contains a 675-MW coal-fired electric generating facility, serving approximately 650,000 homes (AES Corporation, 2008a). Figure 9.3-8 contains a vicinity map showing the 6-mi (9.7-km) radius surrounding the AES Somerset site.

9.3.2.3.1 Land Use

The land surrounding the AES Somerset site is rural. The AES Somerset site is zoned as a public utility district, and the existing land use is industrial. Surrounding land uses are predominantly agriculture with some industrial land uses to the south and residential land uses to the east. There is a land fill on the existing AES Somerset property (EDR, 2008a).The Town of Somerset Comprehensive Plan identified an area on the northeast corner of the site that is planned for park land (Town of Somerset Planning Board and Town Board, 2003).

Impacts to land use at this site are expected to be SMALL due to the existing power generating facility. In addition, most of the adjacent lands are undeveloped or contain low density development.

9.3.2.3.2 Air Quality

The AES Somerset site is located in Niagara County, New York. Niagara County is currently designated as being in attainment of all federally regulated pollutants except for ozone by the USEPA (USEPA, 2008). According to the USEPA, Niagara County is classified as nonattainment for ozone, with a designation of "basic nonattainment." A basic nonattainment area is the lowest level of nonattainment status, previously referred to as "marginal nonattainment." Any air emissions that will occur as a result of the operation of the proposed nuclear power generating station will be low enough that they are not expected to 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 levels at any location. While the ozone nonattainment status of Niagara 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. Therefore, air quality impacts would be SMALL.

9.3.2.3.3 Water

The main source of water for the proposed nuclear power generating station at the AES Somerset site would be Lake Ontario. Water use impacts and mitigation measures associated with the construction of a new nuclear station at the AES Somerset nuclear facility would be similar to those identified in Section 9.3.2.2.3. Overall construction related water impacts would be SMALL.

It is anticipated that there would be a site-specific water treatment system or the use of a municipal water treatment system, if available. The impacts associated with operating the proposed nuclear power generating station's CWS and intake and discharge systems would be similar to those impacts associated with operating the two existing nuclear power plants (NMPNS and R.E. Ginna) that use water from Lake Ontario for their plant cooling systems. Those impacts are identified in Sections 5.3.1 and 9.3.2.2.3. Ensuring permitted limits for water withdrawal and discharge are met through operational controls and monitoring would minimize the potential for adverse impacts to water availability and water quality. Therefore, it is anticipated that overall water use impacts from operation activities would be SMALL.

9.3.2.3.4 Terrestrial Ecology and Selective Species

The AES Somerset site is situated in a flat agricultural area with an approximate elevation of 290 ft (88.4 m) above mean sea level.

Table 9.3-5 (NYSDEC, 2008c) provides a list of federally and state-listed protected terrestrial species in the State of New York. Because the surrounding land is agricultural, there is less chance that threatened and endangered species occur within the area of the proposed nuclear power generating station; however, species may exist in the forested areas adjacent to the existing coal facility. A search of the EDR database for the AES Somerset site indicated that the Indiana Bat (*Myotis sodalis*) is a federal endangered species that is located in the county but not found on site (EDR, 2008b).

Impacts on the terrestrial ecosystem associated with construction of the proposed nuclear power generating station would be similar to those described in Section 9.3.2.2.4. Overall terrestrial ecology impacts from construction of the proposed nuclear power generating station, water pipeline, and transmission line corridors are anticipated to be MODERATE, but would be minimized by searching for sensitive species and complying with permit and mitigation requirements before beginning construction activities. Because no land will be disturbed once construction is complete, the impacts of operation would be SMALL.

9.3.2.3.5 Aquatic Ecology and Selective Species

The NWI shows small areas of forested and scrub/shrub wetlands surrounding the site (EDR, 2008b). FEMA floodplain maps indicate there is a small floodplain associated with Lake Ontario to the north of the site area (FEMA, 2008). Table 9.3-5 (NYSDEC, 2008c) provides a list of federally and state-listed protected terrestrial species in the State of New York. No threatened or endangered aquatic species occur on site (EDR, 2008b).

Construction-related impacts on the aquatic ecology would be similar to those identified in Section 9.3.2.2.5. Construction activities would have a SMALL TO MODERATE impact on the aquatic ecology at the AES Somerset site based on the impacts associated with construction of the CWIS and other appurtenant structures (such as blowdown and discharge pipelines).

By ensuring permitted limits for water withdrawal, consumptive use and discharge are met through operational controls and monitoring will minimize the potential for adverse impacts to aquatic ecology during operation of the proposed nuclear station. Therefore, it is anticipated that overall aquatic ecology impacts from operation activities would be SMALL.

9.3.2.3.6 Socioeconomics

The AES Somerset site is located within CT 24102, BG 3, Niagara County, New York. In 2000, Niagara County had a population of approximately 219,846. In 2000, the population within CT 24102 BG 3 was 902. The population density for CT 24102 BG 3 in 2000 was 65 ppsm. The population density of Niagara County in 2000 was 417 ppsm.

CT data from 2000 were reviewed to determine the average population density within a 20-mi (32-km) radius of the AES Somerset site. Based on these data, there are 106 ppsm within this area, including seasonal transient populations (U.S. Census Bureau, 2000). When using population data from the year 2000 as a baseline, Niagara County is estimated to experience a population decrease of 3.1% by 2010, 4.8% by 2015, and 6.9% by 2020 (Cornell University, 2008).

Approximately 14 hospitals are located within a 50-mi (80-km) radius of the AES Somerset site. Mercy Hospital of Buffalo is the closest hospital to the site and is located 27 mi (43.5 km) from the site. De Graff Memorial, Deaconess, and Edward Meyer Memorial hospitals are the next closest hospitals to the site and are located between 30 and 31 mi (48 and 50 km) from the site. (ESRI, 2006)

The Niagara County, New York Fire Services consists of 21 fire departments, 10 of which are volunteer fire departments (Niagara County, 2008).

There are approximately 22 public and private airports located within a 50-mi (80-km) radius of the AES Somerset site. This does not include airstrips or heliports. Cambria Airport located in Niagara County is the closest airport to the site (12 mi [19.3 km]). Flying F, Orchard Park, and Donnellys airports are the next closest airports to the site and are located between 16 and 22 mi (25 and 36 km) from the site. (ESRI, 2006)

Approximately 75 parks, which include gardens, game lands, some playgrounds and athletic fields, are located within a 50-mi (80 km) radius of the AES Somerset site. Cazenovia Park located in Erie County is the closest park to the site, located 12.mi from the site. Centennial, Heacock, and Houghton parks are the next closest parks to the site and are located between 13 and 16 mi (25.7 km) from the site. (ESRI, 2006)

Approximately 437 public and private schools, which include elementary, middle and high school, colleges, and universities, are located within a 50-mi (80-km) radius of the AES Somerset site. Allendale Elementary School located in Erie County is the closest school to the site, located 0.8 mi (1.3 km) from the site. Bellwood, Fisher, Holy Family and Lackawanna High Schools are the next closest schools to the site and are located between 8 and 13 mi (12 and 21 km) from the site (ESRI, 2006)

Currently, there is a 6.7% unemployment rate in Niagara County and a 5.7% unemployment rate in the Western New York region. Of the 100,200 Niagara County residents employed in 2000, 9,080 were in construction. Erie County, which contains the largest city in the area, Buffalo, New York, had 429,900 residents employed, of which 29,391 were in construction in 2000.

Beginning in 2005, Western New York's economy improved markedly, resulting in both lower unemployment and improved private sector job figures. Financial activities played a large role in region’s change in economy. A combination of ongoing job growth and lower unemployment rates predicts that the region's economy should continue to do well; however, in 2008 unemployment rates have increased from 2007 by slightly over 1%. (NYLB, 2008a)

- In addition to lower taxes, New York offers a variety of incentives to companies expanding or relocating to New York as described in Section 9.3.2.2.6.

Based on 2000 U.S. Census data, approximately 7,869 housing units were vacant in Niagara County, representing 8.2% of the total housing units in the county (U.S. Census Bureau, 2000). Within a 50-mi (80-km) radius of the site, approximately 46,276 housing units are vacant, representing 12.1% of the total housing in that area (U.S. Census Bureau, 2000).

The cooling tower plume from the proposed nuclear power generating station would likely be visible at a considerable distance; however, a limited alteration of the aesthetics in the area would occur due to the existing AES Somerset coal-powered facility.

Overall impacts to the area’s population from construction and operation of a new nuclear power generating station would be SMALL. The construction and operation of the new nuclear station would have a SMALL beneficial economic impact to the surrounding area and region.

9.3.2.3.7 Transportation

State Route 18 (Lake Road) is the main east-west road in the region and State Route 148 (Quaker Road) is the main north-south road. Both of these roads are state highways and important parts of the regional transportation system. Other roads in the town and in the vicinity of the site are under local or county road jurisdiction.

The Niagara Falls International Airport is the closest major airport and is located approximately 25 mi (40.2 km) southwest in the City of Niagara Falls, New York. The site is not currently served by barge access; however, conceptual plans have been developed to construct a Lake Unloading Project consisting of a large pier, which would allow materials to be shipped to the site (AES Corporation, 2008b).

The site is served by an active rail line that runs through the western end of the Town of Somerset, New York. The railroad ROW continues eastward through the town, but this portion of the rail line is in private ownership and is not in operation. There are no public transportation services in Somerset, New York.

It is anticipated that there will be traffic impacts on local roads during construction and operation activities. The development of a traffic management plan prior to construction would aid in identifying and mitigating potential traffic impacts. The following mitigation measures will be considered in the 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 impacts on local roads.

- Carpooling: The use of carpooling and providing transit services (buses) during construction and operation of the facility could be considered.

- Coordination with local planning authorities: If necessary, the upgrading of local roads, intersections, and signals to handle increased traffic loads could be considered.

By implementing the appropriate measures, it is expected that there would be MODERATE impacts on transportation during construction activities and SMALL impact during operation of the facility.

9.3.2.3.8 Historic, Cultural, and Archeological Resources

The AES Somerset site is located in Niagara County, New York. Niagara County is in the northwest corner of the state, and the town of Somerset in the northeast corner of the county. The current facility is located north of State Route 18, also known as Lake Road, and the south shore of Lake Ontario. It is northwest of the Village of Barker. Lake Road was one of the original roads running through the Somerset, New York community. Niagara County was formed in 1808, and the town of Somerset was founded in the 1820s, although it was settled as early as 1810. Somerset is the site of the Thirty-Mile Point Lighthouse, built in 1875 on the southern shore of Lake Ontario. The lighthouse is the only National Register of Historic Places (NRHP)-listed property in Somerset located approximately 8 mi (12.9 km) to the east of the AES Somerset site. There are 59 NRHP-listed properties in Niagara County in total. (NRHP, 2008) Because the site was cleared for new construction in the late 1970s, there is a low potential for finding above ground resources in the immediate vicinity. A search of the EDR database for the AES Somerset site indicated that no historic properties occur on site (EDR, 2008b).

Consultation with the SHPO would occur if any significant cultural resources were identified, and appropriate mitigation measures would be negotiated prior to construction and operation. Thus, construction- and operation-related impacts on historical, cultural, and archeological resources at this site would be SMALL.

9.3.2.3.9 Environmental Justice

The demographic characteristics surrounding the AES Somerset site were evaluated to determine the potential for environmental justice issues based on disproportionately high and adverse impacts to minority or low-income population. Demographic information used for this study was obtained from the 2000 U.S. Census. Demographics of the adjoining CTs/BGs on and around the site within the county were examined and compared with the demographics of Niagara County and the State of New York. Table 9.3-6 (U.S. Census Bureau, 2000) presents this demographic information.

Figure 9.3-9 presents the census tract and block groups that fall within a 6-mi (9.7-km) radius of the site. In addition, the figure also presents the minority populations and percentages that fall within the census tract and block groups within that 6-mi (9.7-km) radius (U.S. Census Bureau, 2000).

The AES Somerset site is located in CT 24102, BG 3. Adjacent CTs include CT 24102 (BG 1 and 2), CT 24101 (BG 1), CT 24201 (BG 6), and CT 24202 (BG 1). CT 24102 BG 3 has a 4.4% minority population, which is slightly higher then all adjacent CTs within the county (CT 24102 BG 1 [2.2%], CT 24102 BG 2 [2.3%], CT 24101 BG 1 [2.7%], and CT 24201 BG 6 [2.1%]) except CT 24202 BG 1 (8.1% below poverty).

The Hispanic population for the proposed action CT/BG is 1.7% and is comparable to the adjacent CTs and BGs, which range from 0.9% to 3.8%.

CT 24102 BG 3 (4.4%) has a lower percentage of minority residents compared to Niagara County (9.3%) and the State of New York (31.2%). The Hispanic population of CT 24102 BG 3 (1.7%) is slightly higher than Niagara County (1.3%) and lower than the State of New York (15.1%).

Approximately 6.8% of the CT 24102 BG 3 population is below the poverty level, which is lower than the adjacent CT 24102 BG 1 (12.6%), CT 24102 BG 2 (9.1%), CT 24101 BG 1 (9.8%), and CT 24202 BG 1 (7.9%), and higher than CT 24201 BG 6 (2.2%). The percent of the population classified as below the poverty level in CT 24102 BG 3 (6.8%) is lower than Niagara County (10.6%) and the State of New York (14.6%).

In 2000 the median household income for Niagara County was $38,136, compared to an average of $43,393 for the State of New York (U.S. Census Bureau, 2000).

Based on the data presented in Table 9.3-6 (U.S. Census Bureau, 2000), no disproportionately high percentage of minority or low-income residents would be directly impacted by construction and operation of the proposed nuclear power generating station. Furthermore, no disproportionately high percentage of minority residents that live within a 6-mi (9.7-km) radius of the site would be directly impacted by the proposed nuclear plant, as shown on Figure 9.3-9. The economic benefits of the facility to the county would likely benefit the minority and low-income populations to some degree, either directly by offering new jobs, or indirectly through secondary job creation and increased services from the increased tax revenue.

The proposed nuclear power generating station would be a positive economic stimulus to Niagara County and the local economy. Any adverse human health and environmental consequences from the proposed nuclear power generating station would not be borne disproportionately by minority or low-income groups. Therefore, it is anticipated that environmental justice impacts would be SMALL.

9.3.2.3.10 Transmission Corridors

The AES Somerset site is located less than 1 mi (1.6 km) from the nearest 345-kV transmission line and has access to an existing switchyard. The new facility would be connected to the existing switchyard facility which would result in lower amounts of new circuits. However, transmission grid capacity and system congestion may require upgrades to the transmission system including transmission corridors. Impacts associated with transmission system upgrades would be similar to those identified in Section 9.3.2.2.10. It is anticipated that construction impacts from the development of new transmission corridors would be SMALL to MODERATE due to the commitment of land and construction impacts on ecological resources while operation activities would have a SMALL impact on the transmission system of the proposed new unit.

9.3.2.4 Blenheim-Gilboa Site

The Blenheim-Gilboa site is located adjacent to an existing electric power generating facility: The New York Power Authority's Blenheim-Gilboa Hydroelectric Power Plant, located approximately 40 mi (64.4 km) southwest of Albany, in Schoharie County, New York; and 3 mi (4.8 km) north of Gilboa, New York, and 2.5 mi (4 km) south of North Blenheim, New York, along Schoharie Creek in the northern Catskill Mountains. Figure 9.3-10 contains a vicinity map showing the 6-mi (9.7-km) radius surrounding the Blenheim-Gilboa site.

9.3.2.4.1 Land Use

The surrounding region contains mostly undeveloped lands that are forested. The Blenheim-Gilboa site is located adjacent to the Mine Kill State Park that was built by the New York Power Authority and operated by the Saratoga-Capital District Region of the State Office of Parks, Recreation and Historic Preservation. The park is 650 ac (263 ha) and includes three swimming pools and facilities for picnicking, softball, basketball, volleyball, horseshoes and fishing.

Neither of the neighboring communities of Blenheim or Gilboa has existing zoning ordinances. In addition, Schoharie County does not control zoning in the area of the site. Land uses would be regulated under the State of New York public, health, and safety clauses. Land use impacts at this site are expected to be SMALL due to construction activities near an existing power generating facility.

9.3.2.4.2 Air Quality

The Blenheim-Gilboa site is located in Schoharie County, New York. Schoharie County is currently designated as being in attainment of all federally regulated pollutants except for ozone by the USEPA (USEPA, 2008). According to the USEPA, Schoharie County is classified as nonattainment for ozone, with a designation of "basic nonattainment." A basic nonattainment area is the lowest level of nonattainment status, previously referred to as "marginal nonattainment." Any air emissions that will occur as a result of the operation of the proposed nuclear power generating station will be low enough that they are not expected to 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 levels at any location. While the ozone nonattainment status of Schoharie 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. Therefore, air quality impacts are expected to be SMALL.

9.3.2.4.3 Water

The site is comprised of two reservoirs that are a part of the power generation facility. Both reservoirs have a capacity of 5 billion gallons (over 71.6 million cubic meters). One of the reservoirs is located at the foot of Brown Mountain in the Schoharie Valley, and the other is located at the top of the mountain.The proposed nuclear power generating station would be located on the shoreline of the Lower Blenheim-Gilboa Reservoir. Water for the Blenheim-Gilboa site would be drawn from the Schoharie Creek/Upper Blenheim-Gilboa Reservoir/Lower Blenheim-Gilboa Reservoir complex adjacent to the site. New permits would be required for water consumption and use. New intake and discharge structures would need to be constructed at the site. The proposed new nuclear station is expected to utilize a closed-cycle cooling system, which will have less of an impact to the impingement and entrainment of fish and shellfish of the receiving water body. Water use impacts associated with the construction and operation of the proposed nuclear station would be similar to those identified in Section 9.3.2.2.3. Overall construction- and operation-related water use impacts would be SMALL.

9.3.2.4.4 Terrestrial Ecology and Selective Species

This Blenheim-Gilboa site is approximately 1200 ft (365.8 m) above mean sea level and surrounded to the east by deciduous and evergreen forests. Figure 9.3-10 (NYSDEC, 2008c) provides a list of federally and state-listed protected terrestrial species in the State of New York. A search of the EDR database for the Blenheim-Gilboa site indicated that the Indiana Bat (*Myotis sodalis*) is a federal endangered species that is located in the county but not found on site (EDR, 2008c).

Impacts on the terrestrial ecosystem associated with construction and operation of the proposed nuclear power station would be similar to those identified in Section 9.3.2.2.4.The terrestrial ecology impacts from construction activities are anticipated to be MODERATE, but would be minimized by searching for sensitive species and complying with permit and mitigation requirements before beginning construction activities. Operation impacts to the terrestrial ecology in the area are anticipated to be SMALL since no land will be disturbed once operation of the unit commences.

9.3.2.4.5 Aquatic Ecology and Selective Species

The NWI shows emergent wetlands associated with Schoharie Creek, which borders the site to the west (EDR, 2008c). FEMA floodplain maps show no flood zones within the study area (EDR, 2008c). Figure 9.3-10 (NYSDEC, 2008c) provides a list of federally and state-listed protected terrestrial species in the State of New York. A search of the EDR database for the Blenheim-Gilboa site indicated that there are no threatened and endangered species are located on site (EDR, 2008c).

Construction and operation related impacts to the aquatic ecology of the area would be similar to those identified in Section 9.3.2.2.5. Therefore, construction activities would have a SMALL to MODERATE impact, while operation activities would be SMALL.

9.3.2.4.6 Socioeconomics

The Blenheim-Gilboa site is located within CT 990600, BG 2, Schoharie County, New York. In 2000, Schoharie County had a population of approximately 31,,582. In 2000, the population within CT 990600 BG 2 was 803. The population density for CT 990600 BG 2 in 2000 was 15 ppsm. The population density of Schoharie County in 2000 was 50 ppsm. CT data from 2000 were reviewed to determine the average population density within a 20-mi (32-km) radius of the Blenheim-Gilboa site. Based on these data, there are 68 ppsm within this area, including seasonal transient populations (U.S. Census Bureau, 2000). When using population data from the year 2000 as a baseline, Schoharie County is estimated to experience a population increase of 1.3% by 2010 and 0.4% by 2015, and a decrease of 1.3% by 2020 (Cornell University, 2008).

Approximately 15 hospitals are located within a 50-mi (80-km) radius of the Blenheim-Gilboa site. A.O.Fox Hospital, Homer Folks State Hospital and Parshall Hospital are located in Otsego County, approximately 32 mi (51.5 km) from the site (ESRI, 2006).

The Schoharie County, New York Fire Services consists of 11 fire departments, 3 of which are volunteer fire departments (Schoharie County, 2008).

Approximately 53 public and private airports are located within a 50-mi (80-km) radius of the Blenheim-Gilboa site. This does not include airstrips or heliports. Sky-Ranch Airport located in Herkimer County is the closest airport to the site and is located 11.2 mi (18.0 km) from the site. O'Riley, Tomahawk Hills, and Richfield Airports are the next closest airports to the site and are located approximately 11 and 17 mi (18 and 28 km) from the site. (ESRI, 2006)

Approximately 49 parks, which include gardens, game lands, some playgrounds and athletic fields, are located within a 50-mi (80-km) radius of the Blenheim site. Adirondack State Park located in Fulton County is located 7 mi (11.3 km) from the site. Klock Park and Wilbur Park are the next closest parks to the site and are located approximately 17 mi (27.4 km) from the site. (ESRI, 2006)

Approximately 455 public and private schools, which include elementary, middle and high school, colleges, and universities, are located within a 50-mi (80-km) radius of the Blenheim-Gilboa site. Beekman Primary School, located in Fulton County, is the closest school, located approximately 2 mi (3.2 km) from the site. The next closest schools are located approximately 3 to 6 mi (4 to 10 km) from the site (ESRI, 2006).

Currently, there is a 5.7% unemployment rate in Schoharie County and a 5.5% unemployment rate in the Mohawk Valley, New York, region. Of the 8,200 Schoharie County residents employed in 2000, 1,611 were in construction. Oneida County, which contains one of the largest cities in the area, Utica, had 107,100 residents employed, of which 7,720 were in construction (NYLB, 2008a).

For the Mohawk Valley region, export industries play a key role in the economy by bringing in money from outside the region. A majority of the export industries have wage levels at or above the region's average. Some industries, such as leather and allied product manufacturing, however, have declined in recent years, but other newer industries have grown robustly. These industries play an integral part in the region's economy (NYLB, 2008a).

- In addition to lower taxes, New York offers a variety of incentives to companies expanding or relocating to New York, as described in Section 9.3.2.2.6.

Based on 2000 census data, approximately 3,924 housing units were vacant in Schoharie County, representing 25% of the total housing units within the county. Within a 50-mi (80-km) radius of the Blenheim-Gilboa site, approximately 65,470 housing units were vacant, representing 6.6% of the total housing within that area (U.S. Census Bureau, 2000).

The cooling tower plume from the proposed nuclear power generating station would likely be visible at a considerable distance; however, a limited alteration of the aesthetics in the area would occur due to the existing power generating infrastructure at the Blenheim-Gilboa Hydroelectric Power Plant.

Overall impacts to the area's population from construction and operation of a new nuclear power generating station would be SMALL. The construction and operation of the new nuclear station would have a SMALL beneficial economic impact to the surrounding area and region.

9.3.2.4.7 Transportation

The Blenheim-Gilboa site is served by Power Plant Access Road that has access to State Route 30. State Route 30 is the principle roadway in the vicinity of the site. This highway serves as local access to communities located along the East Branch of the Delaware River and along the upper valley of Schoharie Creek.

The site does not have access to a barge facility. The closest airport is the Albany International Airport, located in the City of Albany, New York, approximately 40 mi (64.4 km) northeast of the site. The site does not have direct access to a rail spur. The nearest active rail line is located approximately 6 mi (9.6 km) from the site.

It is anticipated that there will be traffic impacts on local roads during construction and operation activities associated with the proposed nuclear station. The transportation impacts as well as mitigation strategies would be similar to those identified in Section 9.3.2.3.7. Overall transportation impacts would be MODERATE during construction activities, and SMALL during operation of the facility.

9.3.2.4.8 Historic, Cultural, and Archeological Resources

The Blenheim-Gilboa site is located in Schoharie County, New York, in the Catskills Mountains. Schoharie County was created from Albany and Otsego counties in the late eighteenth century. The nearest community is North Blenheim, located approximately 3 mi (4.8 km) north-northwest of the power plant. The site includes two reservoirs in the vicinity of Brown Mountain and a pumped-storage hydroelectric power plant, constructed in 1974. The power plant is located at the base of Brown Mountain near the lower reservoir (New York Power Authority [NYPA], 2008).

There are 36 NRHP-listed properties in Schoharie County and only 2 in Blenheim (NRHP, 2008). The North Blenheim Historic district, which straddles State Route 30 beside the Schoharie Creek, includes 280 ac (113 ha) and 25 buildings. The Lansing Manor House, listed in the NRHP in 1975, is located 2 mi (3.2 km) south of North Blenheim on State Route 30. The Lansing Manor House, built in 1818, is located opposite the power plant. The Blenheim-Gilboa visitor center, located adjacent to the NRHP-listed manor home, is housed in a nineteenth century dairy barn, and other period structures, such as a smoke house and an ice house, are located nearby (NYPA, 2008).

Due to a lack of substantial information regarding previous records of prehistoric, archaeological, and historic architecture in the immediate vicinity of the Blenheim-Gilboa site, it is suggested that both a survey and investigation be completed before construction activities begin. Consultation with the SHPO would occur if any significant cultural resources were identified and appropriate mitigation measures would be negotiated prior to construction and operation. Impacts to cultural resources would include indirect impacts, such as visual, noise and light/glare, to the NRHP-listed Lansing Manor House across the reservoir. Because the site was cleared for new construction in 1974, there is the low potential for finding aboveground resources in the immediate vicinity. Therefore, construction- and operation-related impacts to historical, cultural, and archeological resources would be SMALL, but investigations of the site would be needed before siting a new nuclear power generating station at this location.

9.3.2.4.9 Environmental Justice

The demographic characteristics surrounding the Blenheim-Gilboa site were evaluated to determine the potential for environmental justice issues based on disproportionately high and adverse impacts to minority or low-income population. Demographic information used for this study was obtained from the 2000 U.S. Census. Demographics of the adjoining CTs/BGs on and around the site within the county were examined and compared with the demographics of Schoharie County and the State of New York. Figure 9.3-11 (U.S. Census Bureau, 2000) presents this demographic information.

Figure 9.3-6 presents the census tract and block groups that fall within a 6-mi (9.7-km) radius of the Blenheim-Gilboa site. In addition, the figure also presents the minority populations and percentages that fall within the census tract and block groups within that 6-mi (9.7-km) radius (U.S. Census Bureau, 2000).

The Blenheim-Gilboa site is located in CT 990600, BG 2. Adjacent CTs include 990600 (BG 1 and 3), CT 990500 (BG 4), and CT 990800 (BG 3 and 4). CT 990600 BG 2 has a 19.4% minority population, which is higher than all adjacent CTs within the county (CT 990600 BG 1 [0.7%], CT 990600 BG 3 [0.2%], CT 990500 BG 4 [2.8%], CT 990800 BG 3 [4.0%], and CT 990800 BG 4 [4.4%]. The Hispanic population for the proposed action CT/BG is 9.6% and is higher than the adjacent CTs and BGs, which range from 0.8% to 2.9%.

CT 990600 BG 2 (19.4%) has a higher percentage of minority residents compared to Schoharie County (3.4%) and lower than the State of New York (31.2%). The Hispanic population of CT 990600 BG 2 (9.6%) is higher than Schoharie County (1.9%) and lower than the State of New York (15.1%).

CT 990600 BG 2 has 12.3% of its population below the poverty level, which is lower than the adjacent CT 990600 BG 1 (18.4%) and CT 990600 BG 3 (12.6%), CT 990500 BG 4 (15.9%), CT 990800 BG 4 (13.1%), and higher than CT 990800 BG 3 (10.1%). The% of the population classified as below the poverty level in CT 990600 BG 1 (12.3%) is slightly higher than Schoharie County (11.4%) and lower than that in the State of New York (14.6%).

In 2000, the median household income for Schoharie County was $36,585, compared to an average of $43,393 for the State of New York (U.S. Census Bureau, 2000).

Based on the data presented in Figure 9.3-11 (U.S. Census Bureau, 2000), no disproportionately high percentage of low income residents would be directly impacted by construction and operation of the proposed nuclear power generating station. The Blenheim-Gilboa site does have a higher minority population in comparison to the surroundings CTs/BGs and Schoharie County. The minority population at the Blenheim-Gilboa site, however, is not disproportionately higher when compared to the State of New York. Furthermore, when the census tract and block groups were extended to the 6-mi (9.7-km) radius, no additional minority groups would be directly impacted by the proposed nuclear plant, as shown on Figure 9.3-11. The economic benefits of the facility to the county would likely benefit minority and low-income populations to some degree, either directly by offering new jobs, or indirectly through secondary job creation and increased services from the increased tax revenue.

The proposed nuclear power generating station would be a positive economic stimulus to Schoharie County and the local economy. Any adverse human health and environmental consequences from the proposed nuclear power generating station would not be borne disproportionately by minority or low-income groups. Therefore, it is anticipated that environmental justice impacts would be SMALL to MODERATE because of the higher minority population near the site in comparison to the surrounding census tracts and Schoharie County.

9.3.2.4.10 Transmission Corridors

The Blenheim-Gilboa site is located less than 1 mi (1.6 km) from the nearest 345-kV transmission line and has access to an existing switchyard. The new facility would be connected to the existing switchyard facility which would result in lower amounts of new circuits. However, transmission grid capacity and system congestion may require upgrades to the transmission system including transmission corridors. Impacts to the transmission system (transmission lines, corridors, and infrastructure) from construction and operation activities would be similar to those identified in Section 9.3.2.2.10. It is anticipated that construction impacts from the development of new transmission corridors would be MODERATE due to the commitment of land and construction impacts on ecological resources while operation activities would have a SMALL impact on the transmission system of the proposed new unit.

9.3.3 SUMMARY AND CONCLUSIONS

UniStar 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 NMP3NPP site, located in Oswego County, New York, as the proposed site. The evaluation and comparison of the alternative sites to the proposed site verified that none of the alternative sites is environmentally preferable, and thus obviously superior, to the selected proposed site. Therefore, the NMP3NPP 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 NMP3NPP site over the alternative sites is summarized as follows:

- The location of the site would not result in land use impacts greater than those anticipated at the alternative sites.
- The site has a reliable source of cooling water in Lake Ontario, and impacts related to water quality and consumptive use would not exceed those anticipated at the alternative sites.
- No new off-site transmission corridors or widening of existing corridors are required. The switchyard and transmission lines will be constructed on-site. Therefore, impacts associated with transmission lines, due to the need to build new transmission lines or expand transmission line corridor ROWs, are much less than those at the alternative sites.
- Impacts on terrestrial ecology at the site, due to the need to construct new transmission lines or corridors, or water intake structures/lines, or due to the number of listed species present at the other sites, would not exceed those at the alternative sites.
- Impacts on aquatic ecology at the site, primarily due to the need to construct a new water intake structure, would not exceed those at the alternative sites.

Collocating the NMP3NPP with the existing NMPNS facility affords a number of benefits, including the following:

- By collocating nuclear reactors, the total number of generating sites is reduced.
- No additional land acquisitions are necessary, and the applicant can readily obtain control of the property. This reduces both initial costs to the applicant and the degree of impact to the surrounding anthropogenic and ecological communities.
- Site characteristics, including geologic/seismic suitability, are already known, and the site has already undergone substantial review through the National Environmental Policy Act (NEPA) process during the selection procedure for the existing NMPNS.
- Collocated sites can share existing infrastructure, reducing both development costs and environmental impacts associated with construction of new access roads, waste

disposal areas, and other important supporting facilities and structures. Construction of new transmission corridors may be eliminated or reduced because of the potential use of existing corridors.

- Existing nuclear plants have nearby markets, the support of the local community, and the availability of experienced personnel.

Finally, as summarized in Table 9.3-8, none of the alternative sites are environmentally preferable and, therefore, cannot be considered obviously superior to the NMP3NPP site. The alternative sites offer no environmental advantages over the proposed site (NMP3NPP).

9.3.4 REFERENCES

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Table 9.3-1—Screening Criteria Used for the Technical Evaluation of Potential Alternative Sites

(Page 1 of 2)

Criterion	Measure of Suitability	
	Metric	Rating Rationale
Distance to Cooling Water Supply	Distance in miles	5 = less than 2 mi (3.2 km) 4 = 2 mi (3.2 km) to less than 6 mi (9.7 km) 3 = 6 mi (9.7 km) to less than 10 mi (16.1 km) 2 = 10 mi (16.1 km) to less than 20 mi (32.2 km) 1 = 20 mi (32.2 km) or greater
Flooding	A 0.5-mi (0.8-km) radius of the site was reviewed for the presence of 100-year and 500-year floodplains.	5 = Not within 500-year floodplain 3 = Not in 100-year floodplain but in 500-year floodplain 1 = Within 100-year floodplain
Distance to Population Center	Distance to nearest population center (census tract with more than 300 ppsm [or 300 persons per 2.6 km^2]).	5 = no population centers within 20 mi (32.2 km) 4 = population centers greater than 15 mi (24.1 km) but less than or equal to 20 mi (32.2 km) 3 = population centers greater than 10 mi (26.2 km) but less than or equal to 15 mi (24.1 km) 2 = population centers greater than 5 mi (8 km) but less than or equal to 10 mi (16.1 km) 1= population centers within 5 mi (8 km)
Regional Population Density	Population density within 10-mi (16.1-km) radius of site, based on data for census tracts.	5 = less than 10,000 persons 4 = 10,001 to 50,000 persons 3 = 50,001 to 100,000 persons 2 = 100,001 to 200,000 persons 1 = over 200,001 persons
Ecology	Number of federal, state rare, threatened, and endangered species in the county (aquatic and terrestrial)	5 = 0 to 25 species 4 = 26 to 49 species 3 = 50 to 74 species 2 = 75 to 99 species 1 = 100 or more species
Wetlands	Wetland maps from the NWI were reviewed. The site was evaluated based on the presence or absence of wetlands at or surrounding the site. Site area defined as approximately 0.5-mi (0.8-km) radius around site. GIS determined percentage of area classified as wetland.	5 = 0% to 10% of area classified as wetlands 4 = >10% to 20% of area classified as wetlands 3 = >20% to 30% of area classified as wetlands 2 = >30% to 40% of area classified as wetlands 1 = >40% of area classified as wetlands
Railroad Access	Estimated distance to nearest active rail line	5 = less than 1 mi (1.6 km) 3 = 1 mi (1.6 km) to less than 5 mi (8 km) 1 = greater than or equal to 5 mi (8 km)
Distance to Transmission Access	Distance to nearest 500-kV line – this refers only to direct grid access requirements.	5 = less than or equal to 1 mi (1.6 km) 4 = greater than 1 mi (1.6 km) and less 5 mi (8 km) 3 = 5 mi (8 km) to less than 10 mi (16.1 km) 2 = 10 mi (16.1 km) to less than 15 mi (24.1 km) 1 = 15 mi (24.1 km) or greater
Existing Transmission Corridor	Based on whether the site has access to an existing transmission corridor within 2 mi (3.2 km) – this refers only to direct grid access requirements.	5 = 345-kv or 500-kv line access 3 = access to 230-kv line 1 = no access to transmission line within 2 mi (3.2 km)
Additional Land Acquisition	Based on whether or not additional surrounding land (other than the minimum land needed for the EPR footprint) would be needed and could be acquired for the appurtenant structures of the proposed nuclear power generating station	5 = sufficient acreage is available and no additional land would need to be acquired 3 = assumes that additional land would need to be acquired for the facility and that additional surrounding land is expected to be readily available for sale/purchase or is low density development 1 = assumes that additional land would need to be acquired for the facility and it is expected that additional land is not readily available for sale based on existing land uses, such as industrial, commercial, or higher density residential development

Table 9.3-1—Screening Criteria Used for the Technical Evaluation of Potential Alternative Sites

(Page 2 of 2)

Criterion	Measure of Suitability	
	Metric	Rating Rationale
Expansion Potential	Based on the site's ability to expand on adjacent land to accommodate an additional nuclear power unit. Measured by evaluating the amount of land potentially available adjacent to the potential site up to 840 ac (340 ha)	5 = sufficient acreage is available 3 = assumes that additional surrounding land is expected to be readily available for sale/purchase, such as low density development. 1 = assumes that additional land is not readily available for sale based on other uses of the surrounding land, such as industrial, commercial, major transportation corridors, or high density residential development
Ownership	Based on site's ownership status	5 = client-owned (UniStar) or affiliated company-owned property 3 = privately owned property 1 = competitor-owned property
Environmental Remediation	Based on the site's anticipated need for environmental remediation due to known current or historic uses	5 = No anticipated environmental remediation necessary (nuclear and hydroelectric facilities) 3 = Unknown if site needs environmental remediation (brownfields and coal/oil facilities) 1 = Expected environmental remediation necessary (landfills and waste facilities)

Table 9.3-2—Site Evaluation Matrix

(Page 1 of 13)

Functional Evaluation Element	NMP3NPP		Ginna Site		Blenheim-Gilboa Site		AES Somerset Site	
	Score	Remarks	Score	Remarks	Score	Remarks	Score	Remarks
Construction and Operational Considerations								
Land Area								
Ability to support the combined EPR footprint including protected area, cooling towers, ponds, switchyard, and construction support areas (420 ac [170 ha] per plant)	8	The site would accommodate a 420 ac (170 ha) EPR footprint. Land is currently forested and farmed.	8	The site would accommodate a 420 ac (170 ha) EPR footprint. Approximately 488 ac (198 ha) available.	8	The site would accommodate a 420 ac (170 ha) EPR footprint. Land is currently forested.	8	The site would accommodate a 420 ac (170 ha) EPR footprint. Land is currently forested.
Land ownership/rights	9	Existing facility is 100% owned by CEG. Adjacent properties are assumed to be privately owned.	9	Existing facility is 100 percent owned by CEG. Adjacent properties are assumed to be privately owned.	6	The land is privately owned. Adjacent land is also privately owned.	6	The land is privately owned. Adjacent land is also privately owned.
Impacts on existing facilities or land use, including buildings, roads, Meteorological Tower, demolition and disposal, relocation costs	7	New ERP would require expansion beyond existing footprint in undeveloped areas. Adjacent lands contain agricultural and residential land uses.	7	New ERP would require expansion beyond existing footprint in undeveloped areas. Adjacent lands contain agricultural and residential land uses.	7	New ERP would require expansion beyond existing footprint in undeveloped areas. Adjacent lands contain agricultural and/or residential land uses.	7	New ERP would require expansion beyond existing footprint in undeveloped areas. Adjacent lands contain agricultural and/or residential land uses.
New unit structures, systems and components installed in proximity to existing unit structures, systems, and components to maximize synergies	8	Collocation of the new reactor unit at an existing nuclear site would allow existing infrastructure and transmission lines to be used.	8	Collocation of the new reactor unit at an existing nuclear site would allow existing infrastructure and transmission lines to be used.	7	Collocation of the new reactor unit at an existing power generating facility would allow existing infrastructure and transmission lines to be used.	7	Collocation of the new reactor unit at an existing power generating facility would allow existing infrastructure and transmission lines to be used.
Existing facilities: Site field offices/warehouse/infrastructur e for site characterization support	8	There are existing facilities associated with the electric plant.	8	There are existing facilities associated with the electric plant.	8	There are existing facilities associated with the electric plant.	8	There are existing facilities associated with the electric plant.

Table 9.3-2—Site Evaluation Matrix

(Page 2 of 13)

Functional Evaluation Element	NMP3NPP		Ginna Site		Blenheim-Gilboa Site		AES Somerset Site	
	Score	**Remarks**	**Score**	**Remarks**	**Score**	**Remarks**	**Score**	**Remarks**
Land use and zoning	7	Site currently zoned for power generation.	7	The site and the transmission ROWs are zoned industrial, and the majority of the surrounding land is zoned for residential use.	7	The site and the transmission ROWs are zoned industrial.	7	The site and the transmission ROWs are zoned industrial.
Transportation								
Barge access and capacity – distance, construction or upgrade requirements	6	No existing barge access. Construction of barge access could facilitate delivery of construction materials and supplies.	6	No existing barge access. Construction of barge access could facilitate delivery of construction materials and supplies.	6	No existing barge access. Construction of barge access could facilitate delivery of construction materials and supplies.	6	No existing barge access. Construction of barge access could facilitate delivery of construction materials and supplies.
Rail line access and capacity – distance, spur requirements, line capacity or upgrade requirements	7	The site is approximately 3 mi (4.8 km) from the nearest active rail line.	7	The site is approximately 4 mi (6.4 km) from the nearest active rail line.	4	The site is not in proximity to a rail line.	7	The site is in proximity to a rail line.
Roadways to site for heavy hauling; capacity including weight, width, height	8	The site has access from County Route 1A, a two-lane paved roadway. Because there is an existing plant at the site, it is assumed the roadways are sufficient to accommodate heavy hauling capacity.	8	The site has access to State Route 104 approximately 3.6 mi (5.8 km) south of Ginna. Because there is an existing plant at the site, it is assumed the roadways are sufficient to accommodate heavy hauling capacity.	7	Because there is an existing plant at the site, it is assumed the roadways are sufficient to accommodate heavy hauling capacity.	7	Because there is an existing plant at the site, it is assumed the roadways are sufficient to accommodate heavy hauling capacity.
Access road issues for construction workers including impact on operation plant staff/security	8	There is sufficient access at the existing site and no conflicts have been identified.	8	There is sufficient access at the existing site and no conflicts have been identified.	8	There is sufficient access at the existing site and no conflicts have been identified.	8	There is sufficient access at the existing site and no conflicts have been identified.

Table 9.3-2—Site Evaluation Matrix

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Functional Evaluation Element	NMP3NPP		Ginna Site		Blenheim-Gilboa Site		AES Somerset Site	
	Score	Remarks	Score	Remarks	Score	Remarks	Score	Remarks
Construction Impact Mitigation								
Potential impacts to existing facilities or entities (for example, noise, blasting, and dust)	8	Few nearby residences subject to potential noise and dust impacts.	8	Few nearby residences subject to potential noise and dust impacts.	5	Few nearby residences subject to potential noise and dust impacts. Popular outdoor recreation area; Mine Kill State Park and myriad of popular hiking trails are nearby.	8	Few nearby residences subject to potential noise and dust impacts.
Regulatory and ROW issues	8	Existing transmission corridor near site. No Issues identified.	4	No ROWs exist for transmission expansion.	7	Existing transmission corridor near site. No Issues identified.	7	Existing transmission corridor near site. No Issues identified.
Heat Sink (Water)								
Water availability, including volume and quality of supply	9	Water for the EPR would be drawn from Lake Ontario. The site is located on the southeastern shoreline of the lake. The existing power generation facility currently draws water for industrial purposes. The EPR consumptive use requirements exceed the spare capacity of the NMP3NPP. Additional/new permits would be required.	9	Water for the EPR would be drawn from Lake Ontario. The site is located on the southeastern shoreline of the lake. The existing power generation facility currently draws water for industrial purposes. The EPR consumptive use requirements exceed the spare capacity of Ginna. Additional/new permits would be required.	6	Water for the EPR would be drawn from the Schoharie Creek/Upper Blenheim-Gilboa Reservoir/Lower Blenheim-Gilboa Reservoir complex adjacent to site. No information on the water availability in the Schoharie Creek/Upper Blenheim-Gilboa Reservoir/Lower Blenheim-Gilboa Reservoir complex. The existing hydroelectric power generation facility currently draws water for industrial purposes. Additional/new permits would be required.	9	Water for the EPR would be drawn from Lake Ontario. The site is located on the southern shoreline of the lake. The existing power generation facility currently draws water for industrial purposes. The EPR consumptive use requirements exceed the spare capacity of the AES Somerset, LLC Coal Generating Plant. Additional/new permits would be required.
Cooling tower requirements and options	5	There is no clear delineation among the sites, assuming one round mechanical draft cooling tower.	5	There is no clear delineation among the sites, assuming one round mechanical draft cooling tower.	5	There is no clear delineation among the sites, assuming one mechanical draft cooling tower.	5	There is no clear delineation among the sites assuming, one mechanical draft cooling tower.

Table 9.3-2—Site Evaluation Matrix
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Functional Evaluation Element	NMP3NPP		Ginna Site		Blenheim-Gilboa Site		AES Somerset Site	
	Score	Remarks	Score	Remarks	Score	Remarks	Score	Remarks
Intake structure – distance and cost	9	Water for the EPR would be drawn from Lake Ontario. The intake structure is expected to be similar to the existing structure at the site. The new facility would be on the shoreline of the lake.	9	Water for the EPR would be drawn from Lake Ontario. The intake structure is expected to be similar to the existing structure at the site. The new facility would be on the shoreline of the lake.	5	Water for the EPR would be drawn from the Schoharie Creek/Upper Blenheim-Gilboa Reservoir/Lower Blenheim-Gilboa Reservoir complex adjacent to site. New intake and discharge structures would need to be constructed at the site. The new facility would be located on the shoreline of the Lower Blenheim-Gilboa Reservoir. New permits would be required.	9	Water for the EPR would be drawn from Lake Ontario. The intake structure is expected to be similar to the existing structure at the site. The new facility would be on the shoreline of the lake.
Geology/Seismology								
Vibratory ground motion – seismic peak ground acceleration	5	Spectral Acceleration at 5 Hertz ~ 0.20 gravity Site Class ~ B	5	Spectral Acceleration at 5 Hertz ~ 0.20 gravity Site Class ~ B	5	Spectral Acceleration at 5 Hertz ~ 0.22 gravity Site Class ~ B	5	Spectral Acceleration at 5 Hertz ~ 0.25 gravity Site Class ~ B
Distance to bedrock	7	Hard Oswego sandstone is present approximately 10 to 15 ft (3 to 4.5 m) below ground surface at the existing station.	7	The Ginna site is located in the same physiographic province as Nine Mile Point (Interior Lowlands). Bedrock conditions are therefore anticipated to be similar.	7	The Blenheim-Gilboa site is located in the eastern portion of the Allegheny Plateau physiographic province. The Allegheny Plateau is characterized by hilly uplands created by streams eroding into horizontal rock layers. Therefore, shallow bedrock is expected at the site.	7	The AES Somerset site is located in the same physiographic province as Nine Mile Point (Interior Lowlands). Therefore, shallow bedrock is expected at the site.
Surface faulting and deformations	5	There is no clear delineation among the sites.	5	There is no clear delineation among the sites.	5	There is no clear delineation among the sites.	5	There is no clear delineation among the sites.
Soil stability and compaction	7	Bedrock is in close proximity to ground surface at the site.	7	Bedrock is in close proximity to ground surface at the site.	7	Bedrock is expected in close proximity to ground surface at the site.	7	Bedrock is expected in close proximity to ground surface at the site.

Table 9.3-2—Site Evaluation Matrix
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Functional Evaluation Element	NMP3NPP		Ginna Site		Blenheim-Gilboa Site		AES Somerset Site	
	Score	Remarks	Score	Remarks	Score	Remarks	Score	Remarks
Other geological hazards	8	No identified other geological hazards.	8	No identified other geological hazards.	8	No identified other geological hazards.	8	No identified other geological hazards.
Climate and Meteorology								
Existing Meteorological Tower/data – availability and applicability of data	5	There is no clear delineation among the sites. The site has an existing on-site meteorological monitoring system that can provide the requisite data for use in predicting radiological impacts during plant operation.	5	There is no clear delineation among the sites. The site has an existing on-site meteorological monitoring system that can provide the requisite data for use in predicting radiological impacts during plant operation.	3	As an existing non-nuclear power generating facility, this site is assumed to not have an existing meteorological monitoring system located on or near the site that can be used in support of predicting radiological impacts during plant operation. Significant lead time will be required to procure the tower and instrumentation (3 to 6 months) and to operate the system for a minimum of 1 year prior to application submittal.	3	As an existing non-nuclear power generating facility, this site is assumed to not have an existing meteorological monitoring system located on or near the site that can be used in support of predicting radiological impacts during plant operation. Significant lead time will be required to procure the tower and instrumentation (3 to 6 months) and to operate the system for a minimum of 1 year prior to application submittal.
Weather risks/conditions	5	There is no clear delineation among the sites.	5	There is no clear delineation among the sites.	5	There is no clear delineation among the sites.	5	There is no clear delineation among the sites.
Location impacts on atmospheric dispersion factors (X/Q values)	5	There is no clear delineation among the sites.	5	There is no clear delineation among the sites.	5	There is no clear delineation among the sites.	5	There is no clear delineation among the sites.
Local Infrastructure and Support								
Political support or concerns	5	There is no clear delineation among the site alternatives	5	There is no clear delineation among the site alternatives	5	There is no clear delineation among the site alternatives	5	There is no clear delineation among the site alternatives.
Public support or concerns	4	There is no clear delineation among the site alternatives.	4	There is no clear delineation among the site alternatives.	4	There is no clear delineation among the site alternatives.	4	There is no clear delineation among the site alternatives.

Table 9.3-2—Site Evaluation Matrix

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Functional Evaluation Element	NMP3NPP		Ginna Site		Blenheim-Gilboa Site		AES Somerset Site	
	Score	Remarks	Score	Remarks	Score	Remarks	Score	Remarks
Aesthetics	5	Plume would be adjacent to the plume of an exiting power generating facility resulting in a limited alteration of the aesthetics in the area.	5	Plume would be adjacent to the plume of an exiting power generating facility resulting in a limited alteration of the aesthetics in the area.	4	Plume likely visible at considerable distance.	5	Plume would be adjacent to the plume of an exiting power generating facility resulting in a limited alteration of the aesthetics in the area.
Tax incentives or other political incentives	5	ITC, R&D Tax Credit, Sales Tax Exemptions, Real Property Tax Abatement, No Personal Property Tax, Economic Development Zone/Empire Zone Tax Credits	5	ITC, R&D Tax Credit, Sales Tax Exemptions, Real Property Tax Abatement, No Personal Property Tax, Economic Development Zone/Empire Zone Tax Credits	5	ITC, R&D Tax Credit, Sales Tax Exemptions, Real Property Tax Abatement, No Personal Property Tax, Economic Development Zone/Empire Zone Tax Credits	5	ITC, R&D Tax Credit, Sales Tax Exemptions, Real Property Tax Abatement, No Personal Property Tax, Economic Development Zone/Empire Zone Tax Credits

Table 9.3-2—Site Evaluation Matrix

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Functional Evaluation Element	NMP3NPP		Ginna Site		Blenheim-Gilboa Site		AES Somerset Site	
	Score	**Remarks**	**Score**	**Remarks**	**Score**	**Remarks**	**Score**	**Remarks**
Environmental justice issues	5	The demographic characteristics surrounding the proposed site were evaluated to determine the potential for environmental justice issues based on disproportionately high and adverse impacts to minority or low-income population. Demographics of the adjoining census tract and block groups on and around the site within the county were examined and compared with the demographics of Oswego County and the State of New York. No disproportionately high percentage of minority or low-income residents would be impacted by the proposed project.	5	The demographic characteristics surrounding the proposed site were evaluated to determine the potential for environmental justice issues based on disproportionately high and adverse impacts to minority or low-income population. Demographics of the adjoining census tract and block groups on and around the site within the county were examined and compared with the demographics of Wayne County and the State of New York. No disproportionately high percentage of minority or low-income residents would be impacted by the proposed project.	5	The demographic characteristics surrounding the proposed site were evaluated to determine the potential for environmental justice issues based on disproportionately high and adverse impacts to minority or low-income population. Demographics of the adjoining census tract and block groups on and around the site within the county were examined and compared with the demographics of Schoharie County and the State of New York. No disproportionately high percentage of minority or low-income residents would be impacted by the proposed project.	5	The demographic characteristics surrounding the proposed site were evaluated to determine the potential for environmental justice issues based on disproportionately high and adverse impacts to minority or low-income population. Demographics of the adjoining census tract and block groups on and around the site within the county were examined and compared with the demographics of Niagara County and the State of New York. No disproportionately high percentage of minority or low-income residents would be impacted by the proposed project.
Workforce								
Union/labor support/issues	4	There is no clear delineation among the site alternatives.	4	There is no clear delineation among the site alternatives.	4	There is no clear delineation among the site alternatives.	4	There is no clear delineation among the site alternatives.

Table 9.3-2—Site Evaluation Matrix
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Functional Evaluation Element	NMP3NPP		Ginna Site		Blenheim-Gilboa Site		AES Somerset Site	
	Score	Remarks	Score	Remarks	Score	Remarks	Score	Remarks
Availability of labor – craft/professional; training capability	4	Currently, there is a 6.4% unemployment rate in Oswego county and a 4.3% unemployment rate in the Central New York region. Of the 53,000 Oswego county residents employed in 2000, 7,000 were in construction. Onandoga County, which contains the largest city in the area, Syracuse, had 222,000 residents employed, of which 14,000 were in construction. A combination of slow population growth, increasing numbers of baby boomers retiring, and fewer young people entering the local job market have contributed to a tightening labor supply in Central New York. If these trends continue, local employers will have great difficulty filling positions, which could hamper future job growth. In response, the region's employers are aggressively advertising to fill vacancies at various skill levels.	4	Currently, the unemployment rate in Wayne County is 5.4%. Of the 47,000 people employed in Wayne County, 4,500 are in construction. The economy of the Finger Lakes region is presently in transition. The local economic base, which was once dependent upon a few large manufacturing firms, has become much more diverse in recent years. A mix of small manufacturers and firms in a variety of service-producing industries are adding jobs, a trend that will likely continue. Among the region's most important economic assets are its post-secondary educational institutions.	4	Currently, there is a 5.7% unemployment rate in Schoharie County and a 5.5% unemployment rate in the Mohawk Valley New York region. Of the 8,200 Schoharie County residents employed in 2000, 1,611 were in construction. Oneida County, which contains the largest city in the area, Utica, had 107,100 residents employed, of which 7,720 were in construction. For the Mohawk Valley region, export industries play a key role in the economy by bringing in money from outside the region. A majority of the export industries have wage levels at or above the region's average. Some industries, such as leather and allied product manufacturing, however, have declined in recent years, but other newer industries have grown robustly. These industries play an integral part in the region's economy.	4	Currently, there is a 6.7% unemployment rate in Niagara County and a 5.7% unemployment rate in the Western New York region. Of the 100,200 Niagara County residents employed in 2000, 9,080 were in construction. Erie County, which contains the largest city in the area, Buffalo, had 429,900 residents employed, of which 29,391 were in construction in 2000. Beginning in 2005, Western New York's economy improved noticeably, resulting in both lower unemployment and improved private sector job figures. Financial activities played a large role in region's change in economy. A combination of ongoing job growth and lower unemployment rates predicts that the region's economy should continue to do well; however, in 2008, unemployment rates have increased from 2007 by slightly over 1%.

Table 9.3-2—Site Evaluation Matrix
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Functional Evaluation Element	NMP3NPP		Ginna Site		Blenheim-Gilboa Site		AES Somerset Site	
	Score	Remarks	Score	Remarks	Score	Remarks	Score	Remarks
Construction workforce housing and infrastructure	5	Housing: According to 2000 survey data, there were approximately 7,309 housing units currently vacant, representing 14% of the total housing units within the county. Infrastructure: Existing nuclear plant infrastructure is currently in place to accommodate the proposed nuclear plant.	5	Housing: According to 2000survey data, there were approximately 3,859 housing units currently vacant, representing 10% of the total housing units within the county. Infrastructure: Existing nuclear plant infrastructure is currently in place to accommodate the proposed nuclear plant.	5	Housing: According to 2000 survey data, there are approximately 3,924 housing units were vacant, representing 25% of the total housing units within the county. Infrastructure: Power plant infrastructure is currently in place	5	Housing: According to 2000 survey data, there were approximately 7,869 housing units currently vacant, representing 8% of the total housing units within the county. Infrastructure: Power plant infrastructure is currently in place
Health and Safety								
Operations/Transportation								
Proximity to independent spent fuel storage installations (ISFSI) for operating unit	7	There is no clear delineation among the other nuclear sites.	7	There is no clear delineation among the other nuclear sites.	5	Not in proximity to ISFSI operating unit.	5	Not in proximity to ISFSI operating unit.
Support/challenges to transport of nuclear fuel and wastes	5	There is no clear delineation among the sites.	5	There is no clear delineation among the sites.	5	There is no clear delineation among the sites.	5	There is no clear delineation among the sites.

Table 9.3-2—Site Evaluation Matrix
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Functional Evaluation Element	NMP3NPP		Ginna Site		Blenheim-Gilboa Site		AES Somerset Site	
	Score	Remarks	Score	Remarks	Score	Remarks	Score	Remarks
Security/Emergency Planning								
Emergency preparedness program inspection – proximity of residences/businesses for exclusion zone	8	No impact on siren system. The proposed site should integrate well with the existing nuclear plant security plan. The standard exclusion area boundary (EAB) radius encompasses several permanent residences. Need to (1) reduce the EAB boundary distance, (2) procure additional property, and/or (3) obtain control agreements for the remaining properties with supporting removal provisions and dose analyses.	8	No impact on siren system. The proposed site should integrate well with the existing nuclear plant security plan. The standard EAB radius encompasses several permanent residences. Need to (1) reduce the EAB boundary distance, (2) procure additional property, and/or (3) obtain control agreements for the remaining properties with supporting removal provisions and dose analyses.	5	Land will have to be procured to support the standard foot print.	5	Land will have to be procured to support the standard foot print.
Potential use / modification of operating unit security barriers, facilities, personnel	5	There is a potential for use/modification of operating unit security perimeters, barriers, fence lines, facilities, personnel.	5	There is a potential for use/modification of operating unit security perimeters, barriers, fence lines, facilities, personnel.	5	There is a potential for use/modification of operating unit security perimeters, barriers, fence lines, facilities, personnel.	5	There is a potential for use/modification of operating unit security perimeters, barriers, fence lines, facilities, personnel.

Table 9.3-2—Site Evaluation Matrix
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Functional Evaluation Element	NMP3NPP		Ginna Site		Blenheim-Gilboa Site		AES Somerset Site	
	Score	Remarks	Score	Remarks	Score	Remarks	Score	Remarks
Environmental (Federal, State, and Local Requirements and Permits								
Special Areas/Resources								
Surface water, floodplains, wetlands, endangered/threatened species and critical habitats	4	Surface water(s), floodplains, and wetland impacts associated with the construction of the site would be mitigated. Applicable permits and BMPs would be followed during construction to diminish potential impacts to ecological resources. No terrestrial or aquatic threatened and endangered species on site.	5	There are no terrestrial or aquatic threatened and endangered species on site. Site is near the floodplain associated with Lake Ontario. Surface water(s), floodplains, and wetland impacts associated with the construction of the site would be mitigated. Applicable permits and BMPs would be followed during construction.	7	There are no floodplains, but freshwater emergent wetlands are associated with Schoharie Creek. Surface water(s) and wetland impacts associated with the construction of the site would be mitigated. Applicable permits and BMPs would be followed during construction to diminish potential impacts to ecological resources. There are no terrestrial or aquatic threatened and endangered species on site. It is anticipated that any new cooling water or transmission line corridors would be shared with the existing facility to diminish potential impacts to ecological resources.	5	There are small areas of floodplains along Lake Ontario and small areas of forested and scrub/shrub wetlands. Surface water(s), floodplains, and wetland impacts associated with the construction of the site would be mitigated. Applicable permits and BMPs would be followed during construction to diminish potential impacts to ecological resources. No terrestrial or aquatic threatened and endangered species on site. It is anticipated that any new cooling water or transmission line corridors would be shared with the existing facility to diminish potential impacts to ecological resources.

Table 9.3-2—Site Evaluation Matrix

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Functional Evaluation Element	NMP3NPP		Ginna Site		Blenheim-Gilboa Site		AES Somerset Site	
	Score	Remarks	Score	Remarks	Score	Remarks	Score	Remarks
Cultural resources (historic/archaeological)	7	Potential for cultural resources is zero in area occupied by existing plant. Previous surveys and construction activities on the NMP3NPP site have encountered no significant resources. Moderate probability of archaeological resources due to proximity to the lake and evidence of prehistoric occupation from other sites in the area. Known historic properties in Oswego County would not be affected because none are closer than 4 mi (6.4 km).	7	Potential for cultural resources is zero in area occupied by existing plant. No significant artifacts have been identified in the vicinity. Evidence of prehistoric occupation indicates moderate probability of archaeological resources in the area. Known historic properties in Wayne County would not be affected because none are closer than 5 mi (8 km).	3	Because there is no online access to the New York SHPO inventory, it cannot be determined if there are NRHP-eligible properties in the immediate vicinity. According to the plant's website, there is a NRHP-listed building, the Lansing Manor, in the immediate vicinity. In addition, the visitor center is an 1881 Dairy Barn and other period buildings are in close proximity. Potential for cultural resources is high. The site is located in Schoharie County, which was created in the 1790s, and near several bodies of water. Given the location and history of the area, there is a high potential for archaeological resources.	8	No known cultural resource surveys at the site have been conducted. Plant was constructed in late 1970s. There is only one NRHP-listed property in the Town of Somerset: Thirty Mile Point Light, a lighthouse which is not near the project area. Because there is no online access to the NY SHPO inventory, it cannot be determined if there are NRHP-eligible properties in the immediate vicinity. Because the location is rural, sparsely populated and was cleared for the plant within the past thirty years, there is low potential for the discovery of cultural resources and low to moderate potential for the discovery of archaeological resources at the site.

Table 9.3-2—Site Evaluation Matrix
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Functional Evaluation Element	NMP3NPP		Ginna Site		Blenheim-Gilboa Site		AES Somerset Site	
	Score	Remarks	Score	Remarks	Score	Remarks	Score	Remarks
Waste disposal sites, soil/groundwater contamination	7	Ensuring permitted limits for water withdrawal and discharge are met through operational controls and monitoring would minimize the potential for adverse impacts to water availability and water quality impacts. It is anticipated that there would be a site-specific water treatment system or the use of a municipal system, if available.	7	Ensuring permitted limits for water withdrawal and discharge are met through operational controls and monitoring would minimize the potential for adverse impacts to water availability and water quality impacts. It is anticipated that there would be a site-specific water treatment system or the use of a municipal system, if available.	7	Consistent with the existing conditions at the hydroelectric station. Ensuring permitted limits for water withdrawal and discharge are met through operational controls and monitoring would minimize the potential for adverse impacts to water availability and water quality impacts. It is anticipated that there would be a site-specific water treatment system or the use of a municipal system, if available.	7	Consistent with the existing conditions at the coal station. Ensuring permitted limits for water withdrawal and discharge are met through operational controls and monitoring would minimize the potential for adverse impacts to water availability and water quality impacts. It is anticipated that there would be a site-specific water treatment system or the use of a municipal system, if available.
Permits								
Comprehensive construction/operating permits	8	Success of obtaining the necessary permits is high due to location adjacent to existing permitted nuclear facility.	8	Success of obtaining the necessary permits is high due to location adjacent to existing permitted nuclear facility.	7	Success of obtaining the necessary permits is high due to location adjacent to existing permitted power facility.	7	Success of obtaining the necessary permits is high due to location adjacent to existing permitted power facility.
Other permits and approvals (discharge and stormwater)	7	Higher success of obtaining the applicable permits because the site will be collocated with an existing nuclear facility.	7	Higher success of obtaining the applicable permits because the site will be collocated with an existing nuclear facility.	7	Higher success of obtaining the applicable permits because the site will be located adjacent to an existing power facility.	7	Higher success of obtaining the applicable permits because the site will be collocated with an existing power facility.

Table 9.3-3—Site Evaluation Matrix Summary
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Functional Evaluation Element	Primary Weight	NMP3NPP		Ginna Site		Blenheim-Gilboa Site		AES Somerset Site	
		Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Construction/Operational Requirements									
Land Area and Existing Facilities									
Ability to support the combined EPR footprint including the protected area, cooling towers, ponds, switchyard, construction support areas 420 ac (170 ha)	13.50	8	1.08	8	1.08	8	1.08	8	1.08
Land ownerships/rights	13.50	9	1.22	9	1.22	6	0.81	6	0.81
Impacts on existing facilities or land use, including buildings, roads, Meteorological Tower, firing range (for example, demolition and disposal, relocation costs)	13.50	7	0.95	7	0.95	7	0.95	7	0.95
New unit structures, systems and components installed in proximity to existing unit structures, systems, and components to maximize synergies	13.50	8	1.08	8	1.08	7	0.95	7	0.95
Existing facilities: Site field offices, warehouse, and infrastructure for site characterization support	13.50	8	1.08	8	1.08	8	1.08	8	1.08
Land use and zoning	13.50	7	0.95	7	0.95	7	0.95	7	0.95
Average Weighted Score: Land Area and Existing Facilities			**1.01**		**1.01**		**0.93**		**0.93**
Transportation									
Barge access and capacity – distance, construction, or upgrade requirements	7.50	6	0.45	6	0.45	6	0.45	6	0.45
Rail line access and capacity – distance, spur requirements, line capacity, or upgrade requirements	7.50	7	0.53	7	0.53	4	0.30	4	0.30
Roadways to site for heavy hauling; capacity including weight, width, height	7.50	8	0.60	8	0.60	7	0.53	7	0.53
Access road issues for construction workers including impact on operation plant staff/security	7.50	8	0.60	8	0.60	8	0.60	8	0.60
Average Weighted Score: Transportation			**0.55**		**0.55**		**0.47**		**0.47**
Construction Impact Mitigation									
Potential impacts to existing facilities or entities (for example, noise, blasting, dust)	14.25	8	1.14	8	1.14	5	0.71	8	1.14
Potential impacts – environmental (for example, dredging, erosion control, runoff/turbidity)	14.25	8	1.14	8	1.14	4	0.57	5	0.71
Space for construction crane (equipment), including proximity to existing units and facilities	14.25	8	1.14	8	1.14	5	0.71	8	1.14

Table 9.3-3—Site Evaluation Matrix Summary
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Functional Evaluation Element	Primary Weight	NMP3NPP		Ginna Site		Blenheim-Gilboa Site		AES Somerset Site	
		Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Special construction hazards/risks	14.25	7	1.00	7	1.00	4	0.57	7	1.00
Average Weighted Score: Construction Impact Mitigation			**1.11**		**1.11**		**0.64**		**0.99**
Transmission Grid and Power Market									
Proximity/availability of power corridors	10.00	9	0.90	4	0.40	8	0.80	8	0.80
Interconnection Issues	10.00	6	0.60	5	0.50	5	0.50	6	0.60
Upgrade/extension costs and issues	10.00	5	0.50	5	0.50	5	0.50	5	0.50
Regulatory and right-of-way issues	10.00	8	0.80	4	0.40	7	0.70	7	0.70
Average Weighted Score: Transmission Grid and Power Market			**0.70**		**0.45**		**0.63**		**0.65**
Heat Sink (Water)									
Water availability, including volume and quality of supply	8.50	9	0.77	9	0.77	6	0.51	9	0.77
Cooling tower requirements and options	8.50	5	0.43	5	0.43	5	0.43	5	0.43
Intake structure – distance and cost	8.50	9	0.77	9	0.77	5	0.43	9	0.77
Average Weighted Score: Heat Sink			**0.66**		**0.66**		**0.45**		**0.66**
Geology/Seismology									
Vibratory ground motion – seismic peak ground acceleration	8.50	5	0.43	5	0.43	5	0.43	5	0.43
Distance to bedrock	8.50	7	0.60	7	0.60	7	0.60	7	0.60
Surface faulting and deformations	8.50	5	0.43	5	0.43	5	0.43	5	0.43
Soil stability and compaction	8.50	7	0.60	7	0.60	7	0.60	7	0.60
Other geological hazards	8.50	8	0.68	8	0.68	8	0.68	8	0.68
Average Weighted Score: Geology/Seismology			**0.55**		**0.55**		**0.55**		**0.55**
Climate and Meteorology									
Existing meteorological tower/data – availability and applicability of data	2.75	5	0.14	5	0.14	3	0.08	3	0.08
Weather risks/conditions	2.75	5	0.14	5	0.14	5	0.14	5	0.14
Location impacts on atmospheric dispersion factors (X/Q values)	2.75	5	0.14	5	0.14	5	0.14	5	0.14
Average Weighted Score: Climate and Meteorology			**0.14**		**0.14**		**0.12**		**0.12**
Socioeconomic									
Local Infrastructure and Support									

Table 9.3-3—Site Evaluation Matrix Summary
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Functional Evaluation Element	Primary Weight	NMP3NPP		Ginna Site		Blenheim-Gilboa Site		AES Somerset Site	
		Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Political support or concerns	9.00	5	0.45	5	0.45	5	0.45	5	0.45
Public support or concerns	9.00	4	0.36	4	0.36	4	0.36	4	0.36
Aesthetics	9.00	5	0.45	5	0.45	4	0.36	5	0.45
Tax incentives or other political incentives	9.00	5	0.45	5	0.45	5	0.45	5	0.45
Environmental justice issues	9.00	5	0.45	5	0.45	5	0.45	5	0.45
Workforce									
Union/labor support/issues	9.00	4	0.36	4	0.36	4	0.36	4	0.36
Availability of labor – craft/profession; training capability	9.00	4	0.36	4	0.36	4	0.36	4	0.36
Construction workforce housing and infrastructure	9.00	5	0.45	5	0.45	4	0.36	4	0.36
Average Weighted Score: Local Infrastructure, Support, and Workforce			**0.40**		**0.40**		**0.39**		**0.39**
Operations/Transportation & Security/Emergency Planning									
Operations/Transportation									
Proximity to independent spent fuel storage installations for operating unit	6.75	7	0.47	7	0.47	5	0.34	5	0.34
Support/challenges to transport of nuclear fuel and wastes	6.75	5	0.34	5	0.34	5	0.34	5	0.34
Security/Emergency Planning								5	0.34
Emergency preparedness program inspection – proximity of residences/businesses for exclusion zone	6.75	5	0.34	5	0.34	5	0.34	5	0.34
Potential use and modification of operating unit security barriers, facilities, and personnel	6.75	5	0.34	5	0.34	5	0.34	5	0.34
Average Weighted Score: Operations/Transportation and Security/Emergency Planning			**0.37**		**0.37**		**0.34**		**0.34**
Environmental (Federal, State, and Local Requirements and Permits)									
Special Areas									
Wetlands, floodplains, endangered/threatened habitats	19.25	4	0.77	5	0.96	7	1.35	5	0.96
Cultural/historical	19.25	7	1.35	7	1.35	3	0.58	8	1.54
Hazardous waste or spoils areas	19.25	7	1.35	7	1.35	7	1.35	7	1.35
Permits									
Construction/operation permits	19.25	8	1.54	8	1.54	7	1.35	7	1.35
Other permits – discharge, stormwater, building	19.25	7	1.35	7	1.35	7	1.35	7	1.35

Table 9.3-3—Site Evaluation Matrix Summary
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Functional Evaluation Element	Primary Weight	NMP3NPP		Ginna Site		Blenheim-Gilboa Site		AES Somerset Site	
		Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Average Weighted Score: Special Areas, Air Quality, and Permits			**1.27**		**1.31**		**1.20**		**1.31**
Score Total (Sum of Average Weighted Scores)	**297**	**6.76**	**289**	**6.55**	**258**	**5.73**	**285**	**6.41**	**297**

Notes:
Weighted Score = (Primary Weight x Score)/10

Table 9.3-4—Demographic Characteristics of the Ginna Site Area

Race	Ginna Site CT 20101 BG 1	CT 20102 BG 1	CT 20401 BG 2	CT 20402 BG 1	Wayne County, New York	State of New York
White alone	4584	4849	1801	3534	87,954	12,893,689
Black or African American alone	39	83	26	210	3044	3,014,385
American Indian and Alaska Native alone	3	16	5	18	245	82,461
Asian alone	23	32	8	20	437	1,044,976
Native Hawaiian and Other Pacific Islander alone	0	0	0	0	14	8,818
Some other race alone	9	24	22	25	819	1,341,946
Two or more races	54	62	14	60	1252	590,182
Total Population	4712	5066	1876	3867	93,765	18,976,457
Hispanic [(a)]	57	62	47	61	2263	2,867,583
Minority Population	2.7%	4.3%	4.0%	8.6%	6.2%	31.2%
Hispanic Population	1.3%	1.2%	2.5%	1.6%	2.4%	15.1%
Income below poverty level						
Total in Census Tract	119	417	127	165	16,470	2,692,202
Percent of population below poverty level	2.5%	8.3%	6.5%	4.3%	14.0%	14.6%

Notes:

a) Hispanic: This category is for individuals who classify themselves in one of the specific Hispanic or Latino categories, such as “Mexican,” Puerto Rican,” or “Cuban,” as well as those who indicate that they are “other Spanish, Hispanic, or Latino.” Origin can be viewed as the heritage, nationality group, lineage, or country of birth of the person or the person’s parents or ancestors before arrival in the United States. People who identify their origin as Spanish, Hispanic, or Latino may be of any race.

Source: U.S. Census Bureau, 2000

Table 9.3-5—State and Federal Threatened and Endangered Species in New York
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Scientific Name	Common Name	Federal Status	State Status
Terrestrial Species			
Insects			
Siphlonisca aerodromia	Tomah Mayfly	Not Listed	E
Nicrophorus americanus	American burying Beetle	E	Extirpated
Enallagma recurvatum	Pine Barrens Bluet	Not Listed	T
Enallagma pictum	Scarlet Bluet	Not Listed	T
Enallagma minisculum	Little Bluet	Not Listed	T
Callophrys hesseli	Hessle's haristreak	Not Listed	E
Lycaeides melissa samuelis	Karner Blue Butterfly	E	E
Speyeria idalia	Regal Fritillary	Not Listed	E
Erynnia persius	Persius Duskywing	Not Listed	E
Pyrgus centaureae wyandot	Grizzled Skipper	Not Listed	E
Atrytone arogos arogos	Arogos Skipper	Not Listed	E
Hemileuca species	Bog Buckmoth	Not Listed	E
Lithophane lepida lepida	Pine Pinion Moth	Not Listed	E
Cicindela dorsalis dorsalis	Northeastern Beach Tiger Beetle	T	Extirpated
Callophrys irus	Frosted Elfin	Not Listed	T
Reptiles			
Sceloporus undulatus	Fence Lizard	Not Listed	T
Crotalus horridus	Timber Rattlesnake	Not Listed	T
Regina septemvittata	Queen Snake	Not Listed	E
Sistrurus catenatus	Massasauga	Not Listed	E
Birds			
Falcipennis canadensis	Spruce Grouse	Not Listed	E
Podilymbus podiceps	Pied-billled Grebe	Not Listed	T
Aquila cherysaetos	Golden Eagle	Not Listed	E
Falco peregrinus	Peregrin Falcon	Not Listed	E
Ixobrychus exilis	Least Bittern	Not Listed	T
Haliaeetus leucocephalus	Bald Eagle	T	T
Latterallus jamaicensis	Black Rail	Not Listed	E
Charadrius melodus	Piping Plover	T	E
Curcus cyaneus	Northern Harrier	Not Listed	T
Numerius borealis	Eskimo Curlew	E	E
Rallus elegans	King Rail	Not Listed	T
Sterna dougallii dougallii	Roseate Tern	E	E
Bartramia longicuada	Upland Sandpiper	Not Listed	T
Sterna hirundo	Common Tern	Not Listed	T
Sterna antillarum	Least Tern	E	T
Chlidonias niger	Black Tern	Not Listed	E
Cistrothorus platensis	Sedge Wren	Not Listed	T
Ammodramus henslowii	Henslow's Sparrow	Not Listed	T
Asio flammenus	Short-eared Owl	Not Listed	E
Lanius ludovicianus	Loggerhead Shrike	Not Listed	E
Mammals			
Myotis sodalis	Indiana Bat	E	E
Neotoma magister	Allegheny Woodrat	Not Listed	E
Canis lupus	Gray Wolf	E	Extirpated
Felis concolor	Cougar	E	Extirpated
Lynx canadensis	Canada Lynx	T	Extirpated

Table 9.3-5—State and Federal Threatened and Endangered Species in New York
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Scientific Name	Common Name	Federal Status	State Status
Plants			
Acalypha virginica var. virginica	Virginia three-seeded mercury	Not Listed	E
Adoxa moschatellina	Moschatel	Not Listed	E
Agalinis acuta	sandplain gerardia	E	E
Allium burdickii	wild leek	T	E
Amaranthus pumilus	seabeach amaranth	Not Listed	E
Amelanchier nantucketensis	Nantucket juneberry	Not Listed	E
Ammophila champlainensis	Champlain beachgrass	Not Listed	E
Amphicarpum purshii	peanut grass	Not Listed	E
Angelica lucida	Angelica	Not Listed	E
Anthoxanthum monticolum ssp. orthanthum	Alpine sweetgrass	Not Listed	E
Aplectrum hyemale	Puttyroot	Not Listed	E
Arabis drummondii	Drummond's rock cress	Not Listed	E
Arabis shortii	toothed rock-cress	Not Listed	E
Aristolochia serpentaria	Virginia snakeroot	Not Listed	E
Arnica lanceolata	Arnica	Not Listed	E
Artemisia campestris var. borealis	wild sage	Not Listed	E
Asclepias variegata	white milkweed	Not Listed	E
Asplenium bradleyi	Bradley's spleenwort	Not Listed	E
Asplenium trichomanes-ramosum	green spleenwort	Not Listed	E
Aster ciliolatus	Lindley's aster	Not Listed	E
Aster concolor	silvery aster	Not Listed	E
Aster laevis var. concinnus	smooth blue aster	Not Listed	E
Aster lanceolatus var. interior	tall white aster	Not Listed	E
Aster lateriflorus var. hirsuticaulis	calico aster	Not Listed	E
Aster oolentangiensis	sky-blue aster	Not Listed	E
Aster puniceus var. firmus	cornel-leaved aster	Not Listed	E
Aster radula	swamp aster	Not Listed	E
Astragalus neglectus	Cooper's milkvetch	Not Listed	E
Atriplex glabriuscula	seaside orach	Not Listed	E
Atriplex subspicata	Orache	Not Listed	E
Bartonia paniculata	screw-stem	Not Listed	E
Betula glandulosa	tundra dwarf birch	Not Listed	E
Betula minor	dwarf white birch	Not Listed	E
Bidens hyperborea	estuary beggar-ticks	Not Listed	E
Blephilia ciliata	downy wood-mint	Not Listed	E
Botrychium campestre	prairie dunewort	Not Listed	E
Botrychium lunaria	Moonwort	Not Listed	E
Botrychium minganense	mingan moonwort	Not Listed	E
Botrychium oneidense	blunt-lobe grape fern	Not Listed	E
Botrychium rugulosum	rugulose grape fern	Not Listed	E
Bouteloua curtipendula	side-oats grama	Not Listed	E
Buchnera americana	blue-hearts	Not Listed	E
Cacalia suaveolens	sweet-scented Indian-plantain	Not Listed	E
Calamagrostis perplexa	wood reedgrass	Not Listed	E
Calamagrostis porteri ssp. porteri	Porter's reedgrass	Not Listed	E
Calamagrostis stricta ssp. stricta	Northern reedgrass	Not Listed	E
Callitriche hermaphroditica	Autumnal water-starwort	Not Listed	E
Calypso bulbosa	Calypso	Not Listed	E

Table 9.3-5—State and Federal Threatened and Endangered Species in New York
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Scientific Name	Common Name	Federal Status	State Status
Cardamine rotundifolia	mountain watercress	Not Listed	E
Carex aggregata	glomerate sedge	Not Listed	E
Carex amphibola var. amphibola	narrow-leaved sedge	Not Listed	E
Carex arcta	Northern clustered sedge	Not Listed	E
Carex atherodes	awned sedge	Not Listed	E
Carex atratiformis	black sedge	Not Listed	E
Carex barrattii	Barratt's sedge	Not Listed	E
Carex bullata	button sedge	Not Listed	E
Carex capillaris	hair-like sedge	Not Listed	E
Carex caroliniana	Carolina sedge	Not Listed	E
Carex collinsii	Collins' sedge	Not Listed	E
Carex conjuncta	soft fox sedge	Not Listed	E
Carex decomposita	cypress-knee sedge	Not Listed	E
Carex emoryi	Emory's sedge	Not Listed	E
Carex flaccosperma var. glaucodea	glaucous sedge	Not Listed	E
Carex frankii	Frank's sedge	Not Listed	E
Carex garberi	elk sedge	Not Listed	E
Carex gynocrates	Northern bog sedge	Not Listed	E
Carex haydenii	cloud sedge	Not Listed	E
Carex laxiflora var. serrulata	loose-flowered sedge	Not Listed	E
Carex livida var. radicaulis	livid sedge	Not Listed	E
Carex meadii	Mead's sedge	Not Listed	E
Carex mesochorea	midland sedge	Not Listed	E
Carex nigra	black sedge	Not Listed	E
Carex nigromarginata	black-edge sedge	Not Listed	E
Carex retroflexa	reflexed sedge	Not Listed	E
Carex scirpoidea	Canadian single-spike sedge	Not Listed	E
Carex shortiana	Short's sedge	Not Listed	E
Carex straminea	straw sedge	Not Listed	E
Carex striatula	lined sedge	Not Listed	E
Carex styloflexa	bent sedge	Not Listed	E
Carex sychnocephala	many-head sedge	Not Listed	E
Carex tenuiflora	sparse-flowered sedge	Not Listed	E
Carex tincta	tinged sedge	Not Listed	E
Carex vaginata	sheathed sedge	Not Listed	E
Carex venusta var. minor	graceful sedge	Not Listed	E
Carex wiegandii	Wiegand's sedge	Not Listed	E
Castilleja coccinea	scarlet Indian-paintbrush	Not Listed	E
Ceanothus herbaceus	prairie redroot	Not Listed	E
Chaerophyllum procumbens	spreading chervil	Not Listed	E
Chasmanthium laxum	slender spikegrass	Not Listed	E
Cheilanthes lanosa	wooly lip-fern	Not Listed	E
Chenopodium album var. missouriense	Missouri goosefoot	Not Listed	E
Chenopodium berlandieri var. macrocalycium	large calyx goosefoot	Not Listed	E
Collinsia verna	blue-eyed-Mary	Not Listed	E
Corallorhiza striata	striped coralroot	Not Listed	E
Corema conradii	broom crowberry	Not Listed	E
Cornus drummondii	rough-leaf dogwood	Not Listed	E
Crassula aquatica	Pigmyweed	Not Listed	E

Table 9.3-5—State and Federal Threatened and Endangered Species in New York
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Scientific Name	Common Name	Federal Status	State Status
Crataegus berberifolia	Hawthorn	Not Listed	E
Crataegus compacta	compact hawthorn	Not Listed	E
Crataegus mollis	downy hawthorn	Not Listed	E
Crataegus uniflora	dwarf hawthorn	Not Listed	E
Crotalaria sagittalis	Rattlebox	Not Listed	E
Cuscuta cephalanthi	button-bush dodder	Not Listed	E
Cuscuta obtusiflora var. glandulosa	Southern dodder	Not Listed	E
Cuscuta polygonorum	smartweed dodder	Not Listed	E
Cynoglossum virginianum var. boreale	Northern wild comfrey	Not Listed	E
Cynoglossum virginianum var. virginianum	wild comfrey	Not Listed	E
Cyperus echinatus	globose flatsedge	Not Listed	E
Cyperus flavescens var. flavescens	yellow flatsedge	Not Listed	E
Cyperus polystachyos var. texensis	coast flatsedge	Not Listed	E
Cyperus retrorsus	retrorse flatsedge	Not Listed	E
Cypripedium candidum	small white ladyslipper	Not Listed	E
Cypripedium parviflorum var. parviflorum	small yellow ladyslipper	Not Listed	E
Cystopteris protrusa	lowland fragile fern	Not Listed	E
Descurainia pinnata ssp. brachycarpa	Northern tansey-mustard	Not Listed	E
Desmodium humifusum	spreading tick-clover	Not Listed	E
Desmodium laevigatum	smooth tick-clover	Not Listed	E
Desmodium nuttallii	Nuttall's tick-clover	Not Listed	E
Desmodium obtusum	beggar-lice	Not Listed	E
Desmodium pauciflorum	small-flowered tick-clover	Not Listed	E
Diarrhena obovata	Beakgrass	Not Listed	E
Diplachne maritima	salt-meadow grass	Not Listed	E
Draba glabella	rock-cress	Not Listed	E
Dracocephalum parviflorum	American dragonhead	Not Listed	E
Dryopteris celsa	log fern	Not Listed	E
Dryopteris fragrans	fragrant cliff fern	Not Listed	E
Eclipta prostrata	yerba-de-tago	Not Listed	E
Elatine americana	American waterwort	Not Listed	E
Eleocharis elliptica var. pseudoptera	slender spikerush	Not Listed	E
Eleocharis engelmannii	Engelmann's spikerush	Not Listed	E
Eleocharis fallax	creeping spikerush	Not Listed	E
Eleocharis obtusa var. ovata	blunt spikerush	Not Listed	E
Eleocharis quadrangulata	angled spikerush	Not Listed	E
Eleocharis tricostata	three-ribbed spikerush	Not Listed	E
Empetrum eamesii ssp. atropurpureum	purple crowberry	Not Listed	E
Epilobium ciliatum ssp. glandulosum	willow-herb	Not Listed	E
Epilobium hornemannii	Alpine willow-herb	Not Listed	E
Equisetum laevigatum	smooth scouring rush	Not Listed	E
Erechtites hieraciifolia var. megalocarpa	Fireweed	Not Listed	E
Erigenia bulbosa	harbinger-of-spring	Not Listed	E
Erigeron hyssopifolius	daisy fleabane	Not Listed	E
Eriophorum angustifolium ssp. scabriusculum	narrow-leaf cottongrass	Not Listed	E
Euonymus americana	American strawberry-bush	Not Listed	E
Eupatorium aromaticum	small white snakeroot	Not Listed	E
Eupatorium leucolepis var. leucolepis	white boneset	Not Listed	E
Eupatorium rotundifolium var. ovatum	round-leaf boneset	Not Listed	E

Table 9.3-5—State and Federal Threatened and Endangered Species in New York
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Scientific Name	Common Name	Federal Status	State Status
Eupatorium rotundifolium var. rotundifolium	round-leaf boneset	Not Listed	E
Eupatorium serotinum	late boneset	Not Listed	E
Euphorbia ipecacuanhae	ipecac spurge	Not Listed	E
Festuca saximontana	sheep fescue	Not Listed	E
Galium concinnum	shining bedstraw	Not Listed	E
Galium kamtschaticum	Northern wild-licorice	Not Listed	E
Gaylussacia dumosa var. bigeloviana	dwarf huckleberry	Not Listed	E
Gentiana saponaria	soapwort gentian	Not Listed	E
Gentianopsis procera	lesser fringed gentian	Not Listed	E
Geocaulon lividum	purple comandra	Not Listed	E
Geum vernum	spring avens	Not Listed	E
Geum virginianum	rough avens	Not Listed	E
Gnaphalium helleri var. micradenium	Catfoot	Not Listed	E
Gnaphalium purpureum	purple everlasting	Not Listed	E
Gnaphalium sylvaticum	woodland cudweed	Not Listed	E
Gymnocladus dioica	Kentucky coffee tree	Not Listed	E
Hackelia deflexa var. americana	Northern stickseed	Not Listed	E
Halenia deflexa	spurred gentian	Not Listed	E
Hippuris vulgaris	mare's-tail	Not Listed	E
Houstonia purpurea var. calycosa	purple bluets	Not Listed	E
Houstonia purpurea var. purpurea	purple bluets	Not Listed	E
Huperzia selago	fir clubmoss	Not Listed	E
Hydrangea arborescens	wild hydrangea	Not Listed	E
Hydrocotyle ranunculoides	floating pennywort	Not Listed	E
Hydrocotyle verticillata	water-pennywort	Not Listed	E
Hypericum adpressum	creeping St. John's-wort	Not Listed	E
Hypericum densiflorum	bushy St. John's-wort	Not Listed	E
Hypericum denticulatum	coppery St. John's-wort	Not Listed	E
Hypericum hypercoides ssp. multicaule	St. Andrew's cross	Not Listed	E
Ipomoea pandurata	wild potato-vine	Not Listed	E
Iris virginica var. schrevei	Southern blueflag	Not Listed	E
Isoetes riparia	Quillwort	Not Listed	E
Isotria medeoloides	small whorled pogonia	Not Listed	E
Juncus ambiguus	doubtful toad-rush	Not Listed	E
Juncus brachycarpus	short-fruit rush	Not Listed	E
Juncus debilis	weak rush	Not Listed	E
Juncus ensifolius	ensiform rush	Not Listed	E
Juncus marginatus var. biflorus	large grass-leaved rush	Not Listed	E
Juncus scirpoides	scirpus-like rush	Not Listed	E
Juncus stygius ssp. americanus	moor-rush	Not Listed	E
Juncus subcaudatus	woods-rush	Not Listed	E
Juniperus horizontalis	prostrate juniper	Not Listed	E
Lachnanthes caroliniana	Carolina redroot	Not Listed	E
Lactuca floridana	false lettuce	Not Listed	E
Lactuca hirsuta	downy lettuce	Not Listed	E
Lathyrus venosus	rough veiny vetchling	Not Listed	E
Lechea pulchella var. moniliformis	bead pinweed	Not Listed	E
Lemna perpusilla	minute duckweed	Not Listed	E
Lemna valdiviana	pale duckweed	Not Listed	E

Table 9.3-5—State and Federal Threatened and Endangered Species in New York
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Scientific Name	Common Name	Federal Status	State Status
Leucospora multifida	Leucospora	Not Listed	E
Liatris cylindracea	slender blazing-star	Not Listed	E
Ligusticum scothicum	Scotch lovage	Not Listed	E
Lilium michiganense	Michigan lily	Not Listed	E
Linum medium var. medium	wild flax	Not Listed	E
Liparis lilifolia	large twayblade	Not Listed	E
Lipocarpha micrantha	dwarf bulrush	Not Listed	E
Listera auriculata	auricled twayblade	Not Listed	E
Listera australis	Southern twayblade	Not Listed	E
Listera convallarioides	broad-lipped twayblade	Not Listed	E
Lithospermum caroliniense ssp. croceum	golden puccoon	Not Listed	E
Littorella uniflora	American shore-grass	Not Listed	E
Loiseleuria procumbens	Alpine azalea	Not Listed	E
Luzula spicata	spiked woodthrush	Not Listed	E
Lycopodiella caroliniana	Carolina clubmoss	Not Listed	E
Lycopodium complanatum	Northern running-pine	Not Listed	E
Lycopodium sitchense	Sitka clubmoss	Not Listed	E
Lycopus rubellus	Gypsy-wort	Not Listed	E
Lygodium palmatum	climbing fern	Not Listed	E
Lysimachia hybrida	lance-leaved loosestrife	Not Listed	E
Lysimachia quadriflora	four-flowered loosestrife	Not Listed	E
Lythrum lineare	saltmarsh loosestrife	Not Listed	E
Magnolia virginiana	sweetbay magnolia	Not Listed	E
Malaxis bayardii	Bayard's malaxis	Not Listed	E
Malus glaucescens	American crab	Not Listed	E
Melanthium virginicum	Virginia bunchflower	Not Listed	E
Monarda clinopodia	basil-balm	Not Listed	E
Myriophyllum pinnatum	green parrot's-feather	Not Listed	E
Najas guadalupensis var. muenscheri	Muenscher's naiad	Not Listed	E
Najas guadalupensis var. olivacea	Southern naiad	Not Listed	E
Najas marina	holly-leaved naiad	Not Listed	E
Oenothera laciniata	cut-leaved evening-primrose	Not Listed	E
Oldenlandia uniflora	clustered bluets	Not Listed	E
Onosmodium virginianum	Virginia false gromwell	Not Listed	E
Oryzopsis canadensis	Canada ricegrass	Not Listed	E
Oxypolis rigidior	stiff cowbane	Not Listed	E
Panicum leibergii	Leiberg's panic grass	Not Listed	E
Panicum oligosanthes var. oligosanthes	few-flowered panic grass	Not Listed	E
Panicum scabriusculum	panic grass	Not Listed	E
Panicum scoparium	velvet panic grass	Not Listed	E
Panicum stipitatum	tall flat panic grass	Not Listed	E
Panicum wrightianum	Wright's panic grass	Not Listed	E
Paspalum laeve var. circulare	round field beadgrass	Not Listed	E
Paspalum laeve var. pilosum	hairy field beadgrass	Not Listed	E
Paspalum setaceum var. psammophilum	slender beadgrass	Not Listed	E
Petasites frigidus var. palmatus	sweet coltsfoot	Not Listed	E
Phlox maculata	wild sweet-William	Not Listed	E
Phlox pilosa	downy phlox	Not Listed	E
Physalis pubescens var. integrifolia	ground-cherry	Not Listed	E

Table 9.3-5—State and Federal Threatened and Endangered Species in New York
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Scientific Name	Common Name	Federal Status	State Status
Physalis virginiana	Virginia ground-cherry	Not Listed	E
Physocarpus opulifolius var. intermedius	Ninebark	Not Listed	E
Pinus virginiana	Virginia pine	Not Listed	E
Platanthera ciliaris	orange fringed orchis	Not Listed	E
Platanthera cristata	crested fringed orchis	Not Listed	E
Platanthera hookeri	Hooker's orchid	Not Listed	E
Platanthera leucophaea	prairie fringed orchid	Not Listed	E
Poa cuspidata	Bluegrass	Not Listed	E
Poa fernaldiana	Fernald bluegrass	Not Listed	E
Poa glauca	white bluegrass	Not Listed	E
Poa interior	inland bluegrass	Not Listed	E
Poa paludigena	slender marsh bluegrass	Not Listed	E
Poa sylvestris	woodland bluegrass	Not Listed	E
Polygala lutea	yellow milkwort	Not Listed	E
Polygonum buxiforme	Small's knotweed	Not Listed	E
Polygonum erectum	erect knotweed	Not Listed	E
Polygonum setaceum var. interjectum	swamp smartweed	Not Listed	E
Polymnia uvedalia	bear's-foot	Not Listed	E
Polystichum lonchitis	Northern holly-fern	Not Listed	E
Potamogeton diversifolius	water-thread pondweed	Not Listed	E
Potamogeton filiformis var. alpinus	slender pondweed	Not Listed	E
Potamogeton filiformis var. occidentalis	sheathed pondweed	Not Listed	E
Potamogeton ogdenii	Ogden's pondweed	Not Listed	E
Potamogeton strictifolius	straight-leaf pondweed	Not Listed	E
Potentilla paradoxa	bushy cinquefoil	Not Listed	E
Prenanthes boottii	Boott's rattlesnake-root	Not Listed	E
Prenanthes crepidinea	nodding rattlesnake-root	Not Listed	E
Prenanthes nana	dwarf rattlesnake-root	Not Listed	E
Prunus pumila var. pumila	low sand-cherry	Not Listed	E
Ptelea trifoliata	wafer-ash	Not Listed	E
Pterospora andromedea	giant pine-drops	Not Listed	E
Pycnanthemum clinopodioides	mountain-mint	Not Listed	E
Pycnanthemum torrei	Torrey's mountain-mint	Not Listed	E
Pycnanthemum verticillatum var. pilosum	whorled mountain-mint	Not Listed	E
Pyrola minor	mountain pyrola	Not Listed	E
Pyxidanthera barbulata	Pixies	Not Listed	E
Quercus phellos	willow oak	Not Listed	E
Ranunculus cymbalaria	seaside crowfoot	Not Listed	E
Ranunculus hispidus var. nitidus	swamp buttercup	Not Listed	E
Rhododendron lapponicum	lapland rosebay	Not Listed	E
Rhynchospora torreyana	Torrey's beakrush	Not Listed	E
Rosa acicularis ssp. sayi	prickly rose	Not Listed	E
Rosa nitida	shining rose	Not Listed	E
Rubus cuneifolius	sand blackberry	Not Listed	E
Rudbeckia hirta var. hirta	black-eyed-susan	Not Listed	E
Rumex hastatulus	heart sorrel	Not Listed	E
Rumex maritimus var. fueginus	golden dock	Not Listed	E
Sabatia angularis	rose-pink	Not Listed	E
Sabatia campanulata	slender marsh-pink	Not Listed	E

Table 9.3-5—State and Federal Threatened and Endangered Species in New York
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Scientific Name	Common Name	Federal Status	State Status
Sagina decumbens	small-flowered pearlwort	Not Listed	E
Sagittaria teres	quill-leaf arrowhead	Not Listed	E
Salix cordata	sand dune willow	Not Listed	E
Salix herbacea	dwarf willow	Not Listed	E
Salvia lyrata	lyre-leaf sage	Not Listed	E
Saxifraga oppositifolia	purple mountain-saxifrage	Not Listed	E
Saxifraga paniculata	white mountain-saxifrage	Not Listed	E
Schizaea pusilla	Curlygrass	Not Listed	E
Scirpus clintonii	Clinton's clubrush	Not Listed	E
Scirpus georgianus	Georgia bulrush	Not Listed	E
Scirpus heterochaetus	slender bulrush	Not Listed	E
Scirpus maritimus	seaside bulrush	Not Listed	E
Scirpus novae-angliae	saltmarsh bulrush	Not Listed	E
Scleria minor	slender nutrush	Not Listed	E
Scleria pauciflora var. caroliniana	fewflower nutrush	Not Listed	E
Scleria reticularis var. pubescens	reticulate nutrush	Not Listed	E
Scleria verticillata	low nutrush	Not Listed	E
Scutellaria incana	hoary skullcap	Not Listed	E
Scutellaria integrifolia	hyssop-skullcap	Not Listed	E
Sedum integrifolium ssp. leedyi	Leedy's roseroot	T	E
Sedum rosea	Roseroot	Not Listed	E
Sedum telephioides	live-forever	Not Listed	E
Sesuvium maritimum	sea purslane	Not Listed	E
Sisyrinchium mucronatum	Michaux's blue-eyed-grass	Not Listed	E
Smilax pseudo-china	false china-root	Not Listed	E
Smilax pulverulenta	Jacob's-ladder	Not Listed	E
Solidago elliottii	coastal goldenrod	Not Listed	E
Solidago houghtonii	Houghton's goldenrod	T	E
Solidago rugosa ssp. aspera	rough goldenrod	Not Listed	E
Solidago rugosa var. sphagnophila	tall hairy goldenrod	Not Listed	E
Solidago sempervirens var. mexicana	seaside goldenrod	Not Listed	E
Solidago simplex var. racemosa	mountain goldenrod	Not Listed	E
Sphenopholis obtusata var. obtusata	prairie wedgegrass	Not Listed	E
Sphenopholis pensylvanica	swamp oats	Not Listed	E
Spiraea septentrionalis	mountain meadowsweet	Not Listed	E
Spiranthes vernalis	Spring ladies'-tresses	Not Listed	E
Sporobolus clandestinus	rough rush-grass	Not Listed	E
Strophostyles umbellata	pink wild bean	Not Listed	E
Suaeda linearis	narrow-leaf sea-blite	Not Listed	E
Suaeda rolandii	Roland's sea-blite	Not Listed	E
Subularia aquatica var. americana	water awlwort	Not Listed	E
Thalictrum venulosum	veiny meadow-rue	Not Listed	E
Tipularia discolor	cranefly orchid	Not Listed	E
Tofieldia glutinosa	sticky false asphodel	Not Listed	E
Trichomanes intricatum	filmy fern	Not Listed	E
Trichostema setaceum	tiny blue-curls	Not Listed	E
Trillium flexipes	nodding trillium	Not Listed	E
Trillium sessile	toad-shade	Not Listed	E
Triphora trianthophora	nodding pogonia	Not Listed	E

Table 9.3-5—State and Federal Threatened and Endangered Species in New York
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Scientific Name	Common Name	Federal Status	State Status
Trisetum melicoides	melic-oats	Not Listed	E
Utricularia inflata	large floating bladderwort	Not Listed	E
Uvularia puberula var. nitida	mountain bellwort	Not Listed	E
Vaccinium cespitosum	dwarf blueberry	Not Listed	E
Valeriana uliginosa	marsh valerian	Not Listed	E
Valerianella chenopodiifolia	goosefoot corn-salad	Not Listed	E
Valerianella umbilicata	corn-salad	Not Listed	E
Vernonia gigantea	tall ironweed	Not Listed	E
Viburnum nudum var. nudum	possum-haw	Not Listed	E
Viola brittoniana var. brittoniana	coastal violet	Not Listed	E
Viola hirsutula	Southern wood violet	Not Listed	E
Viola nephrophylla	Northern bog violet	Not Listed	E
Viola novae-angliae	New England violet	Not Listed	E
Vitis vulpina	Winter grape	Not Listed	E
Vittaria appalachiana	Appalachian vittaria	Not Listed	E
Woodsia alpina	Alpine woodsia	Not Listed	E
Woodsia glabella	smooth woodsia	Not Listed	E
Aconitum noveboracense	Northern monk's-hood	T	T
Agalinis paupercula var. borealis	Northern gerardia	Not Listed	T
Agastache nepetoides	yellow giant-hyssop	Not Listed	T
Agrimonia rostellata	woodland agrimony	Not Listed	T
Agrostis mertensii	Northern bentgrass	Not Listed	T
Aletris farinosa	Stargrass	Not Listed	T
Allium cernuum	wild onion	Not Listed	T
Arabis missouriensis	green rock-cress	Not Listed	T
Arethusa bulbosa	swamp pink	Not Listed	T
Asclepias viridiflora	green milkweed	Not Listed	T
Asimina triloba	Pawpaw	Not Listed	T
Asplenium montanum	mountain spleenwort	Not Listed	T
Asplenium scolopendrium var. americanum	hart's-tongue fern	T	T
Aster borealis	rush aster	Not Listed	T
Aster pilosis var. pringlei	heath aster	Not Listed	T
Aster solidagineus	flax-leaf whitetop	Not Listed	T
Aster spectabilis	showy aster	Not Listed	T
Aster subulatus	saltmarsh aster	Not Listed	T
Betula pumila	swamp birch	Not Listed	T
Bidens laevis	smooth bur-marigold	Not Listed	T
Calamagrostis stricta ssp. inexpansa	Northern reedgrass	Not Listed	T
Callitriche terrestris	terrestrial starwort	Not Listed	T
Cardamine longii	Long's bittercress	Not Listed	T
Carex abscondita	thicket sedge	Not Listed	T
Carex backii	rocky mountain sedge	Not Listed	T
Carex bicknellii	Bicknell's sedge	Not Listed	T
Carex bigelowii	Bigelow's sedge	Not Listed	T
Carex buxbaumii	brown bog sedge	Not Listed	T
Carex chordorrhiza	creeping sedge	Not Listed	T
Carex crawei	Crawe's sedge	Not Listed	T
Carex cumulata	clustered sedge	Not Listed	T
Carex davisii	Davis' sedge	Not Listed	T

Table 9.3-5—State and Federal Threatened and Endangered Species in New York
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Scientific Name	Common Name	Federal Status	State Status
Carex formosa	handsome sedge	Not Listed	T
Carex hitchcockiana	Hitchcock's sedge	Not Listed	T
Carex hormathodes	marsh straw sedge	Not Listed	T
Carex houghtoniana	Houghton's sedge	Not Listed	T
Carex jamesii	Nebraska sedge	Not Listed	T
Carex merritt-fernaldii	Fernald's sedge	Not Listed	T
Carex mitchelliana	Mitchell's sedge	Not Listed	T
Carex molesta	Troublesome sedge	Not Listed	T
Carex sartwellii	Sartwell's sedge	Not Listed	T
Carex schweinitzii	Schweinitz' sedge	Not Listed	T
Carex seorsa	weak stellate sedge	Not Listed	T
Carex typhina	cat-tail sedge	Not Listed	T
Carex willdenowii	Willdenow's sedge	Not Listed	T
Carya laciniosa	big shellbark hickory	Not Listed	T
Cenchrus tribuloides	dune sandspur	Not Listed	T
Ceratophyllum echinatum	prickly hornwort	Not Listed	T
Chamaelirium luteum	blazing-star	Not Listed	T
Chenopodium rubrum	red pigweed	Not Listed	T
Corydalis aurea	golden corydalis	Not Listed	T
Cyperus lupulinus ssp. lupulinus	hop sedge	Not Listed	T
Cypripedium arietinum	ram's-head ladyslipper	Not Listed	T
Desmodium ciliare	little-leaf tick-trefoil	Not Listed	T
Diapensia lapponica	Diapensia	Not Listed	T
Digitaria filiformis	slender crabgrass	Not Listed	T
Diospyros virginiana	Persimmon	Not Listed	T
Draba arabisans	rock-cress	Not Listed	T
Draba reptans	Carolina whitlow-grass	Not Listed	T
Eleocharis equisetoides	knotted spikerush	Not Listed	T
Eleocharis halophila	salt-marsh spikerush	Not Listed	T
Eleocharis tuberculosa	long-tubercled spikerush	Not Listed	T
Equisetum pratense	meadow horsetail	Not Listed	T
Equisetum palustre	marsh horsetail	Not Listed	T
Eupatorium album var. subvenosum	white boneset	Not Listed	T
Eupatorium hyssopifolium var. laciniatum	fringed boneset	Not Listed	T
Fimbristylis castanea	marsh fimbry	Not Listed	T
Frasera caroliniensis	green gentian	Not Listed	T
Geranium carolinianum var. sphaerospermum	Carolina cranesbill	Not Listed	T
Geum triflorum	prairie-smoke	Not Listed	T
Hedeoma hispidum	mock-pennyroyal	Not Listed	T
Helianthemum dumosum	bushy rockrose	Not Listed	T
Helianthus angustifolius	swamp sunflower	Not Listed	T
Hottonia inflata	Featherfoil	Not Listed	T
Huperzia appalachiana	Appalachian firmoss	Not Listed	T
Hydrastis canadensis	golden-seal	Not Listed	T
Hypericum prolificum	shrubby St. John's-wort	Not Listed	T
Iris prismatica	slender blue flag	Not Listed	T
Jeffersonia diphylla	twin-leaf	Not Listed	T
Juncus trifidus	arctic rush	Not Listed	T
Lechea tenuifolia	slender pinweed	Not Listed	T

Table 9.3-5—State and Federal Threatened and Endangered Species in New York
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Scientific Name	Common Name	Federal Status	State Status
Lespedeza stuevei	velvety lespedeza	Not Listed	T
Liatris borealis	Northern blazing-star	Not Listed	T
Lilaeopsis chinensis	Lilaeopsis	Not Listed	T
Linum intercursum	sandplain wild flax	Not Listed	T
Linum medium var. texanum	Southern yellow flax	Not Listed	T
Linum sulcatum	yellow wild flax	Not Listed	T
Ludwigia sphaerocarpa	globe-fruited ludwigia	Not Listed	T
Megalodonta beckii var. beckii	water-marigold	Not Listed	T
Minuartia glabra	Appalachian sandwort	Not Listed	T
Myriophyllum alterniflorum	water milfoil	Not Listed	T
Myriophyllum farwellii	Farwell's water milfoil	Not Listed	T
Oenothera parviflora var. oakesiana	evening primrose	Not Listed	T
Orontium aquaticum	golden club	Not Listed	T
Oxalis violacea	violet wood-sorrel	Not Listed	T
Panicum flexile	wiry panic grass	Not Listed	T
Paspalum setaceum var. setaceum	slender beadgrass	Not Listed	T
Pedicularis lanceolata	swamp lousewort	Not Listed	T
Pellaea glabella	smooth cliff brake	Not Listed	T
Pinguicula vulgaris	Butterwort	Not Listed	T
Plantago cordata	heartleaf plantain	Not Listed	T
Plantago maritima ssp. juncoides	seaside plantain	Not Listed	T
Podostemum ceratophyllum	Riverweed	Not Listed	T
Polygonum careyi	Carey's smartweed	Not Listed	T
Polygonum douglassii	Douglas knotweed	Not Listed	T
Polygonum hydropiperoides var. opelousanum	opelousa smartweed	Not Listed	T
Populus heterophylla	swamp cottonwood	Not Listed	T
Potamogeton alpinus	Northern pondweed	Not Listed	T
Potamogeton confervoides	algae-like pondweed	Not Listed	T
Potamogeton hillii	Hill's pondweed	Not Listed	T
Potamogeton pulcher	spotted pondweed	Not Listed	T
Potentilla anserina ssp. egedii	Silverweed	Not Listed	T
Primula mistassinica	bird's-eye primrose	Not Listed	T
Proserpinaca pectinata	comb-leaved mermaid-weed	Not Listed	T
Prunus pumila var. depressa	dwarf sand-cherry	Not Listed	T
Pycnanthemum muticum	blunt mountain-mint	Not Listed	T
Pycnanthemum verticillatum var. verticillatum	whorled mountain-mint	Not Listed	T
Pyrola asarifolia	pink wintergreen	Not Listed	T
Ranunculus micranthus	small-flowered crowfoot	Not Listed	T
Rhododendron canadense	Rhodora	Not Listed	T
Rhynchospora inundata	drowned horned bush	Not Listed	T
Rhynchospora nitens	short-beaked bald-rush	Not Listed	T
Rorippa aquatica	lake-cress	Not Listed	T
Rotala ramosior	tooth-cup	Not Listed	T
Sabatia stellaris	sea-pink	Not Listed	T
Sagittaria calycina var. spongiosa	spongy arrowhead	Not Listed	T
Salicornia bigelovii	dwarf glasswort	Not Listed	T
Salix pyrifolia	balsam willow	Not Listed	T
Salix uva-ursi	bearberry willow	Not Listed	T

Table 9.3-5—State and Federal Threatened and Endangered Species in New York
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Scientific Name	Common Name	Federal Status	State Status
Saxifraga aizoides	yellow mountain-saxifrage	Not Listed	T
Scirpus cespitosus	deer's hair sedge	Not Listed	T
Scleria triglomerata	whip nutrush	Not Listed	T
Solidago multiradiata var. arctica	Alpine goldenrod	Not Listed	T
Solidago ohioensis	Ohio golderod	Not Listed	T
Solidago rigida	stiff-leaf goldenrod	Not Listed	T
Solidago simplex var. randii	mountain goldenrod	Not Listed	T
Sparganium nutans	small bur-reed	Not Listed	T
Sporobolus heterolepis	Northern dropseed	Not Listed	T
Stachys hyssopifolia	rough hedge-nettle	Not Listed	T
Stellaria longipes	Starwort	Not Listed	T
Triglochin palustre	marsh arrow-grass	Not Listed	T
Tripsacum dactyloides	Northern gamma grass	Not Listed	T
Ulmus thomasii	cork elm	Not Listed	T
Utricularia juncea	rush bladderwort	Not Listed	T
Utricularia minor	lesser bladderwort	Not Listed	T
Utricularia radiata	small floating bladderwort	Not Listed	T
Utricularia striata	Bladderwort	Not Listed	T
Vaccinium boreale	high-mountain blueberry	Not Listed	T
Verbesina alternifolia	Wingstem	Not Listed	T
Veronicastrum virginicum	culver's root	Not Listed	T
Viburnum dentatum var. venosum	Southern arrowwood	Not Listed	T
Viburnum edule	Squashberry	Not Listed	T
Viola primulifolia	primrose violet	Not Listed	T
Zigadenus elegans ssp. glaucus	white camas	Not Listed	T
Aquatic Species			
Molluscs			
Alasmidonta heterodon	Dwarf Wedgemussel	E	E
Lampsilis abrupta	Pink Mucket	E	E
Alasmidonta varicosa	Brook Floater	Not Listed	T
Lampsilis fasciola	Wavy-rayed lampmussel	Not Listed	T
Pleurobema clava	Clubshell	E	E
Lasmigona subbiridis	Green Floater	Not Listed	T
Potamilus capax	Fat pocketbook	E	E
Villosa fabalis	Rayed Bean	Not Listed	E
Novisuccinea chittenangoenisis	Chittenango Ovate Amber Snail	T	E
Fish			
Acipenser brevirostrum	Shortnose Sturgeon	E	E
Acipenser fulvescens	Lake Sturgeon	Not Listed	T
Hiodon tergisus	Mooneye	Not Listed	T
Macrhybopsis storeriana	Silver Chub	Not Listed	E
Notropis anogenus	Pugnose Shiner	Not Listed	E
Erimyzon sucetta	Lake Chubsucker	Not Listed	T
Prosopium cylindraceum	Round Whitefish	Not Listed	E
Erimystax x-punctata	Gravel Chub	Not Listed	T
Etheostoma camurum	Bluebreast Darter	Not Listed	E
Acantharuchus pomotis	Mud Sunfish	Not Listed	T
Enneacanthus obesus	Banded Sunfish	Not Listed	T
Lepomis megalotis	Longear Sunfish	Not Listed	T

Table 9.3-5—State and Federal Threatened and Endangered Species in New York
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Scientific Name	Common Name	Federal Status	State Status
Percina macrocephala	Longhead Darter	Not Listed	T
Percina evides	Gilt Darter	Not Listed	E
Ammocrypta pellucida	Eastern Sand Darter	Not Listed	T
Cottus ricei	Spoonhead Sculpin	Not Listed	E
Etheostoma fusiforme	Swamp Darter	Not Listed	T
Myoxocephalus thompsoni	Deepwater Sculpin	Not Listed	E
Etheostoma maculatum	Spotted Darter	Not Listed	T
Amphibians			
Ambystoma tigrinum	Tiger Salamander	Not Listed	E
Acris Crepitans	Northern Cricket Frog	Not Listed	E
Reptiles			
Kinosternon subrubrum	Mud Turtle	Not Listed	E
Emydoidea blandingii	Blanding's Turtle	Not Listed	T
Chelonia mydas	Green Sea Turtle	T	T
Clemmys muglenbergii	Bog Turtle	T	E
Eretmochelys imbricata	Atlantic Hawksbill Sea Turtle	E	E
Caretta caretta	Loggerhead Sea Turtle	T	T
Lepidochelys kempii	Atlantic Ridley Sea Turtle	E	E
Dermochelys coriacea	Leatherback Sea Turtle	E	E
Mammals			
Physter catodon	Sperm Whale	E	E
Balaenoptera borealis	Sei Whale	E	E
Balaenoptera musculus	Blue Whale	E	E
Balaenoptera physalus	Finback Whale	E	E
Megaptera novaeangliae	Humpback Whale	E	E
Eubalaena glacialis	Right Whale	E	E

Notes:
New York State does not separate threatened and endangered species by county.
E = Endangered
T = Threatened
Source: NYSDEC, 2008c

Table 9.3-6—Demographic Characteristics of the AES Somerset Site Area

Race	AES Somerset Site CT 24102 BG 3	CT 24102 BG 1	CT 24102 BG 2	CT 24101 BG 1	CT 24201 BG 6	CT 24202 BG 1	Niagara County, New York	State of New York
White alone	862	1359	560	1990	1372	599	199,404	12,893,689
Black or African American alone	8	9	4	10	6	18	13,520	3,014,385
American Indian and Alaska Native alone	5	11	3	9	6	9	2069	82,461
Asian alone	9	4	2	4	0	0	1267	1,044,976
Native Hawaiian and Other Pacific Islander alone	0	0	0	0	0	0	51	8,818
Some other race alone	11	1	1	8	6	26	876	1,341,946
Two or more races	7	6	3	24	11	0	2659	590,182
Total Population	902	1390	573	2045	1401	652	219,846	18,976,457
Hispanic [a]	15	13	9	18	12	25	2913	2,867,583
Minority Population	4.4%	2.2%	2.3%	2.7%	2.1%	8.1%	9.3%	31.2%
Hispanic Population	1.7%	0.9%	1.6%	0.9%	0.9%	3.8%	1.3%	15.1%
Income below poverty level								
Total in Census Tract	62	173	51	199	30	50	22,834	2,692,202
Population below poverty level	6.8%	12.6%	9.1%	9.8%	2.2%	7.9%	10.6%	14.6%

Notes:

(a) Hispanic: This category is for individuals who classify themselves in one of the specific Hispanic or Latino categories, such as “Mexican,” Puerto Rican,” or “Cuban,” as well as those who indicate that they are “other Spanish, Hispanic, or Latino.” Origin can be viewed as the heritage, nationality group, lineage, or country of birth of the person or the person’s parents or ancestors before arrival in the United States. People who identify their origin as Spanish, Hispanic, or Latino may be of any race.

Source: U.S. Census Bureau, 2000

Table 9.3-7— Demographics of the Blenheim-Gilboa Site Area

Race	Blenheim-Gilboa Site CT 990600 BG 2	CT 990600 BG 1	CT 990600 BG 3	CT 990500 BG 4	CT 990800 BG 3	CT 990800 BG 4	Schoharie County, New York	State of New York
White alone	647	1,015	569	1,091	463	701	30,514	12,893,689
Black or African American alone	126	1	13	14	8	3	403	3,014,385
American Indian and Alaska Native alone	1	5	1	2	0	3	96	82,461
Asian alone	0	1	0	3	1	9	120	1,044,976
Native Hawaiian and Other Pacific Islander alone	0	0	0	1	0	0	7	8,818
Some other race alone	16	0	1	4	8	7	149	1,341,946
Two or more races	13	0	13	8	2	10	293	590,182
Total Population	803	1,022	597	1,123	482	733	31,582	18,976,457
Hispanic [(a)]	77	8	9	12	14	10	588	2,867,583
Minority Population	19.4%	0.7%	4.7%	2.8%	4.0%	4.4%	3.4%	31.2%
Hispanic Population	9.6%	0.8%	1.5%	1.1%	2.9%	1.4%	1.9%	15.1%
Income below poverty level								
Total in Census Tract	71	186	76	177	48	98	3,392	2,692,202
Population below poverty level	12.3%	18.4%	12.6%	15.9%	10.1%	13.1%	11.4%	14.6%

Notes:

(b) Hispanic: This category is for individuals who classify themselves in one of the specific Hispanic or Latino categories, such as "Mexican," Puerto Rican," or "Cuban," as well as those who indicate that they are "other Spanish, Hispanic, or Latino." Origin can be viewed as the heritage, nationality group, lineage, or country of birth of the person or the person's parents or ancestors before arrival in the United States. People who identify their origin as Spanish, Hispanic, or Latino may be of any race.

Source: U.S. Census Bureau, 2000

Table 9.3-8—Summary Comparison of Alternative Sites

Location	NMP3NPP	Ginna Site	AES Somerset Site	Blenheim-Gilboa Site
Land Use	SMALL	SMALL	SMALL	SMALL
Air Quality	SMALL	SMALL	SMALL	SMALL
Water	SMALL to MODERATE	SMALL	SMALL	SMALL
Terrestrial Ecology	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Aquatic Ecology	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Socioeconomics	SMALL	SMALL	SMALL	SMALL
Historic, Cultural, and Archeological Resources	SMALL	SMALL	SMALL	SMALL
Environmental Justice	SMALL	SMALL	SMALL	SMALL to MODERATE
Transmission Corridors	SMALL	MODERATE	MODERATE	SMALL to MODERATE
Transportation	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Is this Site a Candidate Site?	Yes	Yes	Yes	Yes
Is this Candidate Site a Good Alternative Site to the Proposed Site?	Yes	Yes	Yes	Yes
Is the Site Environmentally Preferable?	Preferred alternative	No	No	No
Is the Site Obviously Superior?	Preferred alternative	Not Evaluated	Not Evaluated	Not Evaluated

Figure 9.3-1 — Region of Interest

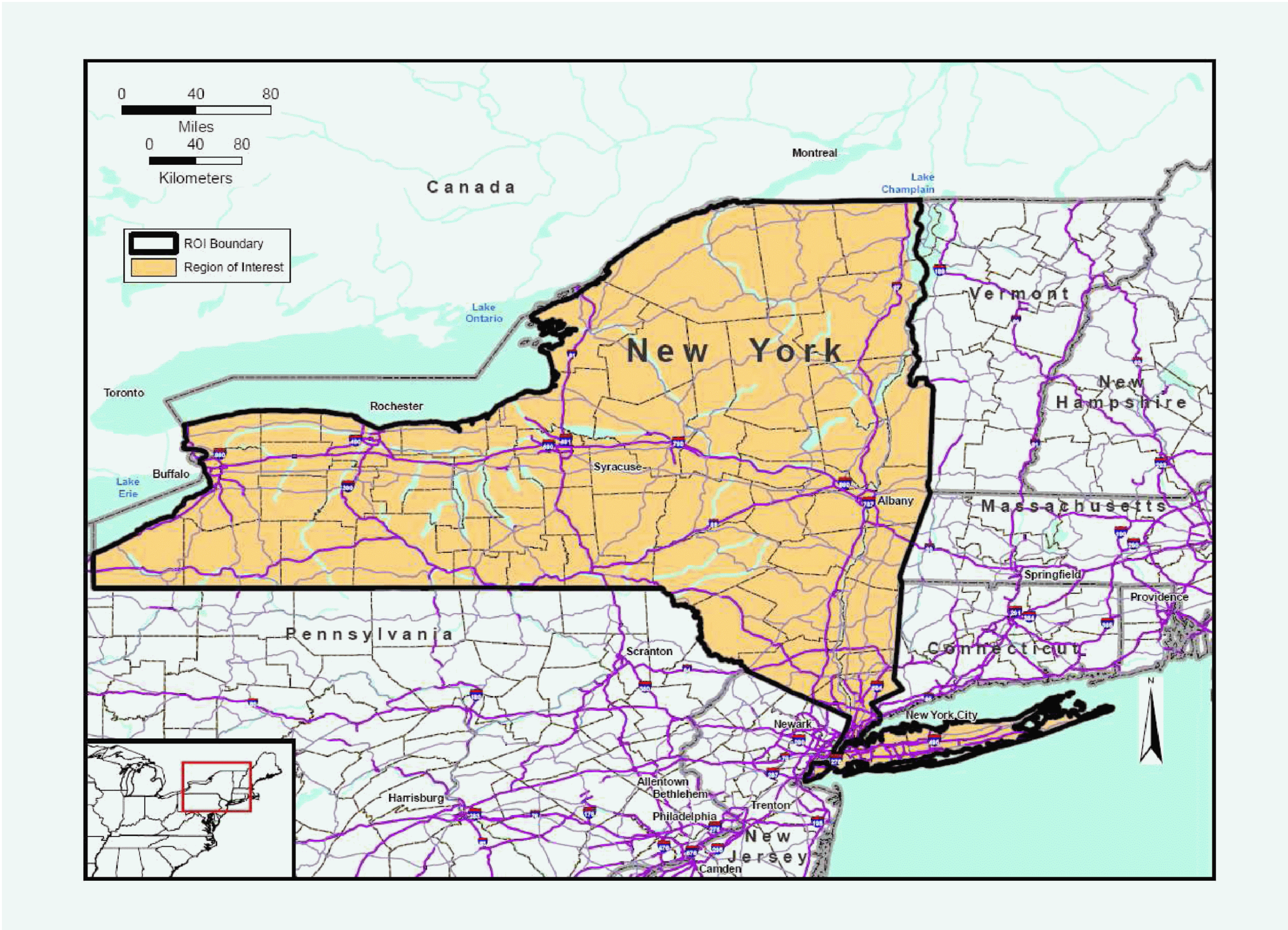


Figure 9.3-2 — Alternative Site Exclusionary Criteria

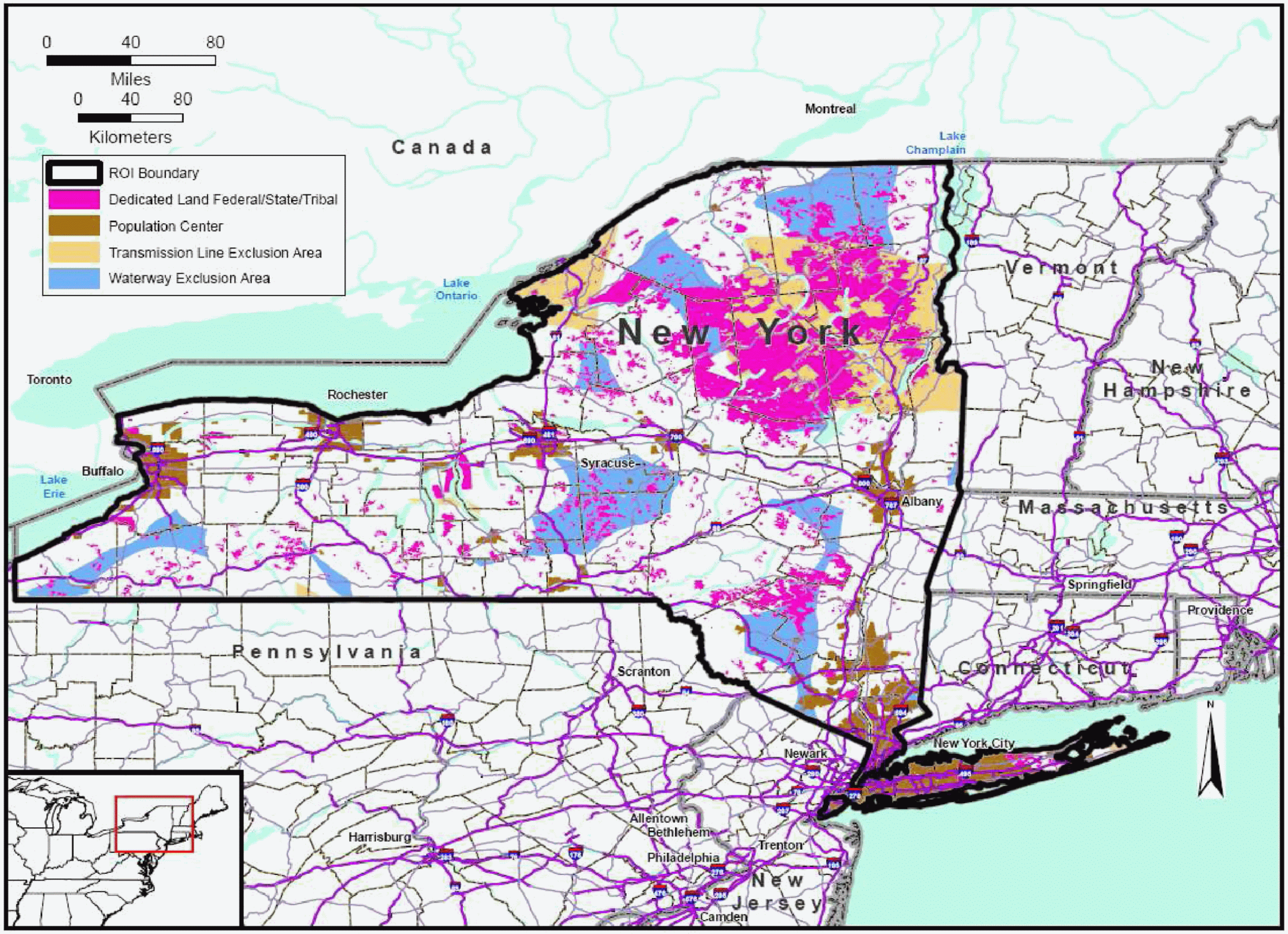


Figure 9.3-3 — Alternative Site Areas

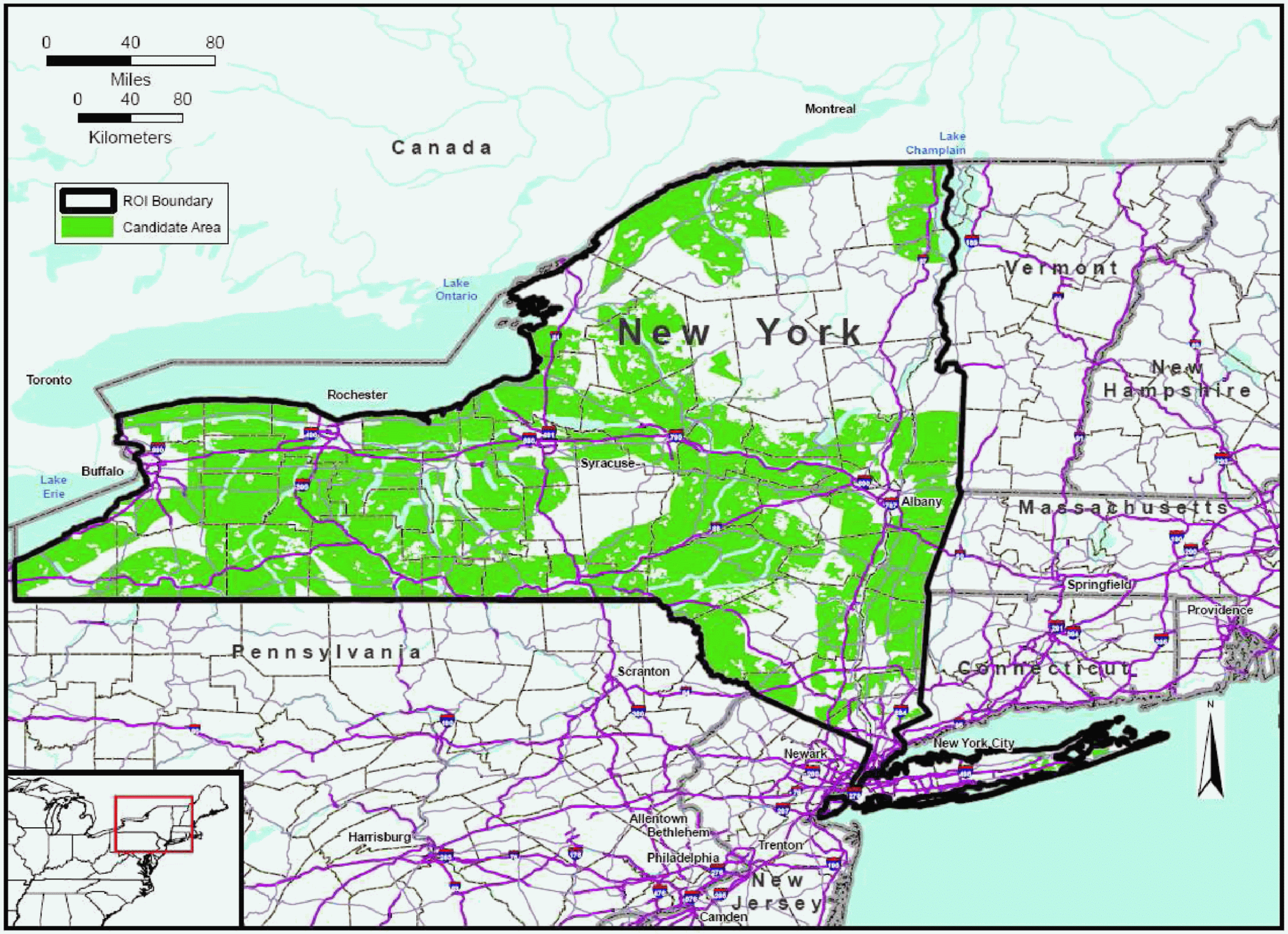


Figure 9.3-4 — Potential Alternative Sites

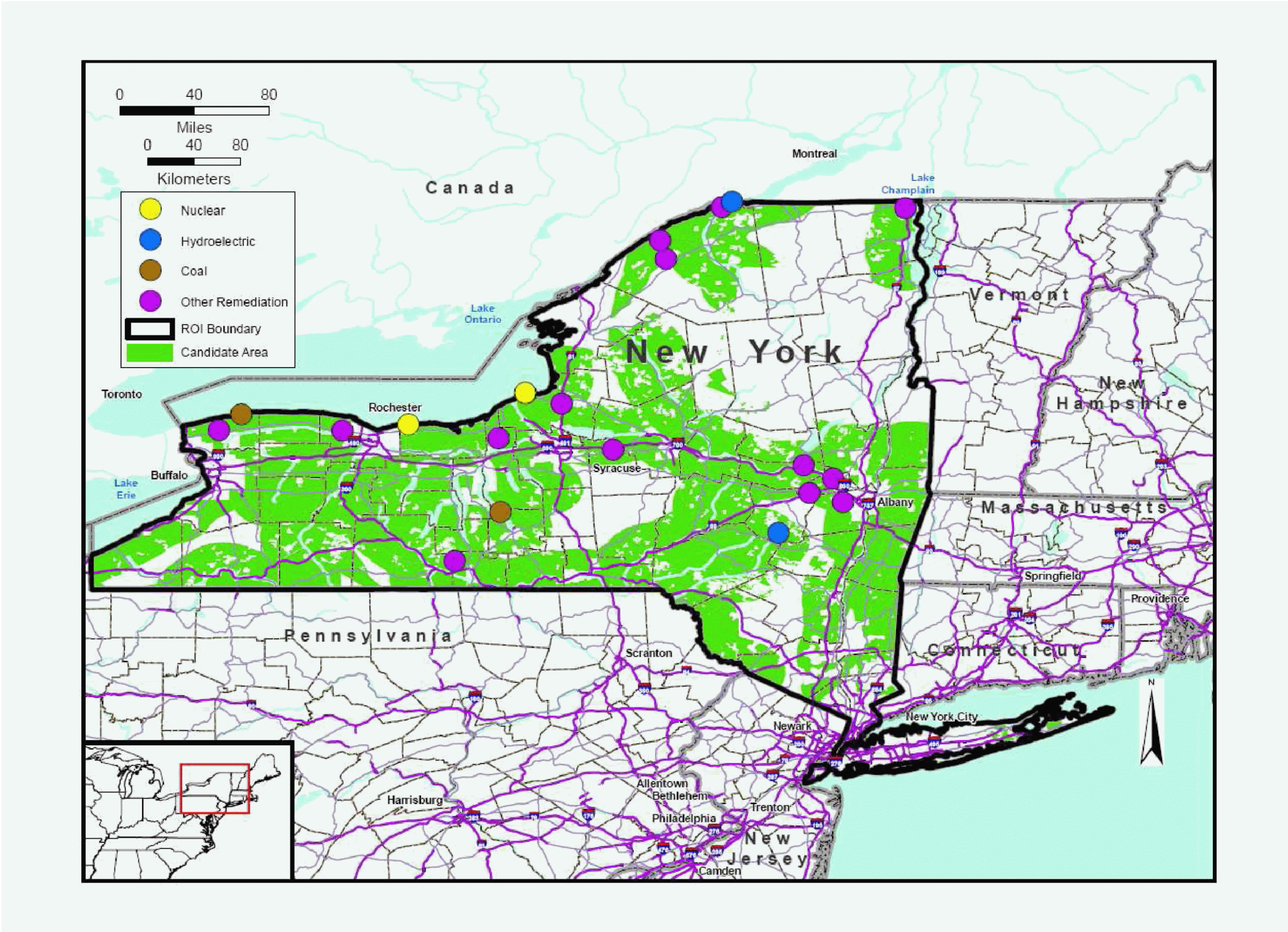


Figure 9.3-5 — Alternative Sites

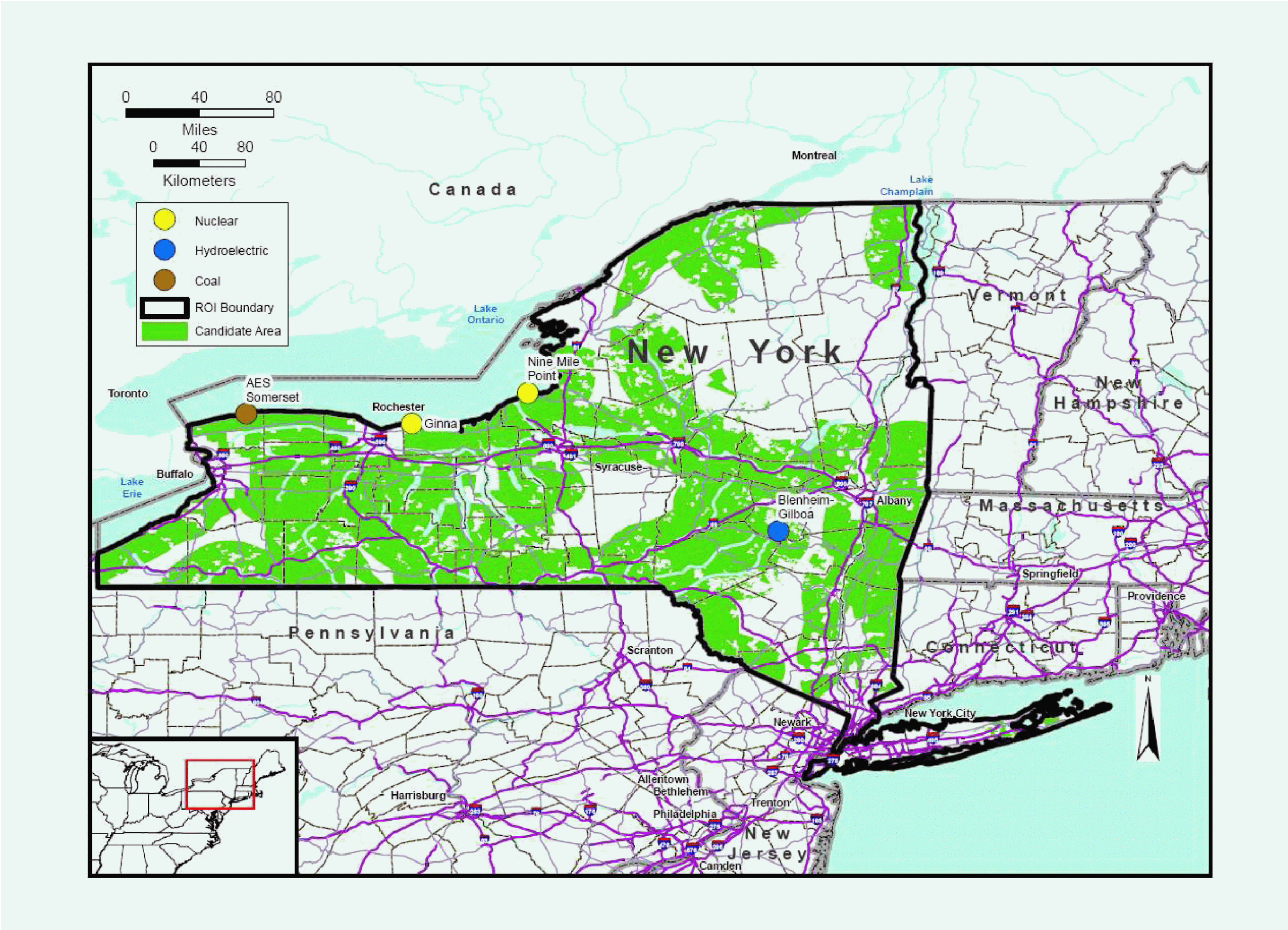


Figure 9.3-6 — Nine Mile Point Nuclear Station Vicinity

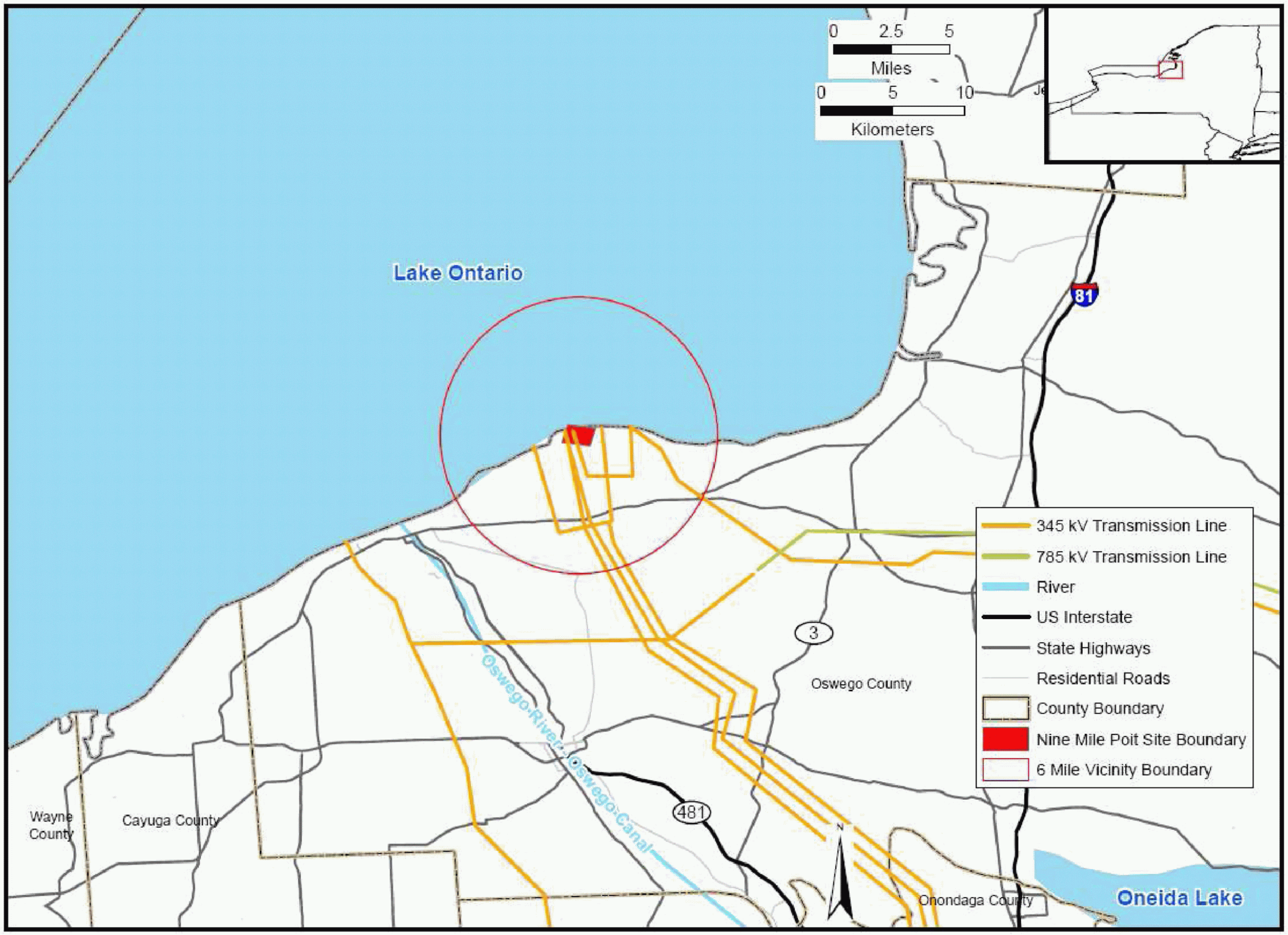


Figure 9.3-7 — Ginna Vicinity

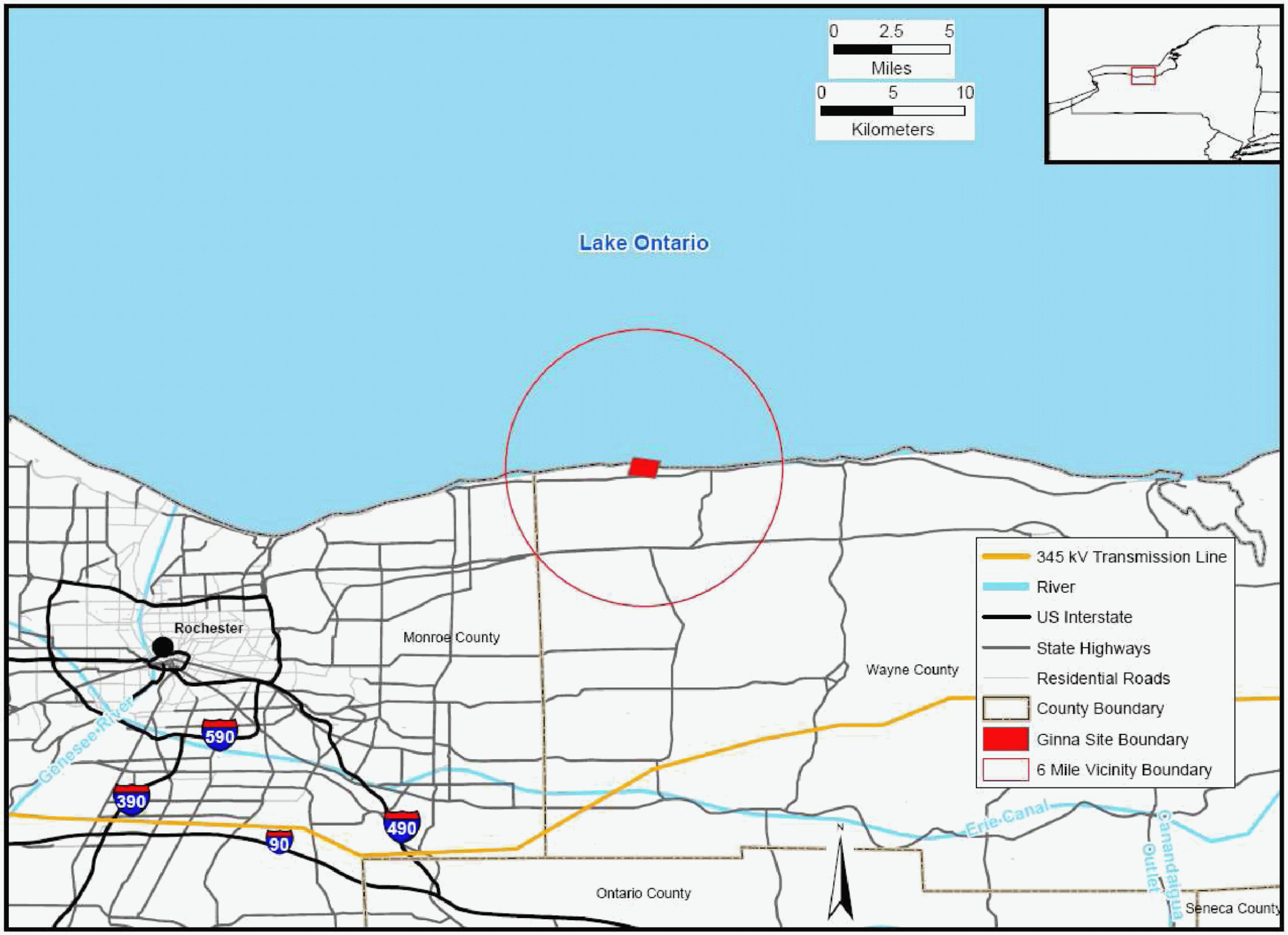


Figure 9.3-8 — AES Somerset Vicinity

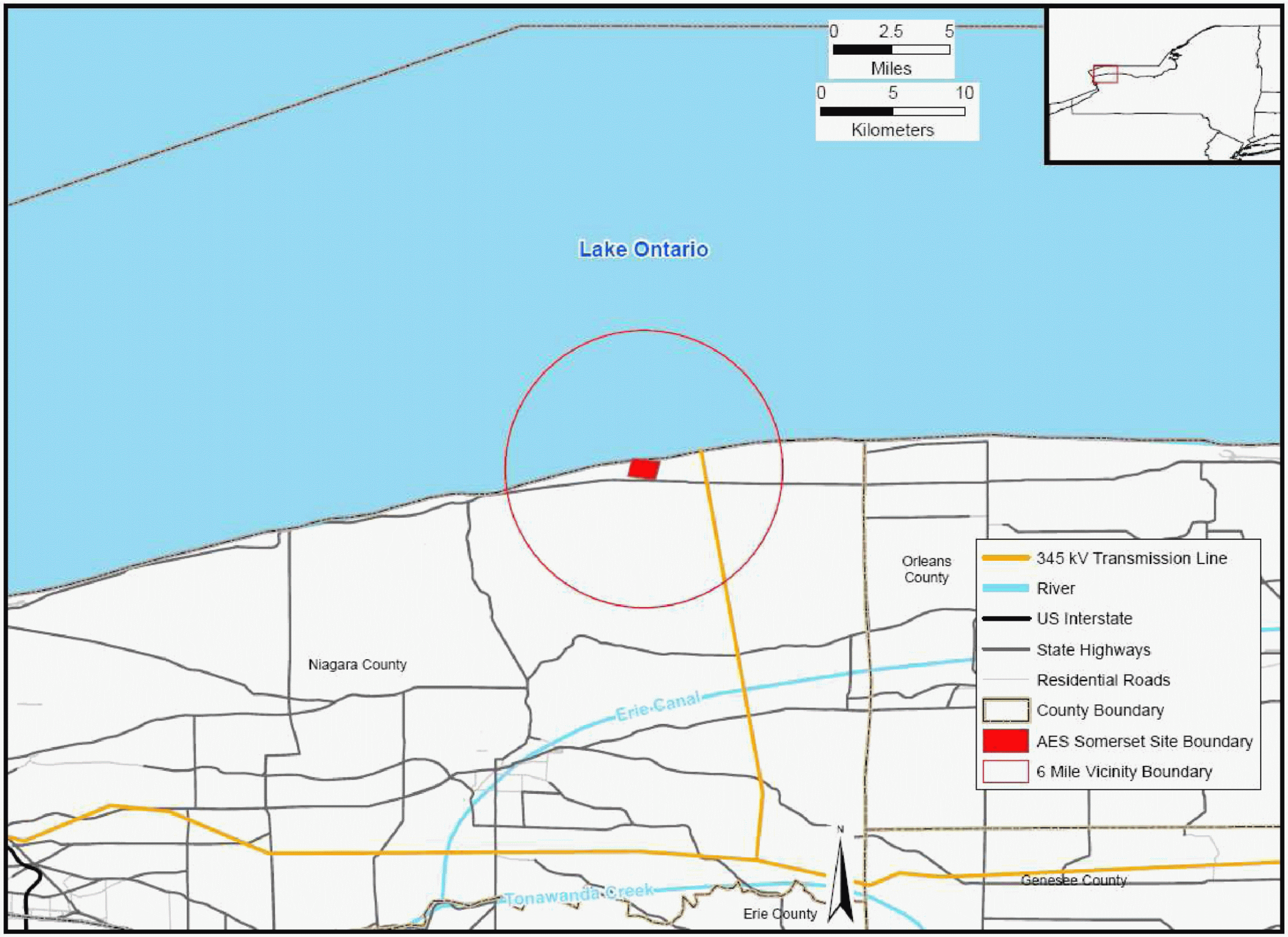
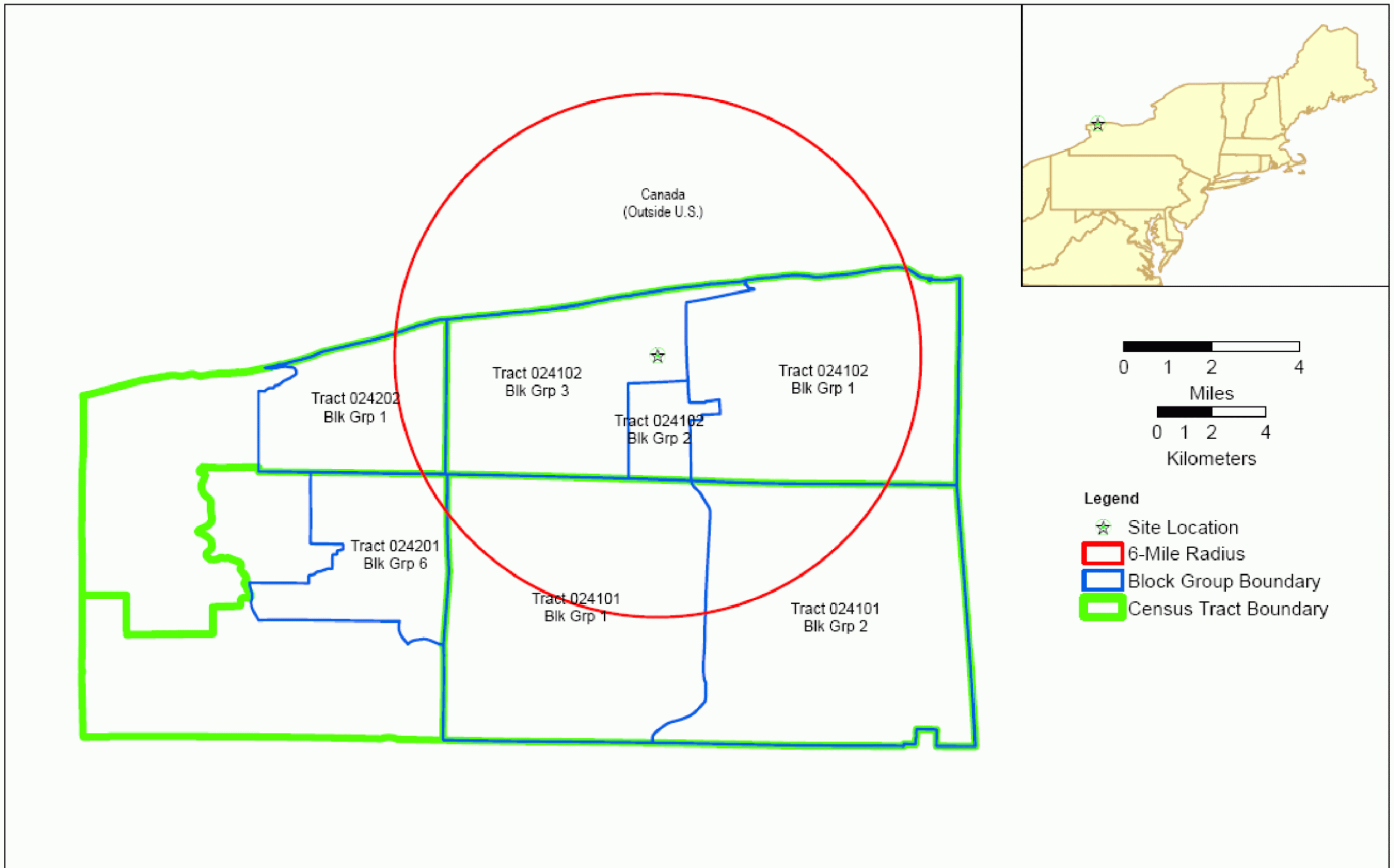


Figure 9.3-9 — AES Somerset Census Tracts



Census Tract	Block Group	Total Population in 2000	White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and other Pacific Islander	Other Race	Two or more Races	Hispanic	Minority Populaton	Hispanic Population
024101	1	2045	1990	10	9	4	0	8	24	18	2.69%	0.88%
024101	2	1902	1876	8	4	2	2	0	10	3	1.37%	0.16%
024102	1	1390	1359	9	11	4	0	1	6	13	2.23%	0.94%
024102	2	573	560	4	3	2	0	1	3	9	2.27%	1.57%
024102	3	902	862	8	5	9	0	11	7	15	4.43%	1.66%
024201	6	1401	1372	6	6	0	0	6	11	12	2.07%	0.86%
024202	1	652	599	18	9	0	0	26	0	25	8.13%	3.83%

Figure 9.3-10 — Blenheim-Gilboa Vicinity

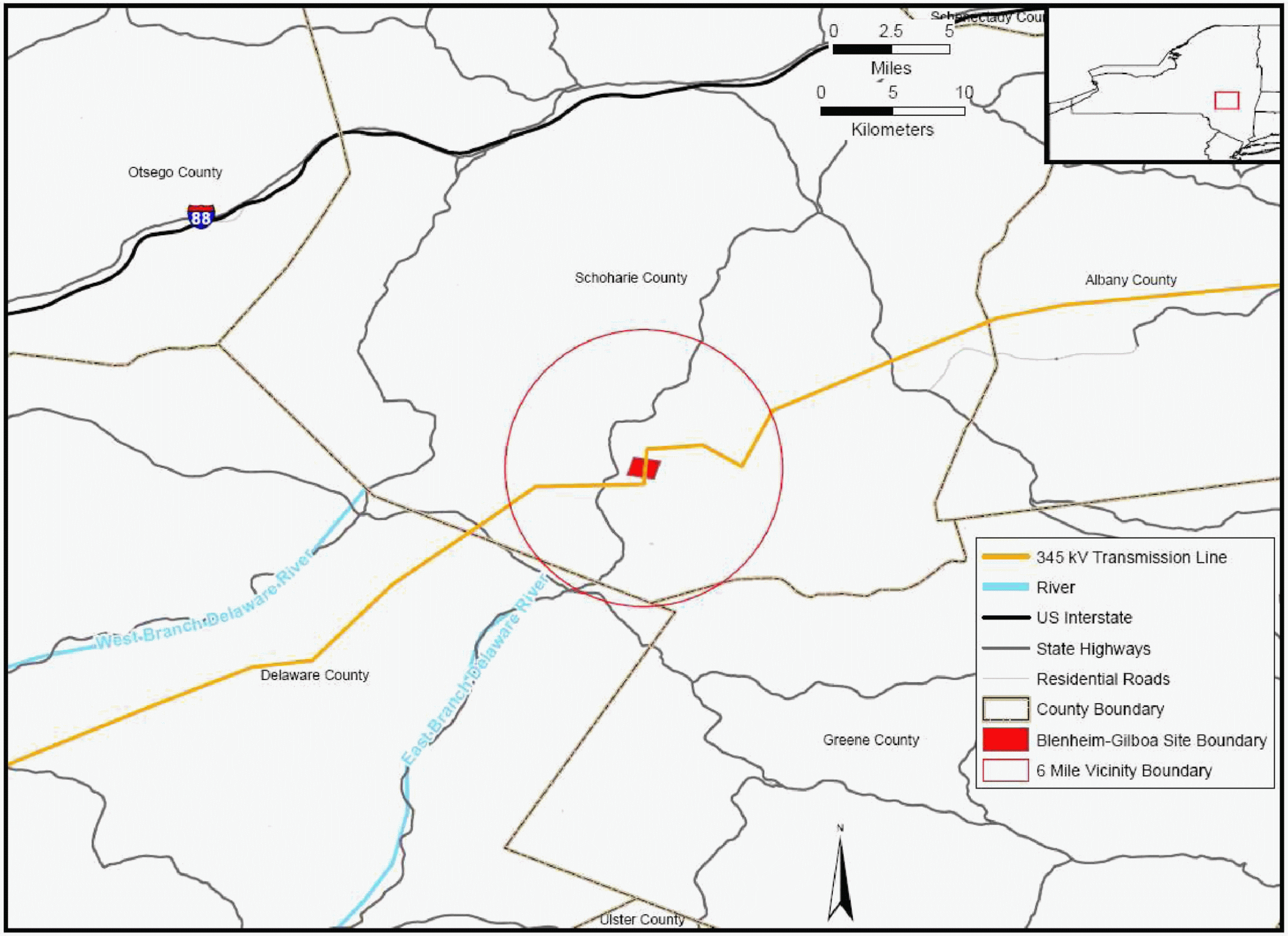
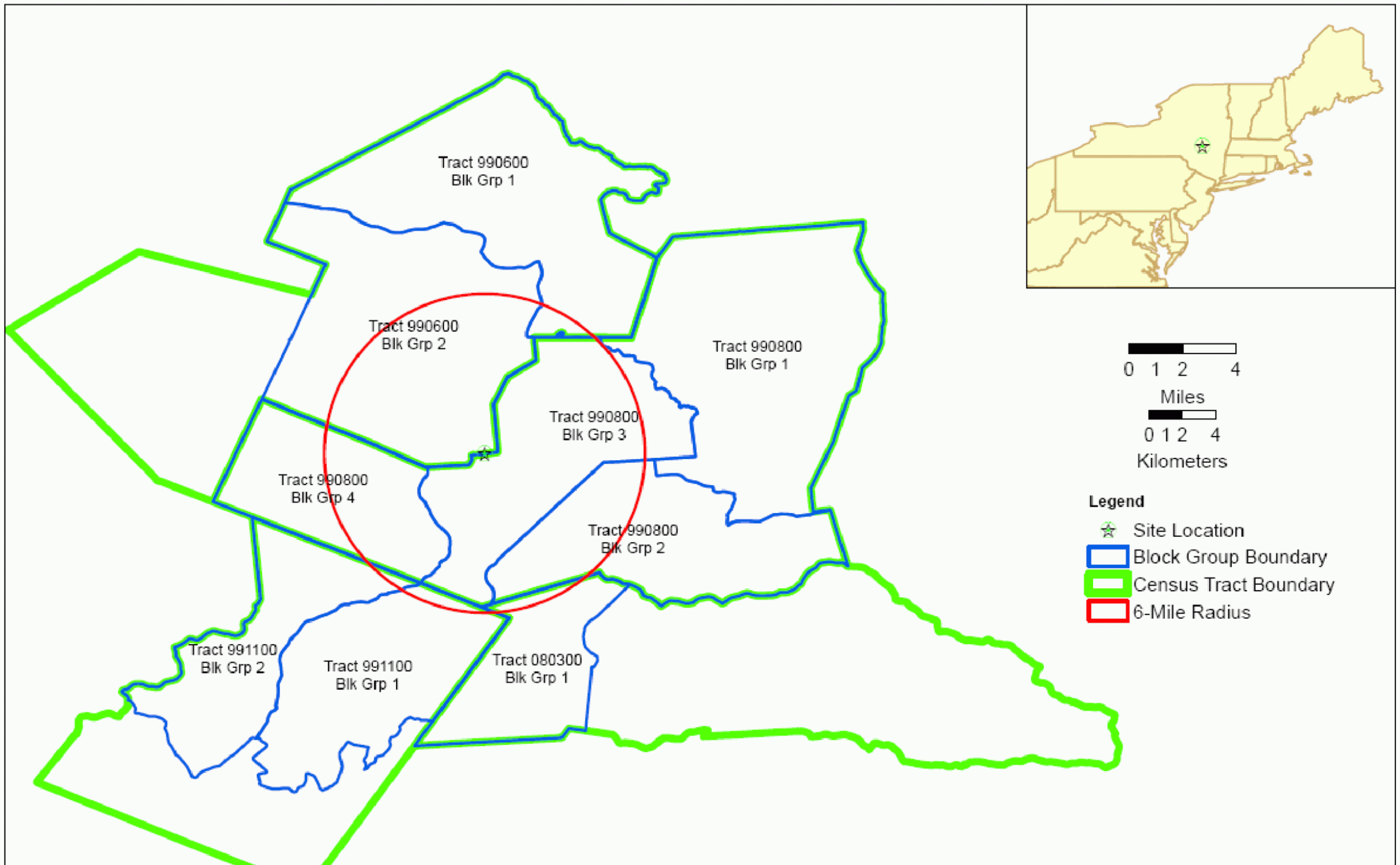


Figure 9.3-11 — Blenheim-Gilboa Census Tracts



Census Tract	Block Group	Total Population in 2000	White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and other Pacific Islander	Other Race	Two or more Races	Hispanic	Minority Populaton	Hispanic Population
991100	1	744	720	2	4	8	0	2	8	6	3.23%	0.81%
991100	2	912	894	4	7	2	0	1	4	9	1.97%	0.99%
080300	1	665	658	0	2	1	0	0	4	9	1.05%	1.35%
990600	1	1022	1015	1	5	1	0	0	0	8	0.68%	0.78%
990600	2	803	647	126	1	0	0	16	13	77	19.43%	9.59%
990800	1	1016	982	7	3	1	0	7	16	18	3.35%	1.77%
990800	2	657	638	2	0	0	0	2	15	12	2.89%	1.83%
990800	3	482	463	8	0	1	0	8	2	14	3.94%	2.90%
990800	4	733	701	3	3	9	0	7	10	10	4.37%	1.36%

9.4 ALTERNATIVE PLANT AND TRANSMISSION SYSTEMS

The information presented in this section describes the evaluation of the alternative plant and transmission systems for heat dissipation, circulating water, and power transmission associated with the 1,562 MWe NMP3NPP facility. The information provided in this section is consistent with the items identified NUREG-1555 (NRC, 2007).

Throughout this chapter, environmental impacts of the alternatives will be assessed based on the significance of impacts, with the impacts characterized as being SMALL, MODERATE, or LARGE. This standard of significance was developed using the guidelines set forth in the footnotes to Table B-1 of 10 CFR 51, Appendix B to Subpart A (NRC, 2001):

- SMALL. Environmental effects are not detectable or are so minor they will neither destabilize, nor noticeably alter, any important attribute of the resource.
- MODERATE. Environmental effects are sufficient to alter noticeably but not to destabilize important attributes of the resource.
- LARGE. Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

The impact categories evaluated in this chapter are the same as those used in the “Generic Environmental Impact Statement for License Renewal of Nuclear Plants” (GEIS), NUREG-1437, (NRC, 1996).

Section 9.4.1 discusses alternative heat dissipation systems. Section 9.4.2 discusses alternative circulating water systems. Section 9.4.3 discusses the transmission systems.

9.4.1 HEAT DISSIPATION SYSTEMS

This section discusses alternatives to the proposed heat dissipation system that was described in Section 3.4, and is presented using the format provided in NUREG-1555 (NRC, 2007), i.e., Environmental Standard Review Plan (ESRP) 9.4.1.

These alternatives are generally included in the broad categories of “once-through” and “closed-loop” systems. The once-through method involves the use of a large quantity of cooling water, withdrawn from and returned to that source (receiving water body) following its circulation through the normal heat sink (i.e., main condenser). Generally, closed-loop cooling systems require the intake of significantly less water than the volume required by once-through cooling systems because the water performing the cooling is continually recirculated through the normal heat sink, and normally only makeup water for evaporative losses, drift, and blowdown is required.

In closed-loop systems, two pumping stations are usually required — a makeup water system and a cooling water system. Closed-loop systems include cooling towers, and a cooling pond or spray pond. As a result of the evaporation process, the concentration of chemicals in the water will increase. To maintain acceptable water chemistry, water must be discharged at a small rate (blowdown) and compensated by a makeup water source.

Heat dissipation systems are also categorized as wet or dry, and the use of either system depends on the site characteristics. Both wet and dry cooling systems use water as the heat exchange medium. Wet heat dissipation systems cool water by circulating it through a cooling tower. Heat from the water is dissipated by direct contact with air circulating through the tower.

The heat transfer takes place primarily by evaporation of some of the water into the air stream (latent heat transfer).

Generally, a relatively minor amount of sensible heat transfer (heating of the air and cooling of the water) also occurs. During very cold weather, the amount of sensible heat transfer can be fairly substantial. On the other hand, during a warm, dry summer day, the amount of sensible heat transfer might be negligible or even negative (when negative, the air discharged from the tower is cooler than the ambient dry bulb temperature). The wet cooling tower is used widely in the industry and is considered a mature technology.

Because wet cooling towers provide direct contact between the cooling water and the air passing through the tower, some of the water could be entrained in the air stream and be carried out of the tower as “drift” droplets. The magnitude of drift loss is influenced by the number and size of the droplets produced within the cooling tower, which in turn, are influenced by the fill design, the air and water patterns, and other interrelated factors. Tower maintenance and operation levels can influence the formation of drift droplets. For example, excessive water flow, excessive air flow, and water bypassing the tower drift eliminators can promote and/or increase drift emission.

To reduce the drift from cooling towers, drift eliminators are usually incorporated into the tower design to remove as many droplets as practical from the air stream before exiting the tower. The drift eliminators rely on inertial separation of the droplets, caused by direction changes, while passing through the eliminators. Types of drift eliminator configurations include herringbone, wave form, and cellular (or honeycomb) designs. The cellular units are generally the most efficient. Drift eliminators may include various materials, such as ceramics, fiber-reinforced cement, fiberglass, metal, plastic, and wood installed or formed into closely spaced slats, sheets, honeycomb assemblies, or tiles. The materials may include other features, such as corrugations and water removal channels, to enhance the drift removal further (USEPA, 1995).

Dry cooling systems transfer heat to the atmosphere without the evaporative loss of water. There are two types of dry cooling systems: direct dry cooling and indirect dry cooling. Direct dry cooling systems use air to directly condense steam, while indirect dry cooling systems use a closed-loop water cooling system to condense steam and air to cool the heated water.

The most common type of direct dry cooling system is a recirculated cooling system with mechanical draft towers. For dry cooling towers, the turbine exhaust steam exits directly to an air-cooled, finned-tube condenser. Because dry cooling systems do not evaporate water for heat transfer, dry cooling towers are quite large in comparison to similarly sized wet cooling towers. Also, because dry cooling towers rely on sensible heat transfer, a large quantity of air must be forced across the finned tubes by fans to improve heat rejection. This results in a larger number of fans being required for a mechanical draft dry cooling tower than would be needed for a mechanical draft wet cooling tower.

The key feature of dry cooling systems is that no evaporative cooling or release of heat to the surface water occurs. As a result, water consumption rates are very low compared to wet cooling. Because the unit does not rely in principle on evaporative cooling like the wet cooling tower, large volumes of air must be passed through the system compared to the volume of air used in wet cooling towers. As a result, dry cooling towers need larger heat transfer surfaces and, therefore, tend to be larger than comparable wet cooling towers.

Dry cooling towers require high capital and operating and maintenance costs that are sufficient to pose a barrier to entry to the marketplace for some facilities (USEPA, 2001). Dry cooling technology has a detrimental effect on electricity production by reducing the energy efficiency of steam turbines. Dry cooling requires the facility to use more energy than would be required with wet cooling towers to produce the same electricity. The energy penalty would result in an increase in environmental impacts because replacement generating capacity would be needed to offset the loss in efficiency from dry cooling.

9.4.1.1 Evaluation of Alternative Heat Dissipation Systems

Heat dissipation system alternatives that are generally included in the broad categories of once-through and closed-loop systems were identified and evaluated. The evaluation included the following types of heat dissipation systems:

- Other heat dissipation systems
    - Cooling ponds
    - Spray ponds
- Once-through cooling
- Natural draft cooling towers
- Dry cooling towers
- Hybrid wet/dry cooling towers
- Mechanical draft cooling towers

An initial screening of the once-through and closed-loop cooling alternative designs was performed to eliminate systems that are unsuitable for use at the NMP3NPP site. The evaluation criteria included aesthetics, public perception, space requirements, environmental effects, noise impacts, fog and drift, water requirements, capital and operating costs, and legislative restrictions that might preclude the use of any of the alternatives.

The screening process identified four round mechanical draft cooling towers as the preferred closed-loop heat dissipation system for NMP3NPP. The analysis of this alternative is discussed in Section 9.4.1.3. The discussion of non-preferred alternatives that were considered is provided below. Selection of the preferred heat dissipation alternative was supported by detailed net present value (NPV) analysis.

Table 9.4-1 and the following sections provide a discussion of the heat dissipation alternatives. and Table 9.4-2 provides a summary of the environmental impacts of the alternatives.

Cooling Ponds and Spray Ponds

Cooling ponds are usually man-made water bodies that are used by power plants and large industrial facilities for heat dissipation. In a conventional static-type cooling pond, warmed cooling water exiting the main condenser and other plant heat loads would be routed to the cooling pond where some of the water would evaporate, and the remaining water would be cooled and recirculated to the plant. The primary heat transfer mechanism in a cooling pond is evaporation. If there is no vertical mixing in the pond, layers (or thermoclines) of warm and cold water can form causing horizontal flows which in turn can restrict the movement of warmer water to the surface for evaporation and cooling. This can result in only portions of the pond cooling capacity being used.

Although the conventional static-type cooling pond is probably the oldest form of water cooling it is not preferred for several reasons. The modern spray pond offers the following advantages over a conventional cooling pond: (1) a spray pond requires less than 10% of the land area required for a conventional pond, and (2) they provide over 30 times the cooling capacity of a conventional pond on a British thermal units per square foot (BTU/ft^2) basis.

A spray pond is typically a bentonite-lined structure in the ground, and is typically long and narrow to improve efficiency. The spray pond structure contains a volume of water and consists of an intake structure that houses pumps to transfer the water from the pond through their respective loops and back to the pond through a network of sprays located in the pond. The spray pond size depends on the number of nozzles required. It is important that the long, narrow spray pond have its long side perpendicular to the prevailing summer wind direction in order to benefit from a better spray droplet surface area and air contact interface. Generally, a spray pond long side dimension would be in the range of two to four times that of the narrow side dimension.

The area of the pond is determined by the quantity of water which it can treat per hour per unit area of the pond. Accepted industry practice for sizing spray ponds is based on values that are typically between 120 pounds per square foot per hour ($lb/ft^2/hr$) (585 kilograms per square meter per hour [$kg/m^2/hr$]) and 150 $lb/ft^2/hr$ (732 $kg/m^2/hr$). In actual practice, a spray pond will only cool the water to a point approximately midway between the hot water and wet bulb temperatures. Because of the various factors in spray pond applications, it is virtually impossible to accurately calculate the expected cooled water temperature. The 50% design efficiency factor (cooling to halfway point between hot water and wet bulb temperature) is considered to be a reasonable value for a well designed and located, long and narrow, spray pond.

Due to evaporation loss of water from the pond, the water levels in cooling and spray ponds are usually maintained by rainfall or augmented by a makeup water system operating on pond level.

Cooling ponds require a relatively large amount of land. For example, for a 1,300 MW power plant, a cooling pond with a surface area of approximately 2,470 acres (10 km^2) is required to be able to maintain a cooling water temperature of 70 degrees Fahrenheit (°F) (21 degrees Celsius [°C]) with a dry air temperature of 54°F (12°C) and relative humidity of 57 percent (ENS, 2008). Given the relatively large amount of land that would be required for a cooling pond or spray pond option, which is not available at the NMP3NPP site, and expected thermal performance, neither the spray pond nor the cooling pond alternative is suitable for the NMP3NPP.

Once-Through Cooling System Using Lake Ontario Water

In a once-through cooling system, water is withdrawn from a water body, passes through the heat exchanger, and is discharged back to of the same water body. The discharged water temperature is higher than the intake water by the temperature gained when passing through the heat exchanger.

Once-through cooling systems are required to comply with Federal and State regulations for thermal discharges into the Lake Ontario. Additionally, U.S. Environmental Protection Agency (USEPA) regulations governing cooling water intake structures under Section 316(b) of Title 33 United States Code (USC) Part 1326, Federal Water Pollution Control Act (USC, 2007) make it difficult for steam electric generating plants to use once-through cooling systems (FR, 2004). For these reasons, impacts from once-through cooling systems were considered to be MODERATE to LARGE and, therefore, once-through cooling systems were eliminated from further consideration. A summary of the environmental impacts of the once-through cooling heat dissipation system alternative is provided in Table 9.4-2.

Natural Draft Cooling Tower

Wet cooling towers predominantly rely on the latent heat of water evaporation to exchange heat between the water and the air passing through the tower. In a natural draft cooling tower, warm water is brought into direct contact with cooler air. When the air enters the cooling tower, its moisture content is generally less than saturation. When the air exits, it emerges at a higher temperature and with moisture content at or near saturation.

Even at saturation, cooling can take place because a temperature increase results in an increase in heat capacity, which allows more sensible heat to be absorbed. A natural draft cooling tower receives its air supply from natural wind currents that result in a convective flow up the tower. This air convection cools the water on contact.

Because of the significant size of natural draft cooling towers (typically 500 ft (152.4 m) high, 400 ft (121.9 m) in diameter at the base), their use is generally reserved for use at flow rates above 200,000 gallons per minute (gpm) (757,000 liters per minute [Lpm]) (Young, 2000). They are typically sized to be loaded at about 2 to 4 gallons per minute per square foot (gpm/ft^2) (1.4 to 2.7 liters per second per square meter [Lps/m^2]) With the cooling water flow rates evaluated for NMP3NPP in the range of 720,000 gpm (2,725,500 Lpm) to 880,000 gpm (3,331,200 Lpm), natural draft towers were considered feasible for NMP3NPP and were further evaluated in the heat rejection study.

Impacts from natural draft cooling tower systems were considered to be SMALL to MODERATE. A summary of the environmental impacts of the natural draft cooling tower heat dissipation system alternative is provided in Table 9.4-2.

Mechanical Draft Cooling Tower

A wet mechanical draft cooling tower system, operated completely as a wet-type cooling tower, would consist of multi-cell cooling tower banks, and associated intake/discharge, pumping, and piping systems. This closed-loop system would receive makeup water from the Lake Ontario and transfer heat to the environment via evaporation and conduction. These towers would have a relatively low profile of approximately 80 ft (24.4 m). Mechanical draft towers use fans to produce air movement.

A mechanical draft cooling tower would typically consist of a continuous row of rectangular cells in a side-by-side arrangement sharing a common cold water basin. Water to be cooled is pumped to a hot water distribution system above the fill, and then falls over the fill to the cold water basin. Air is drawn through the falling water by fans, which results in the transfer of heat from the water to the air, and the evaporation of some of the water. The fill serves to increase the air-water contact surface and contact time, thereby promoting heat transfer.

A mechanical draft cooling tower employs large fans to either force or induce a draft that increases the contact time between the water and the air maximizing the heat transfer. A forced draft tower has the fan mounted at the base, forcing air in at the bottom and discharging air at low velocity through the top. An induced draft tower uses fans to create a draft that pulls air through the cooling tower fill (i.e., the internal packing that provides an expanded surface for air-water interface).

As discussed in Section 9.4.1.3, both round and rectangular cooling tower designs were considered feasible for NMP3NPP and were evaluated further in the heat rejection study. Both concrete and fiberglass were considered as materials for construction of the mechanical draft cooling towers.

Impacts from mechanical draft cooling tower systems were considered to be SMALL to MODERATE. A summary of the environmental impacts of the hyperbolic mechanical draft cooling tower heat dissipation system alternative is provided in Table 9.4-2.

Hybrid Plume Abatement Cooling Tower

A cooling tower plume occurs when the heated and saturated air leaving a wet cooling tower mixes with the relatively cooler ambient air under atmospheric conditions, and a supersaturated condition occurs during the process of mixing and dispersion. The excess vapor condenses (the amount in excess of saturation vapor) and becomes a visible plume.

A cooling tower plume may be visually objectionable or may result in problems of fogging or icing. A plume abatement hybrid cooling tower (i.e., combination wet-dry tower) combines dry cooling and wet cooling to reduce the cooling tower plume. The dry cooling section adds heat to the discharge air without adding moisture (sensible heat transfer). This results in a subsaturated air stream leaving the tower (less than 100% relative humidity) and therefore reduced plume potential.

Although the hybrid plume abatement cooling tower results in reduced water consumption and no visible plume, construction costs, operating and maintenance costs, and land use requirements are significantly higher. Therefore, the hybrid plume abatement cooling tower was not the preferred alternative for NMP3NPP.

Dry Cooling System

Dry cooling is an alternative cooling method in which heat is dissipated directly to the atmosphere using a tower without the evaporative loss of water (USEPA, 2001). This tower transfers the heat to the air by conduction and convection rather than by evaporation. The condenser coolant is enclosed within a piping network with no direct air-to-water interface. Heat transfer is then based on the dry bulb temperature of the air and the thermal transport properties of the piping material. Both natural and mechanical draft can be used to move the air. While water loss is less for dry cooling towers than wet cooling towers, some makeup water is typically required.

There are two types of dry cooling systems for nuclear power generating facility applications: direct dry cooling and indirect dry cooling. Direct dry cooling systems utilize air to directly condense steam, while indirect dry cooling systems utilize a closed-loop water cooling system to condense steam, and the heated water is then air-cooled. Indirect dry cooling generally applies to retrofit situations at existing power generating facilities because a water-cooled condenser would already be in place for a once-through or closed-loop cooling system (USEPA, 2001).

Because there are no evaporative or drift losses in this type of system, many of the problems of conventional cooling systems are eliminated. For example, there are no problems with blowdown disposal, water availability, chemical treatment, fogging, or icing when dry cooling towers are used. Although eliminating such problems is beneficial, the dry towers have associated technical obstacles such as high turbine backpressure and possible freezing in cooling coils during periods of light load and startup.

Unfortunately, a dry cooling system affects plant performance so significantly that the net effect is an increased environmental impact. Dry cooling results in a significant reduction in plant output (approximately 25%). An objective comparison of dry versus wet cooling would therefore require the installation of a larger facility to compensate for the impact of dry cooling. The environmental impact of a larger facility far outweighs the environmental advantages of dry cooling.

Use of a dry system would also require a significant increase in dry cooling land use compared to wet cooling. An air-cooled condenser, where steam turbine exhaust is transported directly to a steam-to-air heat exchanger, has technical limitations due to its physical size. The distances from the main steam turbine condensers to the air-cooled condensers and the size of the steam ducting required would be uncommonly large and would far exceed the largest steam duct ever attempted.

Dry cooling material operation and maintenance (O&M) costs would be significantly greater than wet cooling. Dry cooling land use would increase significantly, and the system would require periods of significant unit power output reduction during periods of high ambient air temperatures. For the reasons stated above, the use of a dry tower was not considered as a feasible alternative for NMP3NPP.

This alternative is not considered suitable for NMP3NPP for the reasons discussed in the USEPA preamble to the final rule addressing circulating water intake structures (CWIS) for new facilities. USEPA conducted a full analysis of the dry cooling technology and concluded that it is not an economically practicable option for new facilities. (FR, 2004) Impacts from dry cooling tower systems were considered to be SMALL to MODERATE. The conditions at the NMP3NPP site do not warrant further consideration of dry cooling. A summary of the environmental impacts of the dry cooling tower heat dissipation system alternative is provided in Table 9.4-2.

9.4.1.2 Summary of Alternative Heat Dissipation Evaluation

As discussed earlier in this section, the evaluation identified four round mechanical draft cooling towers as the preferred closed-loop heat dissipation system for NMP3NPP based on performance, water use, and total costs.. It is therefore the preferred alternative to transfer heat loads from the circulating water system (CWS) to the environment.

Four cooling tower options were evaluated as part of the heat rejection system optimization study:

- Two natural draft hyperbolic cooling towers
- Three rectangular mechanical draft cooling towers
- Four round mechanical draft cooling towers
- One round mechanical draft cooling tower

The evaluation assumed that if the predicted differences in net economic benefit were small, then other considerations might be given higher weight. Other considerations include site layout, aesthetics, corporate preferences related to operations and maintenance issues, initial cost, risk associated with tower technology or vendor capability, and associated site work for arrangement and fitting of cooling water piping fit up to tower.

A review of the cooling tower blowdown in hot months was performed. Sizing the main towers to maintain tower blowdown to temperatures below expected environmental constraints was not practical. Therefore, blowdown cooling options were reviewed, and a recommended option was selected. A summary of the environmental impacts of the one natural draft cooling tower option and the four mechanical draft cooling towers option is provided in Table 9.4-2.

Each of the cooling tower options was evaluated at three different circulating water flow rates using two different weather profiles (the representative "hot" year and the "average" year): 1,604.16 cubic feet per second (ft^3/sec) (45.43 cubic meters per second [m^3/s]), or 720,000 gpm; 1,782.40 ft^3/sec (50.48 m^3/s), or 800,000 gpm; and 1,960.64 ft^3/sec (55.53 m^3/s), or 880,000 gpm. In addition, two energy rates were applied to the net production differences between the base case and each option. For this evaluation, "net power" referred to gross production less the circulating water pump and tower fan power consumed for each option. Auxiliary power serving the power block was common to all options and, therefore, was not considered for the evaluation. For the base case, the natural draft cooling tower option with a 1,782.40 ft^3/sec (50.48 m^3/s), or 800,000 gpm, circulating water flow rate was used.

It was determined that the environmental impacts of the four cooling tower alternatives evaluated were SMALL to MODERATE. Therefore, in considering the comparison of the various cooling tower options, three main costs and benefits were considered:

- Production — This evaluation calculated the detailed net present value for production benefits for an average and the hot single year of plant operation for each cooling tower option (summation of 8,760 hourly computations).
- Initial cost — Additionally, the initial overnight: cooling tower cost was based on vendor input and expected cost differences associated with procurement, support systems, and general contractor items to integrate the towers into the site.
- Maintenance — Finally, inspection and maintenance (replacement parts) cost differences were considered over the anticipated 60 years of the plant life.

Weather information used for this study is based on meteorological data from Watertown, New York, from 1973 to 2006. These data were used to develop a hottest year and an average year. The weather data were developed from the 48 years of the meteorological data by comparing the warmest and average monthly wet bulb temperatures to generate a single year of average weather.

Blowdown from the towers, whether of natural or mechanical draft design, is required to maintain tower water chemistry within design limits. Blowdown will be regulated by environmental permit. Although a maximum blowdown temperature was not identified, the evaluation assumed that the blowdown would be limited to a maximum temperature of 110 °F, which is based on the lower of the two National Pollutant Discharge Elimination System (NPDES) permits for the existing NMP Unit 1 and Unit 2. Therefore, the anticipated blowdown (cooling tower basin) temperature of less than 90°F will not pose any constraints on plant operation as it is much lower than the anticipated maximum discharge limit temperature of 110°F.

The cooling tower performance evaluation demonstrated that the two-shell natural draft cooling tower design resulted in the largest yearly gross generation revenue for all cases considered. However, this is also the cooling tower option with the highest initial cost. The four round mechanical draft cooling towers have the overall lowest cost (net present value) and were selected as the preferred heat dissipation system for NMP3NPP. The simplified economic evaluation shown in Table 9.4-1 incorporates the initial tower cost and maintenance differences, along with the generation revenue differences for the expected 60-year life of the plant for the cases with an assumed 800,000 gpm of CWS flow.

A summary of the environmental impacts of the cooling tower options is provided in Table 9.4-2.

9.4.2 CIRCULATING WATER SYSTEMS

In accordance with NUREG-1555 (NRC, 2007), ESRP 9.4.2, this section discusses alternatives to the following components of the CWS for the NMP3NPP. These components include the intake systems, discharge systems, water supply, and water treatment processes. A summary of the environmental impacts of the circulating water intake system alternatives for NMP3NPP is provided in Table 9.4-3.

The CWS is an integral part of the heat dissipation system. It provides the interface between (1) the normal heat sink (i.e., main steam turbine condenser) where waste heat is discharged from the steam cycle and is removed by the circulating water, and (2) the heat dissipation system where the heat energy is then dissipated or transferred to the environment.

Essentially, two types of CWSs are available for removing this waste heat: once-through (open-loop) and recycle (closed-loop) systems. In once-through cooling systems, water is withdrawn from a cooling source, passed through the condenser, and then returned to the source (receiving water body). In the recycle (closed-loop) cooling system, heat picked up from the condenser by the circulating water is dissipated through auxiliary cooling facilities, after which the cooled water is recirculated to the condenser.

As discussed in Chapter 3, NMP3NPP requires water for both plant cooling and operational uses. NMP3NPP will use independent cooling water systems.

Freshwater from Lake Ontario will be used for makeup water for cooling and other water services required for operation, including the demineralized water treatment system (DTS) and the fire protection system (FPS). Potable water is required for human consumption, sanitary, and other domestic purposes and is provided by the Town of Scriba at the existing NMPNS site and will be provided by the Town of Scriba for NMP3NPP.

Water from the CWS will be pumped from the cooling tower basin through the main steam turbine condensers and turbine plant auxiliary heat exchangers, where heat transferred to the cooling water in the condenser will be dissipated to the atmosphere by evaporation, cooling the water before its return to the condenser. The water from the cooling system lost to the atmosphere through evaporation must be replaced. This evaporation would increase the level of solids in the circulating water. To control solids, a portion of the recirculated water must be removed (generating blowdown) and replaced with clean water. In addition to the blowdown and evaporative losses, a small percentage of water in the form of drift droplets will be lost from the cooling tower.

Makeup water for the CWS will be supplied from the CWIS located on the shoreline of Lake Ontario. This makeup water will be used to replace water lost by evaporation, drift, and blowdown from the cooling tower. Cooling tower blowdown from four mechanical draft cooling towers, including dissipated waste heat, will be transported to a common retention basin that receives much larger flows from the CWS as well as from miscellaneous other systems. Water treatment is done at the common retention basin to meet the discharge water quality requirements. The ultimate discharge from NMP3NPP is to Lake Ontario.

The Ultimate Heat Sink (UHS) structures, systems, and components, which provide cooling for safety related equipment, function to dissipate heat from the Essential Service Water System (ESWS) during normal operations and during post-accident shutdown conditions. The design of the UHS consists of four mechanical draft cooling towers and four ESWS separate safety-related divisions. Each UHS cooling tower basin is sized to provide a minimum 72-hour supply of cooling water to the associated ESWS division under design basis accident (DBA) conditions. At NMP3NPP, this capability will be maintained though a UHS makeup water system that is safety-related, has four independent makeup water lines, and four makeup water pumps that are housed in a safety-related intake pumphouse. Each makeup line will supply the makeup water to its respective UHS basin to compensate for the water losses through evaporation, drift, and blowdown.

9.4.2.1 Intake and Discharge Systems

For both the once-through and closed-loop cooling systems, the water intake and discharge structures can be of various configurations to accommodate the source body of water and to minimize impacts to the aquatic ecosystem. The intake structures are generally located along the shoreline of the body of water and are equipped with fish protection devices. Discharge structures are generally of the jet or diffuser outfall type and are designed to promote rapid mixing of the effluent stream with the receiving body of water. Biocides and other chemicals used for corrosion control and for other water treatment purposes can be mixed with the condenser cooling water and discharged from the system. Only biocides or chemical additives that are approved by USEPA as safe for humans, and the constituent discharged to the environment will satisfy requirements established in the NMPNS NPDES permit.

Cooling water intake structures (CWIS) are typically regulated under Section 316(b) of the Federal Clean Water Act (CWA) and its implementing regulations (FR, 2004). A federal court decision in January 2007 changed that regulatory process. The regulations that implement Section 316(b) were effectively suspended, and the USEPA recommended that all permits for Phase II facilities should include conditions under Section 316(b) developed on a best professional judgment basis (USEPA, 2007). In the State of New York, the 316(b) process is being managed by the New York Department of Environmental Conservation.

A CWIS and a discharge structure will be required for operation of NMP3NPP. No long-term physical changes in land use are anticipated from construction of the CWIS, the pumphouse, and the makeup-water pipeline corridor. Construction activities will cause only temporary effects to shallow pools, streams, and wetlands. The proposed CWIS and discharge structure will be designed to meet all applicable operation, maintenance, and navigation criteria and requirements. The discharge structure will be designed to allow for an acceptable mixing zone for the thermal plume per state regulations for thermal discharges.

Long-term changes in land use from operation of NMP3NPP will be associated primarily with the roads, cooling/heat dissipation systems, makeup water pipeline, CWIS, pumphouse, blowdown pipeline, and transmission corridor routes. The long-term impacts on land use are expected to be SMALL.

Short-term changes in land use from operation of NMP3NPP will be associated primarily with impacts resulting from the increase in the stormwater due to development of NMP3NPP. Short-term changes in land use would be minor and would include roads, NMP3NPP buildings and structures, and ecological issues.

Measures such as accepted BMPs will be taken during construction to minimize effects to ground and surface waters. Construction will be conducted when conditions in streams are low flow or dry. All relevant federal, state, and local permits and regulations will be followed during construction activities. Adhering to the conditions specified in the permits and regulations should minimize temporary effects. Specific erosion control measures will be implemented to minimize effects to Lake Ontario water quality. In addition, NMP3NPP site preparation and construction activities will comply not only with BMPs, but also with federal, state, and local regulations to prevent adverse aquatic ecological effects along the shoreline of Lake Ontario.

UniStar has initiated a Phase 1 cultural resource assessment for the NMPNS site to determine the potential to affect cultural resources (such as archaeological, historical, or architectural resources). As described in Section 4.1.3, no previously recorded archaeological or historic architectural resources are located within the area on the NMPNS site anticipated for direct impacts (ground disturbance) due to construction of NMP3NPP. This area is considered the archaeological Area of Potential Effect (APE), and was the subject of a Phase I investigation. No traditional cultural properties were identified on or in the vicinity of the NMPNS site by the New York SHPO during a consultation meeting on June 3, 2008. During the Phase I investigation conducted in the spring of 2008, no prehistoric sites were identified within the archaeological APE, but seven stone foundations and/or wells were found in the upland APE and are being evaluated for historical significance. No submerged cultural resources were identified within the offshore archaeological APE, around the three proposed intake and discharge structures.

During site preparation for NMP3NPP, construction activities, such as clearing and grading activities, will have localized noise and air quality effects. Construction noise will occur during construction activities and while installing equipment (such as turbines, generators, pumps, transformers, and switchyard equipment). As a result, background noise levels will increase in the short term. To minimize the increased ambient noise, mitigation measures will be implemented. Additionally, controls will be implemented to mitigate potential air emissions from construction sources. Slight but negligible increases in emissions of PM and combustion byproducts might occur during NMP3NPP site preparation and construction activities. Construction-related dust and air emissions from equipment are expected to be SMALL and will be controlled by implementing mitigation measures.

Site preparation and construction activities may result in some temporary visual aesthetic disturbance. Because these impacts will be temporary, no long-term indirect or cumulative impacts to visual aesthetics are expected.

Intake System

For both once-through and closed-loop cooling systems, the water intake and discharge structures can be of various configurations to accommodate the source water body and to minimize impact to the aquatic ecosystem. The intake structures are generally located along the shoreline of the body of water and are equipped with fish protection devices. A study was performed to evaluate three options for the intake structure and its location. Each of the three options, including a description and summary of advantages, disadvantages, and cost, are summarized as follows.

Option A — Lake Shore Intake:

The typical design of an intake structure located immediately on the lake shore would provide a direct water path through an intake rack and traveling water screens to the makeup water pumps. This option was not considered as an alternative for NMP3NPP due to the potential for severe weather on Lake Ontario and the associated problems, such as ice loading on the screens and frazil ice conditions at the intake rack or intake grate. Because of the severe weather potential, this option was not considered any further and was not analyzed in detail in Table 9.4-3.

Option B — East Location:

The East location is near the Training and Energy Information Centers. Two inlet tunnels are provided to convey water to the forebay. From the intake structure, water is supplied to both the cooling water and ESWS pumphouses.

The order of magnitude total cost estimate (with indirect costs, escalation, taxes, etc.) would be $115,906,911.

Advantages of utilizing Option B consist of the following:

- The location is approximately 100 ft (30 m) closer to the cooling tower basin than Option C.
- Topology information of the lake indicates that the full 1500 ft (457 m) feet length of the intake tunnels may not be required. The tunnels for this option will be shorter.
- There appears to be sufficient space available in this location for the pumphouse footprint.

Disadvantages to utilizing Option B consist of the following:

- The location is adjacent to the Nine Mile Point Training Center and Energy Information Center (EIC). The proximate location of these buildings will greatly complicate the routing of the piping to the cooling tower basin (routing around building foundations and roadways).
- The proximate location of the Training Center and EIC will complicate the site characterization activities, including access for core boring equipment and trench construction.
- The location has a small knoll between the pumphouse and the cooling tower basin, requiring additional removal and replacement of material.
- The length of safety related piping to the ESWS/UHS is 1600 ft (488 m) longer than Option C.
- Option B is closest to the Independent Spent Fuel Storage Installation (ISFSI) for NMP Unit 1 and Unit 2. Although dose levels at the boundary of the ISFSI are designed to be such that it is not necessary to designate the ISFSI as a radiological area (so that dose at this location is not a factor), the proximity to the ISFSI may affect construction activities and access to large construction equipment.
- The construction schedule is slightly longer than Option C.
- Option B is estimated to be more expensive than Option C.

Option C — West Location:

The West location is on the opposite side of the proposed cooling towers and 1700 ft (518 m) west of the east location. The pumphouse is situated approximately 60 ft (18 m) from the lake's shore line. The footprint of the pumphouse is the same with two inlet tunnels provided to convey water to the forebay. The inlet tunnels for this option will be longer (approximately 400 ft [122 m]) due to the slope of the lake bottom at this location, and the need to locate the intake structure at an approximate elevation of 223.5 ft (68.1 m).

The order of magnitude total cost estimate (with indirect costs, escalation, taxes, etc.) would be $104,710,245.

Advantages to utilizing Option C consist of the following:

- There are no interferences between this location and the east side of the cooling tower basin or the ESWS/UHS.
- There is sufficient space available at this location for the pumphouse footprint, site characterization activities, including core boring activities, and construction activities.
- Discharge piping lengths are shorter for this alternative.
- The location is further away from the ISFSI for NMP Unit 1 and Unit 2, and construction of the pumphouse will not be affected by proximity to the ISFSI.
- Option C is estimated to be less expensive than Option B.
- The construction schedule is shorter for this alternative.

Disadvantages to utilizing Option C consist of the following:

- The location is approximately 100 ft (30 m) further from the cooling tower basin than Option B.
- Option C requires approximately 400 ft (122 m) more of tunnel length.

The study recommended Option C, West Location with two inlet tunnels, for the intake system and location for NMP3NPP. Figures 3.4-4 and 3.5-5 show details of the intake system.

A study was also performed on differing makeup water intake tunnel depths (25.0, 35.0, 49.2, 65.6, and 82.0 ft [7.6, 10.7, 15.0, 20.0, and 25.0 m]). Based on a review of several critical issues including, (1) construction costs, (2) impact of makeup water on the total temperature of plant cooling water, (3) revenue lost due to high water temperatures and, therefore, a unit shut down, (4) the potential for frazil ice buildup at the intake, (5) zebra and quagga mussel growth, and (6) long-term projections of lake water depths, an intake structure depth of 25.0 ft (7.6 m) was recommended.

As previously noted, the source of the makeup water is Lake Ontario. The makeup water system includes the makeup water piping from the intake pumphouse to the UHS cooling tower basins, the makeup water pumps, traveling water screens, screen wash pumps, and safety-related portion of the intake pumphouse.

The blowdown from the UHS/ESWS enters a common retention basin on-site that also receives blowdown from the CWS. Blowdown discharge is back to the lake.

For NMP3NPP, this capability will be maintained through a UHS makeup water system that is safety related, has four independent makeup water lines, and four makeup water pumps that are housed in a safety-related intake pumphouse. Each makeup line will supply the makeup water to its respective UHS basin to compensate for water losses through evaporation, drift, and blowdown.

For NMP3NPP, two concrete-lined, intake tunnels (Tunnels A and B) would provide water from Lake Ontario to the forebay of the intake pumphouse. Both tunnels would have a diameter of 15 ft (5 m) and have an intake structure at 220 ft (67 m) elevation of the lake bed. The intake structure has hexagonally shaped reinforced concrete cover with screened openings to prevent infiltration of lake debris and marine life into the intake tunnel. Bar racks for the openings would be electrically heated to eliminate the potential for frazil ice adhesion.

The eastern tunnel, Tunnel A, would be located on the side of the CWS bays and would have an intake structure about 1,167 ft (356 m) from the CWIS. Tunnel A would also include a retention basin discharge pipe with a diffuser structure at 204 ft (62 m) elevation of the lake bed. This discharge pipe would result in Tunnel A extending an additional 416 ft (127 m) from the CWIS; thereby, extending the overall length of Tunnel A out to 1,583 ft (482 m) from the CWIS. The western tunnel, Tunnel B, would extend about 1,275 ft (389 m) from the CWIS at the lake shore.

The UHS side of the pumphouse is safety related. Each of the UHS bays would be 18 ft (6 m) (wall center to wall center). The tunnel intake structure would have a hexagonally shaped reinforced concrete cover with screened openings for preventing infiltration of lake debris and marine life into the intake tunnels. Bar grating would be used to keep debris in the water out of the bays. A curtain wall would be installed to keep the floating debris out of the bays. Each of the four bays would contain a UHS makeup water pump, a traveling water screen, and a screen wash pump. Each bay would also contains a trash rack (grate) at the intake, a dual-through traveling water screen, one screen wash pump for the traveling water screen, and a stop log. Flow into the pumphouse and through the traveling water screens must be kept at or below 0.5 feet per second (ft/sec) as required by USEPA Rule 316(b) (USEPA, 2001). The traveling water screens for each bay would be dual-flow screens, and each screen would have a screen wash pump that will provide 80 gpm of water with a design pressure in the range of 80 to 100 pounds per square inch (psi).

An evaluation was performed to determine the relative cost effectiveness of differing makeup water intake tunnel depths/lengths for NMP3NPP EPR. The evaluation encompassed varying depths, the associated temperature range across the different seasons, the different tunnel lengths required to get to those depths, and the costs associated with those different depths/lengths. It also addressed the effect on plant water temperatures due to mixing of cooler makeup water. Furthermore, the evaluation addressed the potential benefits of those depths with respect to avoiding frazil ice and zebra and quagga mussel biofouling and also investigated long-term lake level projections. Utilizing UniStar-determined outage replacement power costs and available maintenance costs, the relative cost effectiveness for the options was also assessed.

As noted above, a review of several critical issues, including (1) construction costs; (2) impact of makeup water on the total temperature of plant cooling water; (3) revenue lost due to high water temperatures and, therefore, a unit shut down; (4) the potential for frazil ice buildup at the intake; (5) zebra and quagga mussel growth; and (6) long-term projections of lake water depths, an intake structure depth of 25 ft (8 m) is recommended.

Discharge System

The blowdown water pipe routing would take into consideration the locations of on-site structures, locating the pipelines along the available corridors where trenches can be constructed for the buried piping. As stated earlier, the blowdown would flow to a common retention basin that receives much larger flows from the CWS as well as from miscellaneous other systems. Chemical treatment would be conducted at the common retention basin. Because the intake would be treated with sodium hypochlorite solution to control microbiological activity, dechlorination of the water would be necessary at the common retention basin. Depending on the specific chemical used to control zebra mussels, bentonite clay may also be required to detoxify the moluscicide during zebra mussel treatments. As previously noted, the proposed discharge from the common retention basin would be to Lake Ontario. Such discharge would have to meet the NPDES permit requirements as well as the state and local requirements. Chemical treatment of the water in the common retention basin would depend on the permit requirements and the analysis of regular water samples from the basin. Samples from the discharge point at the basin would be used to verify that the discharge water meets the water quality requirements..

9.4.2.2 Water Supply (Makeup Water System Alternatives)

NMP3NPP will require makeup water for the CWS and ESWS cooling towers to replace water inventory lost to evaporation, drift, and blowdown. Reject water will be directed into the NMP3NPP CWS blowdown. Under post-accident conditions lasting longer than 72 hours, makeup water for the ESWS may be supplied from the safety-related UHS makeup water system.

The following makeup water system alternatives were analyzed:

- Groundwater sources
- Municipal sources
- Lake Ontario

Summary of Makeup Water Alternatives

Lake Ontario was selected as the source of makeup water for the CWS at NMP3NPP because it provides a safe and reliable source of cooling water for NMP3NPP. The plant raw water system (RWS) will be supplied from Lake Ontario via the CWS. Makeup water to the ESWS is normally supplied from the plant RWS. Appropriate permits will be obtained for operation of NMP3NPP and will contain appropriate mitigation measures. Section 2.3.1 provides additional discussion on Lake Ontario.

9.4.2.3 Water Treatment

Evaporation of water from cooling towers leads to an increase in chemical and solids concentrations in the circulating water, which in turn increases scaling tendencies of the cooling water. A chemical treatment building and storage tank are near the pumphouse building. Sufficient distance is maintained from the concrete slab and the walled structure that houses two electrical transformers. Chemical treatment is required to control zebra mussels at the intakes and downstream facilities and to control microbiological activity in service water piping. A non-oxidizing moluscicide was selected to control zebra mussels and prevent macrofouling. Suitable chemicals include quaternary ammonium compounds such as GE Betz CT1300 (or equal) and filming amines such as Nalco EVAC (or equal). These treatment chemicals are applied at the intakes twice per year for 24 to 48 hours for each treatment. Because the moluscicides are not consumed within the intake tunnels, these applications also treat the forebay and traveling screens at the screenhouse as well as downstream piping and components.

Facilities for injection will be located near the screen house. Small diameter tubing will be routed through the intake tunnels to deliver chemical to the lake intakes. Provisions will also be included to divert chemical directly to the forebay at the entrances of the intake tunnels to the screen house. This will provide localized treatments if needed due to warmer conditions favoring zebra mussel growth within the screen house.

An alternative method for chemical injection is currently employed at older facilities that have no means for land-based chemical treatment because they were constructed prior to zebra mussel infestation of Lake Ontario. The alternative method involves use of a specially equipped boat anchored near the intakes. Temporary injection tubing for chemical injection is installed by divers from the boat to the intake. This alternative method is costly because of the expense of a dedicated boat, crew, and diving team. This alternative method is considered a backup method for NMP3NPP.

An oxidizing biocide was selected to control microbiological growth in service water piping to control fouling, microbiological deposits, and microbiological-related corrosion. Sodium hypochlorite solution (also referred to as bleach) will be injected intermittently. Facilities for sodium hypochlorite storage and injection will be located near the screenhouse and chemical will be injected near the UHS pumps.

9.4.3 TRANSMISSION SYSTEMS

Section 9.4.3 of NUREG-1555 (NRC, 2007) provides guidelines for the preparation of the summary discussion that identifies the feasible and legislatively compliant alternative transmission systems.

The property lies within the NYISO Regional Transmission Organization. In order to effectively transmit power from a 1,600 MW EPR, a minimum of two 345-kV or one 500-kV transmission circuits are required. Currently, there is no 500-kV transmission out of the site, but there are three single-circuit 345-kV lines transmitting power from the existing units at NMPNS. The existing transmission system consists of three substations and two switchyards:

- A 345-kV switchyard for NMP Unit 1, which has two 345-kV single circuits (Nine Mile 1 – Clay Line 8 and Nine Mile 1 – Scriba Line 9)
- A 345-kV switchyard for NMP Unit 2, which has one 345-kV circuit (Nine Mile – Scriba Line 23)
- Line 9 and Line 23 connect to the grid at the Scriba Substation, located approximately 2,000 ft (610 m) southeast of the NMPNS switchyards
- Line 8 extends approximately 26 mi southeast on a 500-ft (152 m) -wide corridor owned by Niagara Mohawk, a National Grid Company, and connects to the grid at the Clay Substation

The area transmission map is presented in Figure 1.2-5.

Transmission corridors for lines interconnecting the NMP3NPP switchyard to the existing transmission grid infrastructure were selected to comply with NRC regulatory guidelines on preferred power sources and to minimize environmental impact. NRC guidelines require a minimum of two physically separated corridors to facilitate the interconnection of a new nuclear power generating station. Additionally, due to the existing transmission lines that are in close proximity to the plant switchyard, a third corridor was required to facilitate bringing two independent power sources into the new nuclear power generating station switchyard and to ensure adequate clearances from existing lines. This configuration was developed through consultation with transmission system experts and transmission line designers. Because options are very limited due to the close proximity of the new switchyard to existing infrastructure, no specific studies were conducted to analyze alternate corridor routes. No additional transmission corridors or other off-site land use is expected to be required to connect a new nuclear power generating station to the existing electrical grid.

A limited number of upgrades and associated modifications will also be required at substations along the corridor. All of the off-site modifications will be implemented within the existing substations (Navigant Consulting, 2005).

NYISO, as regulated by the FERC, will bear the ultimate responsibility for the following:

- Defining the nature and extent of system improvements
- Designing and routing connecting transmission
- Addressing the impacts of such improvements

The effects of constructing and maintaining new transmission lines are evaluated further in Chapters 4 and 5. The measures and controls to limit adverse transmission system impacts that were developed because of this environmental review are described in Sections 4.6 and 5.10.

9.4.4 REFERENCES

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Table 9.4-1—Comparison of Cooling Tower Evaluation Criteria

Type of Cooling Tower(s)[a]	Minimum Footprint per Plant Unit (1,600 MWe) (Acres [Hectares])	Height (Ft [m])	Construction Material	Plant Efficiency Impact (%)	Auxiliary Load (MW)	Water Makeup[b](gpm [Lpm])	Drift Rate (gpm [Lpm])	Pump Head (Feet H_2O)	Visible Plume	Noise (dBA @ 1m)	Annual O&M Cost	Capital Cost (10^3 USD)
Natural Draft (2 Hyperbolic Towers)	16 (6)	~500 (152)	Concrete	0.5	0	23,808 (90,123)	8 (30)	60	Yes	82	Low	$173,727
Rectangular Mechanical Draft (3 Towers)	24 (10)	~60 (18)	Fiberglass	0.5	8.3	23,808 (90,123)	8 (30)	36	Yes	85	High	$130,710
Round Mechanical Draft (4 Towers)	16 (6)	~60 (18)	Concrete	0.5	7.2	23,808 (90,123)	8 (30)	36	Yes	85	High	$143,103
One Round Mechanical Draft (aka Fan-Assisted Natural Draft)	8 (3)	~164 (50)	Concrete	0.5	7.2	23,808 (90,123)	8 (30)	44	Yes	85	High	$135,429

Notes:

(a) For the first three options, additional variations of the base case presented were also evaluated (for example, for Natural Draft Cooling Towers, two small towers and one large tower were evaluated in addition to the base case of two towers)

(b) Total water makeup includes drift, evaporation, and blowdown (at 3 cycles of concentration).

Table 9.4-2—Environmental Impacts of Alternative Cooling Tower Systems
(Page 1 of 3)

Factors Affecting System Selection	Cooling and Spray Ponds	Once- Through Cooling System	Dry Tower Cooling System	Hybrid Wet/Dry Cooling Tower System	Natural Draft Cooling Tower System	Four Mechanical Draft Cooling Towers
Land Use: On-site Land Requirements	Impacts would be MODERATE to LARGE.	N/A Rejected from range of alternatives before land use evaluated. Impacts would be SMALL.	Impacts would be SMALL.	Impacts would be SMALL.	Impacts would be SMALL.	Impacts would be SMALL to MODERATE.
Land Use: Terrain Considerations	N/A Rejected from range of alternatives before land use evaluated. Impacts would be SMALL.	N/A Rejected from range of alternatives before land use evaluated. Impacts would be SMALL.	Terrain features of the NMP3NPP site are suitable for a dry tower cooling system. Impacts would be SMALL.	Terrain features of the NMP3NPP site are suitable for a hybrid wet/dry cooling tower system. Impacts would be SMALL.	Terrain features of the NMP3NPP site are suitable for a natural draft cooling tower system. Impacts would be SMALL.	Terrain features of the NMP3NPP site are suitable. Impacts would be SMALL.
Water Use	Potential for SMALL impacts due to volume of makeup water needed. No significant impacts to aquatic biota. Impacts would be MODERATE.	Significant volume of makeup water needed. Potential for significant impacts to aquatic biota. Impacts would be MODERATE to LARGE.	No makeup water needed for use of a dry tower cooling system. No significant impacts to aquatic biota. Impacts would be SMALL.	Potential for SMALL impacts to aquatic biota. Impacts would be SMALL.	Potential for SMALL to MODERATE impacts to aquatic biota. Impacts would be SMALL to MODERATE.	Potential for SMALL to MODERATE impacts to aquatic biota. Impacts would be SMALL to MODERATE.
Atmospheric Effects	Some plume associated with cooling/spray ponds. Impacts would be SMALL to MODERATE.	Some plume associated with once-through cooling system. Impacts would be SMALL to MODERATE.	No visible plume associated with a dry tower cooling system. Impacts would be SMALL.	Short average visible plume. Presents minor potential for fogging and salt deposition. Impacts would be SMALL.	Visible plume. Presents greater potential for fogging and salt deposition. Impacts would be SMALL.	Visible plume. Presents greater potential for fogging and salt deposition. Impacts would be SMALL.

Table 9.4-2—Environmental Impacts of Alternative Cooling Tower Systems
(Page 2 of 3)

Factors Affecting System Selection	Cooling and Spray Ponds	Once- Through Cooling System	Dry Tower Cooling System	Hybrid Wet/Dry Cooling Tower System	Natural Draft Cooling Tower System	Four Mechanical Draft Cooling Towers
Thermal and Physical Effects	Minor to no discharges associated with a cooling/spray pond cooling system would need to meet applicable water quality standards and comply with applicable thermal discharge regulations. The discharge is not likely to produce tangible aesthetic or recreational impacts. No effect on fisheries, navigation, or recreational use of Lake Ontario. Impacts would be SMALL.	Enormous size of the intake and discharge structures and offshore pipes are needed. Thermal discharges associated with the once-through cooling system would need to meet applicable water quality standards and comply with applicable thermal discharge regulations. Thermal discharge study needed to identify environmental impacts on Lake Ontario. Impacts would be MODERATE to LARGE.	Minor to no discharges associated with a dry tower cooling system would need to meet applicable water quality standards and comply with applicable thermal discharge regulations. The discharge is not likely to produce tangible aesthetic or recreational impacts. No effect on fisheries, navigation, or recreational use of Lake Ontario. Impacts would be SMALL.	Discharges would need to meet applicable water quality standards and comply with applicable thermal discharge regulations. Discharge is not likely to produce tangible aesthetic or recreational impacts. Impacts would be SMALL.	Discharges would need to meet applicable water quality standards and be in compliance with applicable thermal discharge regulations. Discharge is not likely to produce tangible aesthetic or recreational impacts. Impacts would be SMALL.	Discharges would need to meet applicable water quality standards and comply with applicable thermal discharge regulations. Discharge is not likely to produce tangible aesthetic or recreational impacts. Impacts would be SMALL.
Noise Levels	Would emit broadband noise that is largely indistinguishable from background levels and would be considered unobtrusive. Impacts would be SMALL.	N/A Rejected from range of alternatives before noise evaluated.	Would emit broadband noise that is largely indistinguishable from background levels and would be considered unobtrusive. Impacts would be SMALL.	Would emit broadband noise that is largely indistinguishable from background levels and would be considered unobtrusive. Impacts would be SMALL.	Would emit broadband noise that is largely indistinguishable from background levels and would be considered unobtrusive. Impacts would be SMALL.	Would emit broadband noise that is largely indistinguishable from background levels and would be considered unobtrusive. Impacts would be SMALL.

Table 9.4-2—Environmental Impacts of Alternative Cooling Tower Systems

(Page 3 of 3)

Factors Affecting System Selection	Cooling and Spray Ponds	Once- Through Cooling System	Dry Tower Cooling System	Hybrid Wet/Dry Cooling Tower System	Natural Draft Cooling Tower System	Four Mechanical Draft Cooling Towers
Aesthetic and Recreational Benefits	N/A Rejected from range of alternatives before aesthetic and recreational benefits.	N/A Rejected from range of alternatives before aesthetic and recreational benefits.	No visible plume with the use of a dry tower air-cooled system. The cooling tower discharge is not likely to produce tangible aesthetic or recreational impacts; no effect on fisheries, navigation, or recreational use of Lake Ontario is expected. Impacts would be SMALL.	Plumes resemble clouds and would not disrupt the viewscape. The cooling tower discharge is not likely to produce tangible aesthetic or recreational impacts; no effect on fisheries, navigation, or recreational use of Lake Ontario is expected. Impacts would be SMALL.	Plumes resemble clouds and would not disrupt the viewscape. The cooling tower discharge is not likely to produce tangible aesthetic or recreational impacts; no effect on fisheries, navigation, or recreational use of Lake Ontario is expected. Impacts would be SMALL.	Plumes resemble clouds and would not disrupt the viewscape. The cooling tower discharge is not likely to produce tangible aesthetic or recreational impacts; no effect on fisheries, navigation, or recreational use of Lake Ontario is expected. Impacts would be SMALL.
Legislative Restrictions	N/A Rejected from range of alternatives before legislative restrictions.	Potential compliance issues with Section 316(b) of the CWA. In addition, potential significant NPDES thermal discharge issues surrounding discharges back into Lake Ontario. Impacts would be MODERATE to LARGE.	Potential compliance issues with the requirements for emissions under the federal Clean Air Act. These regulatory restrictions would not negatively affect implementation of this heat dissipation system, but they may influence overall operational cost. Impacts would be SMALL to MODERATE	An intake structure would meet Section 316(b) of the CWA and the implementing regulations, as applicable. NPDES discharge permit thermal discharge limitation would address the additional thermal load from blowdown back into Lake Ontario. These regulatory restrictions would not negatively affect implementation of this heat dissipation system. Impacts would be SMALL to MODERATE.	An intake structure would meet Section 316(b) of the CWA and the implementing regulations, as applicable. NPDES discharge permit thermal discharge limitation would address the additional thermal load from blowdown back into Lake Ontario. These regulatory restrictions would not negatively affect implementation of this heat dissipation system. Impacts would be SMALL to MODERATE.	An intake structure would meet Section 316(b) of the CWA and the implementing regulations, as applicable. NPDES discharge permit thermal discharge limitation would address the additional thermal load from blowdown back into Lake Ontario. These regulatory restrictions would not negatively affect implementation of this heat dissipation system. Impacts would be SMALL to MODERATE.
Environmental impacts	SMALL to MODERATE	MODERATE to LARGE	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Is this a suitable alternative heat dissipation system?	No	No	No	No	No	Yes

Table 9.4-3—Alternative Intake Systems

Impacts	Proposed System (Closed-loop – West Location)	Alternative System (Open-loop)	Intake Location Alternative 1 (Lake Shore Intake)	Intake Location Alternative 2 (East Location)
Construction Impacts	Some adverse impacts as discussed in ER Section 4.1, but mitigated as noted in Section 4.6. SMALL	Adverse impacts due to large intake structure required. MODERATE TO LARGE	Some adverse impacts would occur on the shore of Lake Ontario during construction. SMALL	Some adverse impacts would occur during construction. SMALL
Aquatic Impacts	No expected long-term impacts; entrainment and impingement expected to be minimal. SMALL	Adverse impacts from entrainment of resident species. MODERATE TO LARGE	No expected long-term impacts; entrainment and impingement expected to be minimal. SMALL	No expected long-term impacts; entrainment and impingement expected to be minimal. SMALL
Water Use Impacts	No expected long term impacts; water consumption minimal. SMALL	High water use would require large intake structure from Lake Ontario. MODERATE to LARGE	No expected long term impacts; water consumption minimal. SMALL	No expected long term impacts; water consumption minimal. SMALL
Compliance with Regulations	Satisfies regulatory performance standards for CWA and New York regulations. SMALL	Does not meet current CWA criteria for entrainment. MODERATE to LARGE	Satisfies regulatory performance standards for CWA and New York regulations. SMALL	Satisfies regulatory performance standards for CWA and New York regulations. SMALL
Environmental Preferability	Environmentally preferable: shorter construction schedule, more open area for construction and limits entrainment and lower water use.	Cost prohibitive not compliant with regulations.	Alternative is not viable due to complications from Severe weather on Lake Ontario (e.g., ice formation).	Due to more complex construction due to proximity to cooling tower basin and shorter piping lengths, this alternative is not environmentally preferable.