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10.0 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

{This chapter presents the potential environmental consequences of constructing and operating a new U.S. EPR at the Nine Mile Point Unit 3 Nuclear Power Plant (NMP3NPP) site. The environmental consequences are evaluated in five sections:

- Unavoidable adverse impacts of construction and operations
- Irreversible and irretrievable commitments of resources
- Relationship between short-term uses and long-term productivity of the human environment
- Benefit-Cost balance
- Cumulative impacts}

10.1 UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS

{This section summarizes adverse impacts of NMP3NPP construction and operation that cannot otherwise be avoided, and for which there may be no practical means of mitigation. Chapter 4 and Chapter 5 provide supporting details.}

10.1.1 UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS OF CONSTRUCTION

{Most construction related environmental impacts can be avoided or minimized through the application of best management construction plans and conformance with applicable Federal, State and Local regulations that protect the environment. NMP3NPP requires use of a site footprint where permanent structures and roads are located. Construction activities, on the other hand, can be managed in ways that limit long-term loss of habitat and impacts to workers and the public.

Construction impacts and potential mitigation measures are discussed in Section 4.6, and summarized here in Table 10.1-1. Considering the planned mitigation measures, the level of unavoidable adverse impacts from construction is expected to be SMALL. }

10.1.2 UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS OF OPERATIONS

{Operational impacts of NMP3NPP are discussed in Chapter 5. Expected impacts and their mitigation are summarized in Table 10.1-2. Unavoidable impacts are limited to operation of the cooling water systems and the generation of additional non-radioactive and radioactive waste. Actions to minimize these impacts include use of closed-cycle cooling and waste minimization. As a result, the unavoidable adverse impacts of operation are also expected to be SMALL. }

10.1.3 SUMMARY OF UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS FROM CONSTRUCTION AND OPERATIONS

{Construction and operation will require the disturbance of approximately 302 acres (122 hectares) of land for construction, of which 262 acres (106 hectares) will be permanently committed to power plant structures for NMP3NPP. NMP3NPP will be co-located near the existing nuclear power plant site currently occupied by NMP Unit 1 and Unit 2. A new access road will be constructed to support NMP3NPP construction and will remain in place to support

operations. Temporary storage and laydown areas will be restored following construction to reduce the size of the footprint affected during operations.

The infrastructure required for the NMP3NPP will be consistent with existing site use. NMP3NPP will require the construction of a new substation, transmission towers and lines to connect NMP3NPP to the existing NMP Unit 1 switchyard and proposed 345 kV switchyard adjacent to the power block area for NMP3NPP. The use of existing off-site transmission right-of-ways for NMP3NPP will eliminate the need for construction of new corridors, further limiting the plant's utilization of available land. In addition, no modifications to existing roads associated with off-site transmission corridors are anticipated.

Protection of surface and subsurface water resources during construction will require limitations on the amount of groundwater withdrawn and the discharge of construction waste waters from dewatering activities. Best management practices will be implemented to limit construction related erosion and sedimentation of surface waters. Construction controls will include use of groundwater flow barriers, spill containment, silt screens, settling basins and dust suppression. Water quality monitoring will be conducted to verify that control measures are adequate. A limited amount of on-site water will be needed to support the construction of NMP3NPP, and will mostly involve the use of dewatering activities and associated settling basins. Most of the water required for construction will be directly drawn from Lake Ontario or the Town of Scriba water system and off-site water will be trucked in to the construction site. Domestic water will be taken from the local municipal system. Long-term protection of surface waters will be managed through an on-site Storm Water Pollution Prevention Plan which is required under current regulations.

Certain natural resources on site will be affected including encroachment on surface waters and wetlands. Three on-site streams, their adjacent wetlands and associated drainage areas may be affected by construction and operation of NMP3NPP. Activities within these areas will conform to applicable state and federal regulations to ensure that impacts are limited and controlled. Impacts to aquatic resources are expected to be large given the area of wetlands and wetland buffers to be committed to permanent use. Other impacts are anticipated to be limited due to the absence of threatened and/or endangered species on-site. While a portion of the land utilized for construction will impact these resources, the fauna and flora found are typical of those that occur in comparable locations and are not otherwise unique to the NMPNS property. Where possible, sensitive onsite resources such as wetlands will be reclaimed or mitigated. There are no significant mineral resources within the NMPNS site.

Construction of permanent NMP3NPP structures such as the reactor, turbine buildings and cooling towers will require the removal of a portion of the onsite mixed deciduous forest and fields.

The potential for archaeological finds on the NMPNS site was evaluated during the NMP Unit 1 and Unit 2 license renewal. As described in Section 2.5.3, the Phase I Archaeological Survey of the NMPNS site area identified eight historic archaeological sites, four of which are recommended as potentially eligible for inclusion on the NRHP. No prehistoric archaeological sties were identified. A review of available information prior to the Phase I field investigation found no archaeological sites or historic architectural structures that had been previously recorded within the archaeological APE or within the NMPNS site. No historic architectural structures were found within the archaeological APE during the field investigation. Previously recorded archaeological resources and historic architectural structures within 16 km (10 miles) of the proposed site are shown on Tables 2.5-35 and 2.5-36, in accordance with NUREG 1555 (NUREG 1555, 1999). Additional archaeological investigations are ongoing and will include

further consultation with the New York State Historic Preservation Office (SHPO) to aid in the identification of archeological sites and to determine their eligibility for listing on the National Register of Historic Places. Construction activities will be managed to minimize encroachment on any sites potentially found. Appropriate disposition of historical sites that cannot be avoided will be determined in conjunction the New York state SHPO.

Measures to promote public health and safety will be implemented during construction and operation. The temporary increase in workforce during construction will require actions to minimize traffic congestion. Construction workers would use Lake Road, County Road 1, Country Road 29, and Routes 48, 104 and 481 to commute to work, which would substantially increase traffic during peak construction periods, especially during shift change over. To mitigate these impacts, in addition to adding potential signalization and designation of lanes at the affected intersections, a new access road would be built that would connect Miner Road to NMP Unit 1 and Unit 2 to facilitate traffic flow. The existing rail spur would be enhanced and extended from the existing plants to the NMPNS site to transport heavy equipment and construction materials. Transportation routes during operations were predicted to provide acceptable levels of service (LOS).

Noise levels at the site boundary are predicted to conform to applicable New York State Department of Environmental Conservation (NYSDEC) and EPA criteria. Non-routine noise, such as blasting, will be limited to daytime. Measures to control fugitive dust and emissions from equipment will be implemented along with a general Safety and Health Plan. Emissions from the testing of diesel generators will conform to applicable New York state permit requirements and related federal emission standards.

Radiological dose to workers on site and to the general public have been calculated and are estimated to be well within applicable regulatory limits. Continuing monitoring of radioactivity in the environment surrounding the NMP3NPP site will ensure that radiological consequences of station operation are maintained within applicable environmental and health based standards. While some radioactive solid wastes will be created, efforts to control and limit their production will be implemented.

Impacts associated with the NMP3NPP cooling water systems include construction and operation of intake and discharge structures, as well as evaporative losses from operating the cooling towers. The intake and discharge piping will be installed by use of subsurface tunneling, thereby minimizing impacts to sediments and benthic organisms. Aquatic organisms found in Lake Ontario are generally ubiquitous and no protected habitats were found near the site. These activities will conform to applicable state and U.S. Army Corps of Engineers regulations, including proper disposal of dredge spoils.

Since NMP3NPP will employ a closed-cycle cooling water system that conforms to the U.S. Environmental Agency (EPA) Phase I Clean Water Act 316(b) regulations, the withdrawal of cooling water from Lake Ontario will be small. There will be limited impact on near shore hydrology and the potential effects of impingement and entrainment. Measures to further reduce impingement will include intake approach velocities of less than 0.5 ft/sec (0.15m/sec).

Evaporative loss from the cooling towers will create visible plumes. The annual prediction for average plume length would be 2.3 mi (3.7 km). Deposition of solids is likely to occur but will be below the NUREG-1555 significance levels at which visible damage to vegetation may occur. Off-site noise from tower operations is predicted to be within applicable EPA, HUD and New York State Department of Environmental Conservation guidelines.

A portion of the NMP3NPP cooling water will be discharged back into Lake Ontario after being directed through a Waste Water Retention Basin (intermediate discharge reservoir) as blowdown to maintain water quality of the cooling water as it is recirculated. The temperature of this discharge will vary between 15°F (8°C) in summer and 30°F (16°C) in winter above the ambient temperatures, creating a small thermal plume. The extent of the plumes will vary seasonally. The maximum area occupied by the 3°F (1.7°C) isotherm will be less than 1,400 acres (567 hectares) in summer and up to 800 acres (324 hectares) in winter. The resulting thermal plume should not pose a threat to the Lake's benthic community or to motile organisms in the area. The thermal discharge will contain small amounts of chemicals used in plant systems and small quantities of radioactive liquids. Concentrations of these waste water constituents will be limited by SPDES permit requirements and applicable NRC radiological release limitations.

Socioeconomic impacts of the NMP3NPP construction and operation are expected to be small. It is estimated that many of the skilled construction laborers will commute to the site from outside the immediate geographic area and temporary housing and other related public services appear to be adequate to absorb both the temporary increase in workers during construction and the long-term, but smaller, increase in operational staff. Beneficial increases to the local economy from taxes and spending are likely to occur but are estimated to be a small percentage of the existing economy. The percentage of low-income and minority populations within the comparative environmental impact areas is low compared to state averages. Therefore, it is not likely that these groups would be disproportionately affected by construction or operation.}

10.1.4 REFERENCES

{None}

Table 10.1-1—{Construction-Related Unavoidable Adverse Environmental Impacts}

(Page 1 of 4)

Impact Category	Adverse Impact	Mitigation Measures	Unavoidable Adverse Environmental Impacts
Land Use	Approximately 302 acres (122 hectares) of land will be disturbed of which 262 acres (106 hectares) will be permanently committed to power plant structures and roads for NMP3NPP.	Comply with applicable federal, state and local construction permits. Clear only areas necessary for installation of power plant infrastructure and implement construction Best Management Practices. Acreage will be restored/revegetated following construction to the maximum extent possible. Use of existing transmission corridor right-of-ways. Implement Storm Water Pollution Prevention Plan (SWPPP), including sediment and erosion control. Implement Spill Prevention Control and Countermeasures (SPCC) Plan. Use site Best Management Practices (BMP) to protect resources such as wetlands and streams in vicinity. Reclaim and or restore wetlands not permanently committed to the power block. Obtain individual U.S. Army Corps of Engineers 404, Section 10 Rivers and Harbors Act Permit; Comply with BMP requirements.	262 acres (106 hectares) of land will be permanently occupied by nuclear plant infrastructure.
	Potential to disturb archaeological and architectural sites during construction	Undertake extensive archaeological survey of site prior to construction. Review significance of sites with the New York State Historic Preservation Officer (SHPO) and develop plans to avoid and/or minimize impacts to these sites. Develop procedures compliant with Federal and State laws to protect cultural, historical or paleontological resources or human remains in the event of discovery during construction.	Small potential for destruction of unanticipated historic and/or cultural resources.

Table 10.1-1—{Construction-Related Unavoidable Adverse Environmental Impacts}

(Page 2 of 4)

Impact Category	Adverse Impact	Mitigation Measures	Unavoidable Adverse Environmental Impacts
Hydrologic and Water Use	Construction has the potential to change drainage characteristics, flood handling, and erosion and sediment transport. Several wetlands will be eliminated and the hydrology of 3 streams will be altered Surface and subsurface water quality could be affected by construction activities.	Implement BMP and Storm Water Pollution Prevention (SWPPP) Plans according to applicable Local and State regulations to limit erosion and contamination of surface waters. Construction controls to include silt fences, coffer dams, groundwater flow barriers, settling basins. Comply with the U.S. Army Corps of Engineers 404 Permit. Use Lake Ontario and off-site water that is trucked in and avoid groundwater pumping. Monitor water quality in construction impoundments and compare to applicable criteria and historical data. Obtain individual U.S. Army Corps of Engineers 404, Section 10 Rivers and Harbors Act Permit; Comply with BMP requirements. Protect resources such as wetlands and streams in vicinity to the extent possible. Implement Spill Prevention, Control, and Countermeasures (SPCC) Plan, BMP and SWPP	Potential erosion of sediments into surface waters and local streams. Hydrology of 3 on-site streams and associated wetlands will be altered. Potential for contamination of surface and subsurface water, surface waters will be reduced. Of the 176 acres (71.2 hectares) of wetlands, approximately 59 acres (23.9 hectares) will be permanently impacted.
Aquatic Ecology	Several wetlands and streams will be permanently affected, resulting in elimination and/or displacement of aquatic species. Lake Ontario's aquatic life may be affected due to increased suspended sediment, dredging for the intake, and removal of substrate for the discharge structure.	Implement BMP and SWPPP to limit erosion and sedimentation. Protect remaining ponds and wetlands. NMP3NPP surveys were performed to identify protected species and corrective actions if needed. Dredging for the intake cribhouse discharge risers will be confined to a small area and organisms will quickly recolonize based on prior experience. Implement SWPPP, including sediment and erosion control and the construction of new impoundments, as appropriate. Obtain individual U.S. Army Corps of Engineers 404, Section 10 Rivers and Harbors Act Permit; PA DEP 105 Dam Safety Water- Way Management Permit. Comply with BMP requirements. Implement SPCC Plan. No aquatic endangered or threatened species are expected to be impacted.	A portion of site wetlands and streams will be permanently lost. Species present will be lost. Benthic organisms in the intake and discharge areas will be temporarily affected during construction.

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Table 10.1-1—{Construction-Related Unavoidable Adverse Environmental Impacts}

(Page 3 of 4)

Impact Category	Adverse Impact	Mitigation Measures	Unavoidable Adverse Environmental Impacts
Terrestrial Ecology	Vegetation loss will occur in certain construction areas, including mixed forest, old field, and wetlands habitats.	Restore available fields not impacted by NMP3NPP operations and limit removal of mixed deciduous forest.	A limited amount of mixed deciduous forest and fields will be lost.
		Perform activities in wetlands in accordance with permit requirements of Section 404 of the Clean Water Act. Facilities will be sited to limit wetland encroachment. Review NMP3NPP historic survey database to identify important terrestrial species; conduct new surveys, as needed. Use site Resource Management Plan and BMP to protect resources. Preserve aesthetically outstanding tree clusters, as practical; harvest merchantable timber; use or recycle other woody material, as appropriate. Obtain individual U.S. Army Corps of Engineers 404, Section 10 Rivers and Harbors Act Permit; PA DEP 105 Dam Safety Water- Way Management Permit. Comply with BMP requirements. Acreage will be restored following construction to the maximum extent possible.	A portion of on-site wetlands will be lost.
	Designated bird species may be displaced or disturbed.	Manage forest habitat removal to limit habitat fragmentation. Reclamation of fields will contribute to added habitat. Consult with appropriate agencies regarding avoidance and appropriate mitigation measures. Design construction footprint to account for important habitat.	No unavoidable impacts.
	Cooling tower may cause bird impaction	Low profile cooling tower design will limit bird impactions	Some bird impactions may occur.

Table 10.1-1—{Construction-Related Unavoidable Adverse Environmental Impacts}

(Page 4 of 4)

Impact Category	Adverse Impact	Mitigation Measures	Unavoidable Adverse Environmental Impacts
Socioeconomic	Construction workers, existing employees and local residents could be affected by increased dust, noise, emissions and traffic.	On-site noise will be maintained within applicable EPA, HUD and OSHA noise-exposure limits. Limit construction activities resulting in non-routine noise levels to day time. Train construction workers and employees in use of appropriate personal protective equipment Develop fugitive dust and vehicle emissions control strategies in conformance with air quality standards and best management practices. Ameliorated traffic congestion with construction of an access road to and install appropriate traffic controls at affected intersections. Comply with applicable U.S. EPA and State air quality regulations.	No unavoidable impacts.
	Public services supporting construction activities and expanded work force may be impacted.	Minor aggregate socioeconomic impacts anticipated; mitigation not required.	Small increase in emergency calls, number of new students, temporary housing.
	Influx of workers may impact housing availability.	There are adequate numbers of vacant housing units to accommodate the influx of workers.	No unavoidable adverse impacts.
Radiological	Construction workers will be exposed to small doses of radiation from existing units.	All radiological doses will be within 10 CFR 20.1301 limits. Implement As Low As Reasonably Achievable (ALARA) practices at construction site.	Small doses to construction workers.
Atmospheric and Meteorological	Construction will cause increased air emissions from traffic and construction equipment, and fugitive dust.	Train construction workers and employees on appropriate personal protective equipment. Develop fugitive dust and vehicle emissions control strategies in conformance with air quality standards and best management practices. Equipment maintenance plans. Comply with applicable U.S. EPA and State air quality regulations.	No unavoidable adverse impacts.
Environmental Justice	No disproportionate impacts to low income or minority groups were identified.	None.	No unavoidable adverse impacts.
Non-radiological Health Impacts	Risk to workers from accidents and occupational illness.	Implement construction site-wide health and safety program that conforms to OSHA requirements.	Industrial worker accidents may occur.

Table 10.1-2—{Operations-Related Unavoidable Adverse Environmental Impacts}

(Page 1 of 3)

Impact Category	Adverse Impact	Mitigation Measures	Unavoidable Adverse Environmental Impacts
Land Use	The NMP3NPP footprint will permanently occupy a portion of the site. . Approximately 262 acres (106 hectares) will be permanently committed to structures.	Limit area required during design and construction.	Land use is consistent with current operations at the site.
	Some potential impact on land and water courses from spills and discharges	Maintain Storm Water Pollution Prevention Plan (SWPPP), including sediment and erosion control. Maintain Spill Prevention Control and Countermeasures (SPCC) Plan.	No unavoidable impacts
	Operation of the new unit will increase radioactive and non-radioactive waste disposal in landfills and on-site in long-term storage facilities.	Implement a waste minimization, pollution prevention program to limit waste generation.	Some land will be dedicated to offsite and on-site waste storage and will not be available for other uses.
	Transmission line maintenance may have some impact on vegetation and wildlife.	Best management practices will mitigate potential impacts from vegetation control and other rights of way (ROW)activities.	Unavoidable but small impacts may occur as a result of keeping the ROWs in a safe condition.
Hydrologic and Water Use	Circulating water supply system makeup water will be withdrawn from Lake Ontario potentially affecting near-shore hydrology.	Implement closed-cycle cooling and reduce water use.	No unavoidable impact.
	Evaporative loss of water from the cooling tower represents a consumptive use.	Institute a water treatment program that allows the cooling towers to be operated in a manner that minimizes the use of makeup water,	A limited amount of cooling water taken from the Lake Ontario will be consumed through evaporative loss.
Aquatic Ecology	Cooling water withdrawal will result in impingement and entrainment.	Implement closed-cycle cooling. Limit intake velocity	Some limited entrainment and impingement will occur.
Aquatic Ecology (continued)	Thermal plume may impact aquatic species abundance and distribution.	Meet all applicable state and federal regulatory requirements regarding the discharge of heat. The discharge risers are being designed to rapidly disperse the thermal discharge.	A small thermal plume will be created.
	Biofouling and other process control chemicals will be discharged.	Meet all applicable state and federal Clean Water Act and SPDES permit regulations and limitations.	Chemicals will be discharged in small quantities.
	Recreational and commercial fishing may be impacted by impingement and entrainment.	Implement closed-cycle cooling.	No unavoidable adverse impacts.

Table 10.1-2—{Operations-Related Unavoidable Adverse Environmental Impacts}

(Page 2 of 3)

Impact Category	Adverse Impact	Mitigation Measures	Unavoidable Adverse Environmental Impacts
Terrestrial Ecology	Operation of the cooling tower would result in a visible plume, and solids deposition.		The tower plumes will be visible from beyond the site boundary.
	Solid deposition from the cooling tower operations will have some impact on terrestrial vegetation.	Meet NUREG-1555 vegetative criteria	No unavoidable adverse impacts.
	Bird collisions with the tower may occur.	Low profile tower	Some bird impaction may occur.
Socioeconomic	Operating nuclear plants emit low noise.	Studies demonstrate noise levels on and off-site will meet applicable regulations.	No unavoidable adverse impacts.
	The additional transmission line has potential to cause electric shock on-site	Design to NESC code to minimize potential impacts.	No unavoidable adverse impacts.
	Cooling tower and plume may impact existing site aesthetics.		The cooling tower plume will be visible and vary seasonally.
	An additional 363 permanent staff will increase traffic during shift changes.	A new access road and interconnection with NMP3NPP will limit traffic congestion.	No unavoidable adverse impacts.
		Heavy plant components will be brought in by truck and train.	
	Air quality could potentially be affected due to on-site diesel generators.	Conform to state and federal emission standards and permit requirements.	No unavoidable adverse impacts.
	Population increases due to added staff may affect public services.	Existing capacity exists to absorb the increased population related services	Small increase in emergency calls, students use of recreational facilities.
	Increased direct and indirect work force and increased population may impact housing availability.	The number of vacant housing units will be adequate to accommodate the increased work force.	No unavoidable adverse impacts.

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Table 10.1-2—{Operations-Related Unavoidable Adverse Environmental Impacts}

(Page 3 of 3)

Impact Category	Adverse Impact	Mitigation Measures	Unavoidable Adverse Environmental Impacts
Radiological	Potential doses to members of the public from releases to air and surface water.	All releases will be well below regulatory limits.	No unavoidable adverse impacts.
	General public and worker exposure to radiation during incident-free transport of fuel and wastes.	Detailed analysis performed in accordance with 10 CFR 51.52(b), yielding conservative results.	No unavoidable adverse impacts.
Atmospheric and Meteorological	The cooling tower plume will traverse the site.	No mitigation	The plume will be visible off-site.
Environmental Justice	No disproportionately high or adverse impacts on minority or low income populations are predicted	None required.	No unavoidable adverse impacts.
Non-radiological Health Impacts	Potential growth of infectious organisms within the Essential Service Water System cooling towers.	Apply best management biocide treatment to limit growth and dispersal of harmful organisms.	No unavoidable adverse impacts.
	Risk to workers from occupational related accidents and illnesses.	Implement site-wide Safety and Medical Program.	Some accidents are likely to occur.

10.2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

{This section describes the expected irreversible and irretrievable environmental resource commitments used in the construction and operation of NMP3NPP. The information contained in this section satisfies the requirements of 10 CFR 51.45(b)(5) (CFR, 2007) and 10 CFR 51, Appendix A to Subpart A (CFR, 2007), with respect to consideration of irreversible and irretrievable commitment of resources (CFR, 2007).

Irreversible resource commitments are those that could not be restored at a later time to pre-existing conditions. Irretrievable resources are materials that will be used that could not, by practical means, be recycled or restored for other uses.}

10.2.1 IRREVESIBLE ENVIRONMENTAL COMMITTMENTS

{Irreversible environmental commitments resulting from installation of NMP3NPP in addition to materials used for nuclear fuel fabrication and on-site structural components include:

- Surface water
- Land
- Aquatic and terrestrial biota, and
- Releases to air and surface water

10.2.1.1 SURFACE WATER

Surface waters will be withdrawn from Lake Ontario to support the Circulating Water Supply System (CWS), the Raw Water Supply System (RWSS), and the Essential Service Water Systems (ESWS). Some of this water will be consumed as a result of evaporative loss from the cooling towers. The remainder will be returned to Lake Ontario. The amount of water potentially lost from the CWS cooling tower due to evaporation is expected to be approximately 17,064 gpm (64,687 lpm).] Evaporative loss from the ESWS cooling tower will be approximately 1,142 gpm (4,322 lpm) during operation. Because evaporative loss is consumptive, it will be unavailable for other uses.

A portion of the on-site inland wetlands will be filled or otherwise modified to accommodate the construction of NMP3NPP. Of the 176 acres of wetlands, 12 acres will be temporaily impacted and 59 acres will be permanently impacted. represents of the existing areas occupied by these natural resources. The overall area within the NMP3NPP footprint will be permanently unavailable for reclamation in the future.

Groundwater withdrawals will not be needed to support operation of NMP3NPP. Groundwater that is removed from the aquifer to support dewatering activities during construction will be consumed or managed as surface water run off. The impact to this resource will be temporary and SMALL. Because the resource use is consumptive, it will not be available for other uses.

10.2.1.2 LAND USE

Land designated for the storage of radioactive and non-radioactive waste on and off-site is dedicated to that use and will be unavailable for other uses during the operational period. Following decommissioning and the development of permanent offsite storage, the on-site waste storage areas could be reclaimed.

10.2.1.3 AQUATIC AND TERRESTRIAL BIOTA

Construction of NMP3NPP will require the removal of a portion of the on-site mixed deciduous forest and will encroach on inland wetlands. Much of these areas will be permanently occupied by plant structures during operations and will be unavailable for future reclamation. The construction areas represent a small percentage of the overall site acreage and do not contain any unique or otherwise protected aquatic or wetland species.

10.2.1.4 RELEASES TO AIR AND SURFACE WATER

Radioactivity, air pollutants and chemicals will be released to the environment during routine operations of NMP3NPP. Since these releases will conform to applicable Nuclear Regulatory Commission, U.S. Environmental Protection Agency and the State of New York regulations, their impact to the public health and the environment would be limited. Routine long-term monitoring of radioactivity in the environment and the measurement of chemical concentrations discharged will be performed to verify regulatory compliance.}

10.2.2 IRRETRIEVABLE COMMITMENTS OF RESOURCES

{Irretrievable commitments of resources during construction of NMP3NPP will be similar to that required for other major energy construction projects. Studies performed for the U.S. Department of Energy have summarized the amount of materials historically consumed for nuclear power plant construction (DOE, 2004a) (DOE, 2005).

For a typical new 1,300 MWe nuclear power plant, it can be estimated that reactor building steel-plate reinforced structures would require 12,239 yards of concrete and 3,107 tons of rebar. Approximately 2,500,000 linear feet of cable would be required for the reactor building, and 6,500,000 linear feet of cable and up to 275,000 feet of piping for the unit. Based on historical information from operating reactors (DOE, 2005), it is estimated that pressurized water reactors between 1,000 and 1,300 MWe require a total of approximately 182,900 cubic yards of concrete to construct the reactor building, major auxiliary buildings, turbine generator building and the turbine generator pedestal. A total of 20,512 tons of structural steel was typically required.

The rated electrical output for NMP3NPP is approximately 1,600 MWe. This is approximately 22% higher than the largest plant referenced in the historical data. However, these historical estimates are representative of the quantities of materials that will be consumed during construction. Historical data for materials consumed for domestic nuclear power plant construction in the 1970's is summarized in Table 10.2-1 (DOE, 2005). The estimated amount of materials that will be consumed during construction of a U.S. EPR plant is summarized in Table 10.2-2.

While these quantities are large, their use provides a cost-effective allocation of resources given that energy from nuclear power plants is now increasingly cost competitive (DOE, 2004a) (DOE, 2005). Furthermore, nuclear energy provides environmental benefits consistent with current concerns relative to overall life cycle environmental effects caused by fuel extraction, emission of air pollutants and solid waste disposal typically associated with fossil fuel (DOE, 2004b) (WNA, 2005).

Irretrievable resources include uranium and the energy used to fabricate fuel. However, available supplies of uranium suggest that there is a considerable degree of security of supply to ensure the continued operation and expansion of nuclear power for the foreseeable future (NEA, 2002) (WNA, 2006).

The inventories of construction materials tabulated by the U.S. Census Bureau for 2000, 2005 and 2006 are shown in Table 10.2-3. In general, construction supplies increased from 2002 through 2006, suggesting that such commodities will continue to be available for the foreseeable future in response to demand (USCB, 2008a).

Similarly, inventories of minerals and related construction materials have remained relatively stable between 2000 and 2005 as shown in Table 10.2-4 (USCB, 2008b). Another important measure is industry capacity in those sectors that may affect nuclear power plant construction. In general, the data suggest that most industries have surplus capacity as shown in Table 10.2-5 (USCB, 2007). It is concluded that during the fourth quarter of 2006, U.S. domestic manufacturing plants collectively used only 70% of their full production capacity (USCB, 2007).

While a given quantity of material consumed during construction and operation of NMP3NPP will be irretrievable, except for materials recycled during decommissioning, the impact on their availability is expected to be SMALL.}

10.2.3 REFERENCES

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Table 10.2-1—{Summary of Historical Data - Materials Consumed by Nuclear Power Plant Construction in the United States During the 1970's}

	BWR 1074-1308 MWE	PWR 1116-1311 MWE	LWR 1074-1311 MWE
Building Volume			
Building Volume 1,000,000 ft^3 (1,000,000 m^3)	14.6 (0.41)	15.9 (0.45)	15.3 (0.43)
Concrete (Reactor Building, Major Auxiliary Buildings, Turbine Generator Building, Turbine Generator Pedestal, Other)			
Concrete 1,000 yd^3 (1,000 m^3)	195.7 (149.6)	182.9 (139.8)	188.7 (144.3)
Concrete yd^3 (m^3)/KW_{net}	173.2 (132.4)	152.8 (116.8)	162.1 (123.9)
Concrete yd^3 (m^3)/ Building 1,000 yd^3 (1,000 m^3)	12.5 (9.6)	11.3 (8.6)	11.8 (9.0)
Structural Steel (Supports, Shield Plate, Miscellaneous Steel)			
Structural Steel tons (metric tons)	13,642 (12,376)	20,512 (18,608)	17,389 (15,775)
Structural Steel LB/KW_{net} (kg/KW_{net})	23.9 (10.8)	34.1 (15.5)	29.5 (13.4)
Structural Steel TN/ Building 1,000ft^3 (1,000 m^3)	0.94 (0.24)	1.30 (0.033)	1.13 ()0.029

Notes:

BWR - Boiling water reactor
PWR - Pressurized water reactor
LWR - Light water reactor

Source: DOE, 2005

Table 10.2-2—{U.S. EPR Estimated Construction Materials (Tons)}

Estimated Minimum Requirements	Estimated Tons
Civil Material	
Concrete	
Cement	188,525
Sand	282,787
Aggregate	377,050
Steel	
Rebar	55,331
Structural Steel	6,261
Misc. Steel	1,016
Mod Steel	225
Steel Liner	1,412
Embedded Steel	1,903
Siding and Roofing	2,056
Piping and Mechanical Material	
Large and Small bore pipe	7,500
Large bore hangers	2,788
Nuclear Island EM package	15,377
Tubine Island and BOP	1,000*
Consumables	1,000*
Electrical Equipment	
Conduit	1,356
Cable Tray	73
Power and Control Wire	4,496
NI Electrical Equipment	5,000
TI Electrical Equipment	5,000

Note:

* Truck Loads

Table 10.2-3—{Estimated Inventories of Construction Supplies Based on U.S. Merchant Wholesalers Data 2000, 2005 and 2006}

Inventories ($x10E+06)	2002	2005	2006
Metals and Minerals	14,750	23,782	29,567
Electrical Goods	28,188	32,098	35,747
Hardware, Plumbing, Heating equipment and supplies	12,855	15,385	16,635
Machinery, Equipment, and Supplies	53,495	65,237	70,866
Lumber & Other Construction Materials	10,300	16,524	17,080

Source: UCSB 2008a

Table 10.2-4—{U.S. Mineral Production in 2000, 2005 and Estimated for 2006}

Inventories Per 1000 Metric Tons	2000	2005	2006 (est.)
Aluminum (Per 1000 metric tons)	3,688	2,481	2,280
Copper (Per 1000 metric tons)	1,450	1,140	1,200
Iron Ore (million metric tons	61	53	53
Lead (Per 1000 metric tons)	449	426	430
Titanium (Per 1000 metric tons)	300	300	300
Zinc (Per 1000 metric tons)	805	748	725
Portland Cement (million metric tons)	84	94	94
Masonry Cement (million metric tons)	4	5	5
Construction Sand and Gravel (million metric tons)	1,120	1,270	1,280

Source: UCSB, 2008b

Table 10.2-5—{Percent Capacity Utilization Rates by Industry}

Industry	2002	2003	2004	2005	2006
Primary Metal Manufacturing	71	72	74	79	73
Ferrous Metal Foundries	62	63	68	72	72
Nonferrous Metal Foundries	65	63	60	66	64
Fabricated Metal Products	59	61	66	68	70
Electrical Equipment	60	64	69	68	69

Source: UCSB, 2007

10.3 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY OF THE HUMAN ENVIRONMENT

{TheNMP3NPP environmental report provides information associated with the environmental and socioeconomic impacts of activities that occur during construction and operation. These activities are considered short-term for purposes of this section and include that period through prompt decommissioning. Long-term is considered to be that period from construction to end of plant life and beyond that required for delayed decommissioning. This section reviews the extent to which the proposed project use of the environment precludes any future, long-term use of the site.

The information contained in this Section satisfies the requirements of 10 CFR 51.45(b)(4) (CFR, 2007) and 10 CFR 51, Appendix A to Subpart A (CFR, 2007), with respect to consideration of irreversible and irretrievable commitment of resources.}

10.3.1 CONSTRUCTION AND LONG-TERM PRODUCTIVITY

{Section 10.1 summarizes the potential unavoidable adverse environmental impacts of NMP3NPP construction including measures being implemented to mitigate those impacts. While some impacts will remain following construction, none should preclude the future use of the site following decommissioning.

NMP3NPP is being constructed on the property adjacent to the existing nuclear power plant site housing Nine Mile Point Units 1 and 2. As a result, construction related activities and permanent structures will be consistent with established site use. Construction activities will occupy a footprint larger than the permanent structures required for operations, because of the need for additional temporary work force parking, equipment and material lay-down areas and construction buildings.

The acreage to be disturbed includes existing mixed deciduous forest, fields and a portion of the site's existing surface waters and inland wetlands. Construction Best Management Practices and Erosion Control Plans along with other protective measures will limit terrestrial impacts and protect long-term productivity. Various mitigation measures will be evaluated, including but not limited to reforestation, wetlands restoration and/or wetland construction. These mitigation measures will limit terrestrial impacts and protect long-term productivity.

Groundwater and surface waters will be temporarily disturbed during construction due to water withdrawal and creation of dewatering basins. Following completion of construction these impacts will cease and groundwater should recharge to pre-construction levels with no long-term loss of surface or subsurface water resources.

Potential archaeological and architectural sites located in the construction area will be managed in cooperation with the New York State Historic Preservation Office so that appropriate mitigative actions are implemented.

Construction of the NMP3NPP intake and discharge structures will require limited disturbance of sediments within the intake area of Lake Ontario as the structures will be installed by tunneling. As a result, construction of NMP3NPP intake and discharge structures will not affect the long-term ecological productivity of Lake Ontario in the area of NMP3NPP, nor will protected species be impacted.

Noise above ambient levels will occur on-site due to some construction activities. However, at the site boundary, construction related noise is expected to conform to applicable state and

federal environmental standards. Non-routine noise, such as blasting, will be limited to day time. Since construction noise is temporary, there would be not long-term impacts.

Temporary traffic increases will occur due to the numbers of additional workers required to support construction. {A new and/or upgraded site access road is proposed to alleviate on-site and off-site traffic during this period, through operations, and decommissioning with no long-term impact. The Port of Oswego will be utilized to barge in heavy equipment and reactor parts and the existing railroad spur will be enhanced and extended to provide site access for heavy equipment and construction materials, thereby limiting the impact on nearby roads.

Economic benefits during construction accrue from the need for temporary housing and local spending. It is predicted that while this benefit is substantial, it will represent a small increment to the total economic base of the NMP3NPP site two-county area.}

10.3.2 OPERATION AND LONG-TERM PRODUCTIVITY

{The potential unavoidable adverse environmental impacts of NMP3NPP operation are also summarized in Section 10.1 along with proposed mitigation measures. Some impacts will occur during NMP3NPP operations but will largely terminate upon plant shut down and any residual environmental issues resolved during decommissioning such that long-term uses of the site are not precluded.

Environmental impacts during operations are largely related to operation of the CWS system and ESWS and the generation of radioactive wastes. Impacts of the cooling water systems stem from withdrawal of water from Lake Ontario via the intake structure, evaporative loss from the systems' cooling towers and the return of cooling water back to the lake.

The use of closed-cycle cooling systems will substantially reduce these potential impacts such that during and following operations there would be no long-term loss of ecological productivity of marine resources in Lake Ontario. The long-term reproductive viability of marine species potentially affected by entrainment or impingement is expected to be unaffected, resulting in no long-term power plant related loss in biomass.

Discharge of the thermal plume and associated power plant chemical additives will meet applicable permit regulatory requirements during operations and are not expected to have any long-term consequences for water quality in Lake Ontario. Due to the use of closed-cycle cooling, the thermal plume is predicted to occupy a comparatively small area. Similarly the concentrations of chemicals released will be limited and will quickly dissociate in marine waters with little or no long-term accumulation.

Evaporative loss of water from the cooling towers represents a consumptive use during operations but will cease following plant shutdown. Salt deposition during cooling tower operations is not predicted to cause visible vegetative impacts, yet this potential impact will also cease following shutdown as well. It is expected that terrestrial plants and/or soil will quickly recover should impacts be observed.

Emission of fossil fuel combustion byproducts will increase during the periodic testing of the NMP3NPP diesel engines. The amount of emissions will be governed by applicable state permits and federal standards for air pollutants. Since the emissions are periodic and transient, and will cease following NMP3NPP shutdown, long term impacts to air quality are not expected.

Radiological releases will be controlled according to applicable state and federal standards to ensure protection of terrestrial and marine biota, and protection of workers and the general public. On-site storage of radioactive wastes will be temporary and ultimately removed from site. Reclamation of the site including removal of any radioactive contamination will occur such that future long-term uses of the site are not precluded.

Socioeconomic benefits to the counties surrounding the NMP3NPP site will result from increased taxes, additional spending and housing. While the relative impact to the economic base is small, some benefit will continue up to and through decommissioning, particularly where increased tax revenues have been used to enhance public infrastructure and services.}

10.3.3 SUMMARY OF RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

{The construction and operation of NMP3NPP will result in some limited short-term and unavoidable impacts to the environment. Mitigation measures have been proposed to limit both the short-term impacts of construction and those that may occur during the operational life of the power plant. Benefits accrue from the production of electricity and increases in the tax base that could support public infrastructure and services. Following site decommissioning, it is expected there will be no long-term impacts on productivity or the human environment that would preclude alternative uses of the site.}

10.3.4 REFERENCES

{CFR, 2007. Title 10, Code of Federal Regulations, Part 51, Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions, 2007.}

10.4 BENEFIT-COST BALANCE

{This section describes the benefit-cost balance resulting from the proposed construction and operation of NMP3NPP. It was prepared in accordance with the guidance provided in NUREG-1555 (NRC, 1999)(NRC, 2007a)(NRC, 2007b) i.e., "Environmental Standard Review Plan" (ESRP). Section 10.4.1 describes the benefits of the proposed project; Section 10.4.2 discusses the costs associated with the proposed project; and Section 10.4.3 provides a benefit-cost balance summary.

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

10.4.1 BENEFITS

{This section discusses the benefits resulting from the proposed construction and operation of the NMP3NPP. The information provided in this section was prepared in accordance with the guidance provided in NUREG-1555, Revision 1, ESRP 10.4.1 (NRC, 1999)(NRC, 2007a). Information provided in this section includes a summary of the following information:

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

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

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

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

10.4.1.1 Need for Power

As described in Section 8.4.1, the New York Independent System Operator (NYISO) is the regional transmission organization that serves as the electricity broker for New York State and maintains the reliability of the bulk electricity grid for all suppliers of electricity, including those generators within the state. The NYISO also coordinates reliability assessments with adjacent regional transmission organizations (RTOs). These assessments and studies prepared by NYISO fulfill the required evaluation criteria for determining need for power found in NUREG-1555 (NRC, 2007b); they are: (1) systematic, (2) comprehensive, (3) subject to confirmation, and (4) responsive to forecasting uncertainty.

The NYISO 2008 Reliability Needs Assessment (RNA) finds that a reliability need will occur in 2012, primarily in the southeastern region of the state. By 2017, the resource needs will become acute if the equivalent of approximately 2,750 megawatts (MW) is not installed. While energy efficiency measures, such as the 15-x-15 Initiative, which calls for a 15% reduction in the State of New York's overall energy use by 2015 (NY, 2007), might reduce energy demand, the current RNA identifies the need for additional power-generation resources and requests that developers submit market-based solutions to accommodate the reliability need. (NYISO, 2007)

The purpose of the proposed NMP3NPP is to satisfy the need for power identified by NYISO. The result of no action, or not constructing the new facility, would mean that the need for power has not been satisfied, and other electric-generating sources would be needed to satisfy the forecasted electricity demands.

In summary, the need for power is demonstrated by the following:

- The 2008 RNA concludes there will be a reliability need in 2012. (NYISO, 2007)
- The NYISO asks developers to submit market-based solutions to the reliability needs identified in the 2008 RNA. (NYISO, 2007)
- There is existing congestion in the north/south transmission of energy through the state.
- The need for new electric supply both for economic development purposes as well as to provide the environmental and health benefits associated with new energy facility construction is unquestioned. In addition, it is also widely recognized that the NYC metropolitan area is one of the largest load centers in the northeast, but importing electricity is problematic because of transmission line congestion. Siting new power plants in the NYC metropolitan area, however, would not be easy; land is scarce and expensive. The potential areas for locating new generation facilities are densely populated and heavily residential and would be affected by community resistance. Therefore, the best way to meet this need would be through a combination of generation plants (both new and repowered), transmission line and substation improvements, and various methods of energy efficiency and demand reduction.
- There is a growing demand for baseload power. Over the next 10 years, the average annual peak forecast is expected to grow between 1.2% and 1.5% per year.

- To satisfy the growing demand, NYISO has added capacity every year since 2000 at an average of 1,654 MW per year.

- If the supply of energy is not increased and existing demand trends continue, reserve margins will be reduced.

- Given concerns in New York and throughout the northeastern United States about climate change and carbon emissions, NMP3NPP will serve another important need by reducing carbon emissions in the state. NMP3NPP will displace significant amounts of carbon as soon as the plant becomes operational, as contrasted with a coal-fired power-generating facility.

10.4.1.2 Energy Alternatives

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

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

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

10.4.1.3 Alternative Locations for the Proposed Facility

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

Four alternative sites were chosen for analysis: the NMP3NPP site collocated with the existing nuclear facility Nine Mile Point Nuclear Station (NMPNS), a site collocated with the existing nuclear facility R. E. Ginna (Ginna), a site located adjacent to an existing coal-fired facility (AES Somerset), and a site collated with an existing hydroelectric facility (Blenheim-Gilboa). These sites were chosen because, based on the site selection process implemented, they met the site selection criteria and are among the best possible sites available. The alternative sites were evaluated based on potential impacts to land use, air quality, water, terrestrial ecology and sensitive species, aquatic ecology and sensitive species, demographics, socioeconomics and

environmental justice, and historic, cultural, and archeological resources, as described in Section 9.3.

The evaluation concluded that the preferred location for the new nuclear power generating facility is the NMP3NPP site, collocated with the NMP Unit 1 and Unit 2 in Oswego County, New York. Siting a new reactor at an existing nuclear facility offers a number of benefits:

- By collocating nuclear reactors, the total number of generating sites is reduced.
- 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 original selection procedure.
- The environmental impacts of both construction and operation of the existing unit area known. It can be expected that the impacts of a new unit should be comparable to those of the operating nuclear plant.
- Collocated sites can share existing infrastructure, reducing both development costs and environmental impacts associated with construction of new access roads, waste disposal areas, and other important supporting facilities and structures. Construction of new transmission corridors may be eliminated or reduced because of the potential use of existing corridors.
- Existing nuclear plants have nearby markets, the support of the local community, and the availability of experienced personnel.

10.4.1.4 Benefits of the Proposed Facility

Locating the proposed new nuclear facility at the existing NMPNS property at the NMP3NPP site will afford benefits to the local economy. The NMP3NPP owners will pay property taxes on the proposed new unit for the duration of the operating licenses. NMP3NPP owners estimate that annual property tax payments could reach approximately [$78.3 million] following plant startup, which is scheduled for 2018. Most people consider large tax payments a benefit to the taxing entity because they support the development of infrastructure that supports further economic development and growth.

The existing nmp Unit 1 and Unit 2 employs a nuclear-related permanent workforce of approximately 1,281 employees (NMPNS, 2004). As stated in Section 4.4.2.2.1, construction of NMP3NPP is anticipated to require a peak, full-time equivalent workforce in excess of 3,900 full-time equivalents, while operation of NMP3NPP will require the addition of approximately 363 employees to the onsite workforce (see Section 5.8.2). An estimated 1,420 new jobs within approximately a 50-mile (mi) (80-kilometer [km]) radius of the plant would be created by the construction and operation of the new facility. Many of these jobs would be in the service sector and could be filled by unemployed local residents, lessening demands on social service agencies in addition to strengthening the economy. It is anticipated that the new jobs would be maintained throughout the life of the plant.

Construction and operation of the new nuclear facility at NMP3NPP would generate an economic multiplier effect in the area. The economic multiplier effect means that for every

dollar spent, an additional $0.70 of indirect economic revenue would be generated over the construction period within the region of influence (U.S. Bureau of Economic Analysis [BEA], 2008). The economic multiplier effect is one way of measuring direct and secondary effects. Direct effects reflect expenditures for goods, services, and labor, while secondary effects include subsequent spending in the community. The economic multiplier effect due to the increased spending by the direct and indirect labor force created as a result of the construction and operation of the new nuclear reactor unit would increase economic activity in the region, most noticeably in Oswego County.

Given concerns in the ROI/primary market area about climate change and carbon emissions, NMP3NPP serves an important environmental benefit need by reducing carbon emissions in the state. Upon operation, NMP3NPP would displace significant amounts of carbon compared to a coal-fired generating plant. The costs of climate change, which have been quantified, will have a significant impact on the global and national economies.}

10.4.2 COSTS

{This section summarizes estimated costs for construction and operation of NMP3NPP. The information provided in this section was prepared in accordance with the guidance provided in NUREG-1555, ESRP 10.4.2 (NRC, 2007b). The discussion below provides sufficient economic information to assess and predict costs and benefits.

Table 10.4-1 summarizes the benefits and costs of the proposed action. Section 10.5 summarizes the potential cumulative adverse environmental impacts at the proposed project site.

As described in Sections 4.4.2 and 5.8.2, internal costs are the monetary costs of 1) construction, and 2) operation of NMP3NPP. Internal costs can include capital costs of the nuclear power plant, transmission lines, and operating costs (staffing, maintenance, and fuel), as well as decommissioning costs.

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

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

The four economic studies identified above provide sufficient economic information to assess and predict costs of NMP3NPP. By conducting a systematic review of the economics of nuclear power, the studies were able to generate a financial model that estimated the costs of new nuclear power plants coming online in the future. To develop that model, several factors were investigated:

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

Using the information contained within the four studies previously identified, the internal costs of constructing and operating NMP3NPP were developed, meeting the intent of NUREG-1555. The construction and operation cost values accounted for aspects of pertinent construction and operation practices and methods unique to nuclear power generating facilities and were based on industry standards, as outlined in the literature cited above.}

10.4.2.1 Monetary - Construction

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

- Expressed as a constant dollar amount versus actual nominal dollars
- Expressed in $/kilowatt (kW)
- For the nuclear industry, the overnight capital cost does not include inflation, financing, extraordinary site costs, licensing, transmission or the initial fuel load

Overnight costs are exclusive of interest and include engineering, procurement, and construction costs, owner's costs, and contingencies. Published literature, vendor information, internally generated general/site-specific information, and the four studies identified in Section 10.4.2 were reviewed in order to evaluate the monetary cost of NMP3NPP.

The four studies identified in Section 10.4.2 estimate overnight capital costs that range from $1,100 to $2,300/kW, with $1,500 to $2,000/kW being the most representative range. Many factors account for the range, such as the following examples: the specific technology and assumptions about the number of like unit(s) built, allocation of first-of-a-kind costs, site location and parity adjustments to allow comparison between countries, and allowances for contingencies. The estimates are not based on nuclear power plant construction experience in this country and are more than 20 years old. Actual construction costs overseas have been less than most recent domestic construction, suggesting that the industry has learned from the domestic experience. There is an assumption that the overseas experience can be applied domestically, and the studies have found that overseas experience would be most applicable to estimating the cost of the new domestic nuclear power plant construction.

The four studies identified in Section 10.4.2 tend to support $2,000/kW as a reasonable high-end overnight capital cost estimate. The $2,300 value presented above is based on construction in Japan (Nuclear Energy Agency, 2005). While no explanation is offered as to why this cost is so high, it is reasonable to suggest that contributing factors are the high cost of

living in Japan (labor accounts for more than 20 percent of costs) and difficulties associated with construction on an island. For the purpose of the analysis in this Environmental Report and to avoid understating the cost, the $2,000/kW value was chosen. According to Section 3.2, the U.S. Evolutionary Power Reactor (EPR) nuclear power plant for NMP3NPP will have a rated core thermal power of 4,590 megawatts thermal (MWt) and a rated net electrical output of greater than or equal to 1,600 megawatts electric (MWe). As identified in Section 4.4.2.6.2, the total project capital cost estimated for NMP3NPP is [ ] (in 2007 dollars).

10.4.2.2 Monetary - Operation.

The economics associated with the operation of NMP3NPP are discussed in Section 5.8.2. Operational costs for power generating facilities are frequently expressed as the levelized cost of electricity, which is the price at the busbar needed to cover operating costs and annualized capital costs. Overnight capital costs account for one-third of the levelized cost, and interest costs on the overnight costs account for another 25 percent (UC, 2004). The four studies identified in Section A10.4.2 demonstrate a wide range of operation cost estimates. Levelized cost-of-electricity estimates range from $36 to $83/megawatt hour (MWh) ($0.036 to $0.083/kWh). Factors affecting the range include choices for discount rate, construction duration, plant life span, capacity factor, cost of debt and equity that is split between debt and equity financing, depreciation time, tax rates, and premium for uncertainty. According to the UC study, the projected cost associated with operating a new nuclear power plant (similar to the size of NMP3NPP) is in the range of $31 to $46/MWh ($0.031 to $0.046/kWh) (UC, 2004).

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

- The U.S. Department of Energy (DOE) has provided financial support for plants testing the NRC licensing processes for early site permits and combined operating licenses.
- The U.S. government has endorsed nuclear energy as a viable carbon-free generation option.
- The Energy Policy Act of 2005 instituted a production tax credit for the first advanced reactors brought online in the United States.

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

10.4.3 SUMMARY

{Table 10.4-1 summarizes the benefits and costs associated with the proposed construction and operation of NMP3NPP, including information regarding select mitigation measures for potential impacts. Benefits-cost information for the three alternative sites to NMP3NPP, the Ginna, Blenheim-Gilboa, and AES Somerset sites, are also presented in Table 10.4-1. Costs that

are environmental impacts are those anticipated after proposed mitigation measures are implemented. Section 10.5 addresses the environmental costs and cumulative impacts.

There is a growing baseload demand and a growing shortfall in baseload supply in the ROI/primary market area. Energy alternatives were evaluated with nuclear power being the choice to meet the needed energy demands. Based on the site selection process, it was determined that the proposed nuclear power plant should be collocated with the NMP Unit 1 and Unit 2 in Oswego County, New York. NMP3NPP will result in reduced emissions with respect to comparably sized coal- or gas-fired alternative power-generating facilities. While the additional direct and indirect creation of jobs for the construction and operation of the proposed nuclear power plant might place a temporary burden on local services and infrastructures, the annual taxes and revenue generated by the new workers would contribute to the local economy and the productivity of the region.

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

10.4.4 REFERENCES

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Table 10.4-1—{(Benefits and Costs of the Proposed Project Summarized)}

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Category	Proposed Site NMP3NPP Site	Option 1 Ginna Site	Option 2 Blenheim-Gilboa Site	Option 3 AES Somerset Site
Project Description	The NMP3NPP site is collocated with a nuclear power generating facility, NMPNS, located in Oswego County, New York.	The Ginna site is collocated with a nuclear power generating facility, R.E. Ginna Nuclear Power Plant, located in Wayne County, New York.	The Blenheim-Gilboa site is collocated with a hydroelectric generating facility located in Schoharie County, New York.	The AES Somerset site is collocated with a coal-fired electric plant located in Niagara County, New York.
BENEFITS				
Electricity Generated and Generating Capacity	The EPR nuclear power plant for NMP3NPP has a rated core thermal power of 4,590 MWt and a rated net electrical output of greater than or equal to 1,600 MWe.	It is assumed that the electricity generated and generating capacity would be similar to that of NMP3NPP.	It is assumed that the electricity generated and generating capacity would be similar to that of NMP3NPP.	It is assumed that the electricity generated and generating capacity would be similar to that of NMP3NPP.
Fuel Diversity	Nuclear energy provides an alternative to natural gas. It does not have price volatility of natural gas; fuel availability issues limited.	Nuclear energy provides an alternative to natural gas. It does not have price volatility of natural gas; fuel availability issues limited.	Nuclear energy provides an alternative to natural gas. It does not have price volatility of natural gas; fuel availability issues limited.	Nuclear energy provides an alternative to natural gas. It does not have price volatility of natural gas; fuel availability issues limited.
Licensing Certainty	Resolution of design criteria through certification; resolution of site, construction, and operational issues in Combined License Application (COLA); reliance on nuclear power generation.	Resolution of design criteria through certification; resolution of site, construction, and operational issues in COLA; reliance on nuclear power generation.	Resolution of design criteria through certification; resolution of site, construction, and operational issues in COLA; reliance on nuclear power generation.	Resolution of design criteria through certification; resolution of site, construction, and operational issues in COLA; reliance on nuclear power generation.
Carbon Emissions (reduction)	Coal: (1,908,000 carbon dioxide equivalents [CO_2e]) Natural Gas: (623,000 CO_2e) Nuclear: No carbon emissions	Coal and Natural Gas: It is assumed that carbon emissions reduction would be similar to NMP3NPP. Nuclear: No carbon emissions	Coal and Natural Gas: It is assumed that carbon emissions reduction would be similar to NMP3NPP. Nuclear: No carbon emissions	Coal and Natural Gas: It is assumed that carbon emissions reduction would be similar to NMP3NPP. Nuclear: No carbon emissions
Increased Customer Choice	Retail choice of "clean" energy source in addition to menu of renewable sources.	Retail choice of "clean" energy source in addition to menu of renewable sources.	Retail choice of "clean" energy source in addition to menu of renewable sources.	Retail choice of "clean" energy source in addition to menu of renewable sources.
Local Economy	The impact of NMP3NPP on the local and regional economy is discussed in Sections 4.4.2 and 5.8.2. As stated in Section 4.4.2.2.1, construction of the proposed power plant will add in excess of 3,900 full-time equivalent wokers (peak) to the workforce.	It is assumed that a workforce similar in size to that of the anticipated workforce for NMP3NPP would be required.	It is assumed that a workforce similar in size to that of the anticipated workforce for NMP3NPP would be required.	It is assumed that a workforce similar in size to that of the anticipated workforce for NMP3NPP would be required.

Table 10.4-1—{(Benefits and Costs of the Proposed Project Summarized)}

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Category	Proposed Site NMP3NPP Site	Option 1 Ginna Site	Option 2 Blenheim-Gilboa Site	Option 3 AES Somerset Site
Local Economy (continued)	It is anticipated that an additional approximately 363 employees would be added to the onsite workforce for operation of the nuclear power plant. Construction and operation workforce will provide a noticeable but SMALL economic benefit to the area economy.	Construction and operation workforce will provide a SMALL economic benefit to the area economy.	Construction and operation workforce will provide a SMALL economic benefit to the area economy.	Construction and operation workforce will provide a SMALL economic benefit to the area economy.
Aesthetic Values	The NMPNS site already contains an existing nuclear power plant cooling tower and plume. The steam plume from the NMP3NPP cooling tower will not introduce any new elements to the landscape and, therefore, will result in SMALL aesthetic impacts.	The Ginna site already contains an existing nuclear power plant cooling tower and plume. The steam plume from the Ginna cooling tower will not introduce any new elements to the landscape and, therefore, will result in SMALL aesthetic impacts.	Selection of design and cooling tower technology allows for minimal aesthetic impacts. Site contains existing hydroelectric power plant structures.	The AES Somerset site already contains an existing coal-fired power plant cooling tower and plume. The steam plume from the AES Somerset site cooling tower will not introduce any new elements to the landscape and, therefore, will result in SMALL aesthetic impacts.
Air Quality	Major beneficial impact in terms of avoidance of coal-fired or natural gas power plant emissions.	Major beneficial impact in terms of avoidance of coal-fired or natural gas power plant emissions.	Major beneficial impact in terms of avoidance of coal-fired or natural gas power plant emissions.	Major beneficial impact in terms of avoidance of coal-fired or natural gas power plant emissions.
Land Use	There are approximately 769 acres (ac) (311 hectares [ha]) available onsite to support a new nuclear power plant. Land to be used for the proposed nuclear power plant and appurtenant structures is owned by Constellation Energy Group, Inc. (CEG). The land is collocated with an existing nuclear power plant so as to take advantage of existing nuclear power plant and ancillary infrastructure.	There is approximately 370 ac (150 ha) available onsite to support a new nuclear power plant. Land to be used for the proposed nuclear power plant and appurtenant structures is owned by CEG. The land is collocated with an existing nuclear power plant so as to take advantage of existing nuclear power plant and ancillary infrastructure.	The site would support the EPR footprint (240 ac [97 ha] plus an additional 180 ac (73 ha) needed for ancillary structures, construction laydown area, parking areas, and construction support areas. Land would need to be acquired from the current site owners for the proposed nuclear power plant. The required land is collocated with an existing hydroelectric power plant so as to take advantage of applicable power plant and ancillary infrastructure.	The site would support the EPR footprint (240 ac [97 ha] plus an additional 180 ac (73 ha) needed for ancillary structures, construction laydown area, parking areas, and construction support areas. Land would need to be acquired from the current site owners for the proposed nuclear power plant. The required land is collocated with an existing coal-fired power plant so as to take advantage of applicable power plant and ancillary infrastructure.

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Category	Proposed Site NMP3NPP Site	Option 1 Ginna Site	Option 2 Blenheim-Gilboa Site	Option 3 AES Somerset Site
State/Local Tax Payments during Construction and Operations	Tax information associated with the construction and operation of NMP3NPP is discussed in Sections 4.4.2 and 5.8.2. Construction will generate tax revenues from sources including income tax, retail sales tax on materials, supplies, and selected construction services; retail sales tax on expenditures by workers; and corporate income taxes paid by contractors.	It is assumed that tax revenues generated from the construction and operation of the proposed nuclear power plant would be similar to those noted for NMP3NPP.	It is assumed that tax revenues generated from the construction and operation of the proposed nuclear power plant would be similar to those noted for NMP3NPP.	It is assumed that tax revenues generated from the construction and operation of the proposed nuclear power plant would be similar to those noted for NMP3NPP.
	During operation of the nuclear power plant, local government tax revenues will accrue from property taxes and permitting and impact fees. Tax payments (estimated annual) would occur annually over the life of the proposed nuclear power plant. As stated in Section 4.4.2, the increased power plant property tax revenues would result in a LARGE economic impact to Oswego County. Although the revenue from all taxes would be substantial, the overall beneficial impact to tax revenue in the region would be SMALL.	The overall beneficial impact to tax revenue in the region would be SMALL, similar to the NMP3NPP.	The overall beneficial impact to tax revenue in the region would be SMALL, similar to the NMP3NPP.	The overall beneficial impact to tax revenue in the region would be SMALL, similar to the NMP3NPP.

Table 10.4-1—{(Benefits and Costs of the Proposed Project Summarized)}

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Category	Proposed Site NMP3NPP Site	Option 1 Ginna Site	Option 2 Blenheim-Gilboa Site	Option 3 AES Somerset Site
Effects on Regional Productivity	The effect of the proposed project on the regional productivity is discussed in Sections 4.4 and 5.8. It is anticipated that the proposed project will have an increase in regional productivity through the influx of construction and station operation workers. Workers will create additional new indirect (service-related) jobs in the region through the multiplier effect of direct employment. Construction workers and their families will increase the population in the area. The expenditures of construction and operation workers for food, shelter, and services will create jobs, which will have a SMALL positive impact on the region's economy.	It is assumed that the effects on regional productivity from the construction and operation of the proposed nuclear power plant would be similar to those anticipated for NMP3NPP.	It is assumed that the effects on regional productivity from the construction and operation of the proposed nuclear power plant would be similar to those anticipated for NMP3NPP.	It is assumed that the effects on regional productivity from the construction and operation of the proposed nuclear power plant would be similar to those anticipated for NMP3NPP.
Technical and Other Nonmonetary Improvements (e.g., New Recreational Facilities and Improvements to Local Facilities)	NMP3NPP will be collocated with an existing nuclear power plant (NMPNS Units 1 and 2). As stated in Sections 4.4.2 and 5.8.2, existing local and county police, fire, and medical facilities and/or personnel should be able to accommodate the influx of construction and operation workers. The existing water supply and the township wastewater treatment facilities should be able to accommodate the added increase in population. The existing education and social services facilities should be able to accommodate the increase in population.	The proposed nuclear power plant would be collocated with an existing nuclear power plant (Ginna). The existing police, fire, and medical facilities and/or personnel should be able to accommodate the influx of construction and operation workers. The existing water supply and wastewater treatment facilities should be able to accommodate the added increase in population. The existing education and social services facilities should be able to accommodate the increase in population.	The proposed nuclear power plant would be collocated with an existing power plant. The existing local and county police, fire, and medical facilities and/or personnel should be able to accommodate the influx of construction and operation workers. A site-specific wastewater treatment facility/system, either onsite or municipal system if available, may be needed to accommodate the added increase in population. The existing education and social services facilities should be able to accommodate the increase in population.	The proposed nuclear power plant would be collocated with an existing power plant. The existing police, fire, and medical facilities and/or personnel should be able to accommodate the influx of construction and operation workers. A site-specific wastewater treatment facility/system, either onsite or municipal system if available, may be needed to accommodate the added increase in population. The existing education and social services facilities should be able to accommodate the increase in population.

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Category	Proposed Site NMP3NPP Site	Option 1 Ginna Site	Option 2 Blenheim-Gilboa Site	Option 3 AES Somerset Site
Technical and Other Nonmonetary Improvements (e.g., New Recreational Facilities and Improvements to Local Facilities) (continued)	Construction and operation activities should not have long-term, adverse impacts to recreational use of the surrounding area. Neither technical developments nor recreational enhancements are anticipated at this time from the construction and operation of NMP3NPP.	Construction and operation activities should not have long-term, adverse impacts to recreational use of the surrounding area. Neither technical developments nor recreational enhancements are anticipated at this time from the construction and operation of a new nuclear power plant.	Construction and operation activities should not have long-term, adverse impacts to recreational use of the surrounding area. Neither technical developments nor recreational enhancements are anticipated at this time from the construction and operation a new nuclear power plant. In addition, minor road improvements would occur near the nuclear power plant, on an as-needed basis, to support construction and operation activities.	Construction and operation activities should not have long-term, adverse impacts to recreational use of the surrounding area. Neither technical developments nor recreational enhancements are anticipated at this time from the construction and operation of a new nuclear power plant. In addition, minor road improvements would occur near the nuclear power plant, on an as-needed basis, to support construction and operation activities.
Environmental Enhancement	Reduction in carbon emissions with the use of nuclear power is a major environmental enhancement.	Reduction in carbon emissions with the use of nuclear power is a major environmental enhancement.	Reduction in carbon emissions with the use of nuclear power is a major environmental enhancement.	Reduction in carbon emissions with the use of nuclear power is a major environmental enhancement.
INTERNAL COSTS				
Construction Cost	Construction costs are discussed in Section 4.4.2. NMP3NPP will have a rated core thermal power of 4,590 MWt and a rated net electrical output of approximately 1,600 MWe. The total project capital cost estimated for NMP3NPP is [$14.429 billion] (in 2007 dollars).	It is anticipated that the proposed nuclear power plant would be similar to NMP3NPP (net electrical output of approximately 1,600 MWe). It is assumed that construction costs would be similar to those anticipated for NMP3NPP.	It is anticipated that the proposed nuclear power plant would be similar to NMP3NPP (net electrical output of approximately 1,600 MWe). It is assumed that construction costs would be similar to those anticipated for NMP3NPP.	It is anticipated that the proposed nuclear power plant would be similar to NMP3NPP (net electrical output of approximately 1,600 MWe). It is assumed that construction costs would be similar to those anticipated for NMP3NPP.

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Category	Proposed Site NMP3NPP Site	Option 1 Ginna Site	Option 2 Blenheim-Gilboa Site	Option 3 AES Somerset Site
Transmission System	The transmission system is discussed in Section 3.7, while transmission system impacts are discussed in Sections 4.1 and 5.6. Transmission system impacts would include construction of approximately 0.4 mi (0.64 km) of new line to tie NMP3NPP to the existing Scriba substation. The existing Clay - NMP Unit 1 Line #8 will also be intercepted and looped through the NMP3NPP switchyard to create two additional points of interconnection; one being the Clay substation approximately 26.5 miles to the south, and the other being the NMP Unit 1 plant. The cost of these upgrades is estimated to be approximately [$239 million]. No new off-site transmission corridors or widening of existing corridors will be required. New transmission lines would connect to the existing NMP Unit 1 substation and two other nearby substations. Therefore, transmission system upgrade costs would be similar or minimal compared to the other sites. Overall transmission system impacts from construction and operations would be SMALL.	The proposed nuclear power plant would be collocated with the existing Ginna facility. Currently, no right-of-ways (ROWs) capable of supporting the proposed nuclear facilities 345-kilovolt (kV) transmission lines exist. The tie-in from the proposed nuclear power plant to an existing 345-kV transmission corridor would require 20 mi (6 km) of new transmission lines and ROW corridors. Transmission system upgrades would be situated (if possible) in existing transmission corridors to avoid critical or sensitive habitats/species as much as possible. Transmission system impacts from construction would be MODERATE, while impacts from operations would be SMALL.	The proposed nuclear power plant at the Blenheim-Gilboa site would require a transmission system upgrade. Transmission system upgrades would be located in the immediate vicinity of the existing power plant to take advantage of existing transmission system infrastructure and to avoid critical or sensitive habitats/species as much as possible. Transmission system impacts from construction would be SMALL to MODERATE due to the commitment of land and impacts on ecological resources, while transmission system impacts from operations would be SMALL.	The proposed nuclear power plant at the AES Somerset site would require a transmission system upgrade. Transmission system upgrades would be located in the immediate vicinity of the existing power plant to take advantage of existing transmission system infrastructure and to avoid critical or sensitive habitats/species as much as possible. Transmission system impacts from construction would be MODERATE due to the commitment of land and impacts on ecological resources, while transmission system impacts from operations would be SMALL.
Operating Cost	Production cost is estimated to be $0.031 to $0.046/kWh.	Production costs would be similar to those anticipated for NMP3NPP.	Production costs would be similar to those anticipated for NMP3NPP.	Production costs would be similar to those anticipated for NMP3NPP.

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Category	Proposed Site NMP3NPP Site	Option 1 Ginna Site	Option 2 Blenheim-Gilboa Site	Option 3 AES Somerset Site
Land Use	Land use is discussed in Section 2.2, while land use impacts are discussed in Sections 4.1 and 5.1. There is approximately 712 ac (288 ha) available on-site to support a new nuclear power plant. NMP3NPP will be collocated with an existing nuclear power plant, NMP Unit 1 and Unit 2 owned by CEG. Impacts on land use will be minimal compared to a new site and are anticipated to be SMALL from both construction and operations.	The existing R. E. Ginna Nuclear Power Plant site is approximately 488 ac (197 ha), and approximately 370 ac (150 ha) is available to support a new nuclear power plant collocated onsite. Infrastructure and ancillary structures at the R.E. Ginna Nuclear Power Plant can also be utilized to support construction, laydown, and parking. Land to be used for the proposed nuclear power plant and appurtenant structures is owned by CEG. Impacts on land use would be minimal compared to a new site and are anticipated to be SMALL from both construction and operation.	The site would support the EPR footprint (240 ac [97 ha] plus an additional 180 ac (73 ha) needed for ancillary structures, construction laydown area, parking areas, and construction support areas. Land would need to be acquired from the current site owners for the proposed nuclear power plant. The required land is collocated with an existing power plant so as to take advantage of applicable power plant and ancillary infrastructures. Impacts on land use would be minimal compared to a new site and are anticipated to be SMALL from both construction and operation.	The site would support the EPR footprint (240 ac [97 ha] plus an additional 180 ac (73 ha) needed for ancillary structures, construction laydown area, parking areas, and construction support areas. Land would need to be acquired from the current site owners for the proposed nuclear power plant. The required land is collocated with an existing power plant so as to take advantage of applicable power plant and ancillary infrastructures. Impacts on land use would be minimal compared to a new site and are anticipated to be SMALL from both construction and operation.
Materials	Construction materials include concrete, aggregate, rebar, conduit, cable, piping, building supplies, and tools. Operating materials include uranium fuel. As stated in Section 5.8.2, it is estimated that approximately $9 million (in 2005 dollars) would be spent annually on materials, equipment, and outside services, excluding costs for planned outages.	It is assumed that construction materials would be similar to those anticipated for NMP3NPP. It is assumed that annual funding for materials, equipment, and services to operate the proposed nuclear power plant would be similar to those anticipated for NMP3NPP.	It is assumed that construction materials would be similar to those anticipated for NMP3NPP. It is assumed that annual funding for materials, equipment, and services to operate the proposed nuclear power plant would be similar to those anticipated for NMP3NPP.	It is assumed that construction materials would be similar to those anticipated for NMP3NPP. It is assumed that annual funding for materials, equipment, and services to operate the proposed nuclear power plant would be similar to those anticipated for NMP3NPP.

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Category	Proposed Site NMP3NPP Site	Option 1 Ginna Site	Option 2 Blenheim-Gilboa Site	Option 3 AES Somerset Site
Equipment	Typical construction equipment will include cranes, cement trucks, excavation equipment, dump truck, and graders. Equipment for the proposed nuclear power plant would include the necessary components, such as the reactors, turbines, cooling systems, water processing/ treatment systems, and cooling towers. As stated in Section 5.8.2, it is estimated that approximately $9 million (in 2005 dollars) would be spent annually on materials, equipment, and outside services, excluding costs for planned outages.	It is assumed that construction equipment would be similar to those anticipated for NMP3NPP. It is assumed that annual funding for materials, equipment, and services to operate the proposed nuclear power plant would be similar to those anticipated for NMP3NPP.	It is assumed that construction materials would be similar to those anticipated for NMP3NPP. It is assumed that annual funding for materials, equipment, and services to operate the proposed nuclear power plant would be similar to those anticipated for NMP3NPP.	It is assumed that construction materials would be similar to those anticipated for NMP3NPP. It is assumed that annual funding for materials, equipment, and services to operate the proposed nuclear power plant would be similar to those anticipated for NMP3NPP.
Services	Support services and supplies would be needed during construction. Security, maintenance, trash removal, and/or landscaping services may be needed during operation of NMP3NPP. As stated in Section 5.8.2, it is estimated that approximately $9 million (in 2005 dollars) would be spent annually on materials equipment, and outside services, excluding costs for planned outages.	It is assumed that construction support services would be similar to those anticipated for NMP3NPP. It is assumed that annual funding for materials, equipment, and services to operate the proposed nuclear power plant would be similar to those anticipated for NMP3NPP.	It is assumed that construction support services would be similar to those anticipated for NMP3NPP. It is assumed that annual funding for materials, equipment, and services to operate the proposed nuclear power plant would be similar to those anticipated for NMP3NPP.	It is assumed that construction support services would be similar to those anticipated for NMP3NPP. It is assumed that annual funding for materials, equipment, and services to operate the proposed nuclear power plant would be similar to those anticipated for NMP3NPP.

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Category	Proposed Site NMP3NPP Site	Option 1 Ginna Site	Option 2 Blenheim-Gilboa Site	Option 3 AES Somerset Site
Water Use	Water use is discussed in Sections 4.2 and 5.2. As stated in Section 5.2.1.2, the average water demand from Lake Ontario for NMP3NPP operation is anticipated to be 49.6 million gallons per day (187.8 million liters per day). As stated in Section 4.2.2.4, water required for construction of NMP3NPP is estimated to be between 22.1 and 41.6 million gallons (183.5 to 157.6 million liters) annually.	It is assumed that construction and operations water use for a nuclear power plant at the Ginna site would be similar to the water use anticipated for NMP3NPP.	It is assumed that construction and operations water use for a nuclear power plant at the Blenheim-Gilboa site would be similar to is the water use anticipated for NMP3NPP.	It is assumed that construction and operations water use for a nuclear power plant at the AES Somerset site would be similar to the water use anticipated for NMP3NPP.
	No groundwater would be used for the NMP3NPP. Groundwater impacts from foundation dewatering and other construction activities will be SMALL and will not affect other local users. Possible impacts to unconsolidated aquifer water quality are also SMALL. Lake Ontario would supply adequate surface water for plant use. 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. Impacts from construction to surface water quality downstream are anticipated to be SMALL due to implementation of best management practices (BMPs). Water use impacts associated with operation activities are anticipated to be SMALL.	No groundwater is anticipated to be used at this site. Lake Ontario would supply adequate surface water for plant use. Water use impacts from construction and operation are anticipated to be SMALL.	No groundwater is anticipated to be used at this site. Water for the nuclear power plant would be drawn from the Schoharie Creek/Upper Blenheim-Gilboa Reservoir/Lower Blenheim-Gilboa Reservoir complex. Water use impacts from construction and operation are anticipated to be SMALL.	No groundwater is anticipated to be used at this site. Lake Ontario would supply adequate surface water for plant use. Water use impacts from construction and operation are anticipated to be SMALL.

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Category	Proposed Site NMP3NPP Site	Option 1 Ginna Site	Option 2 Blenheim-Gilboa Site	Option 3 AES Somerset Site
EXTERNAL COSTS				
Air Quality	Air quality for NMP3NPP is discussed in Section 2.7. The NMP3NPP site will not be located in an area designated as a maintenance or non-attainment area for any air pollutants by the U.S. Environmental Protection Agency (USEPA). Emissions are low enough at the existing NMPNS to be exempt from any permit requirements. Based on the design of the proposed nuclear power plant, siting the plant at this location would have a SMALL impact on air quality.	Air quality in the vicinity of the Ginna site exceeds national standards for all measured parameters. There are no nearby areas designated as areas of non-attainment or maintenance areas. 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 plant and the actions that will be taken to comply with permit requirements for emissions, it is expected that siting a new nuclear power plant at this location would have a SMALL impact on air quality.	The Blenheim-Gilboa site is located in an area that is designated as being in attainment of all federally regulated pollutants except for ozone by USEPA. Air emissions that will occur as a result of the operation of the proposed nuclear power plant will be low enough that they are not expected to cause or contribute to a significant change in local or regional air quality levels, nor will they contribute to a degradation of ozone levels. Therefore, air quality impacts would be SMALL.	The AES Somerset site is located in an area that is designated as being in attainment of all federally regulated pollutants except for ozone by USEPA. Air emissions that will occur as a result of the operation of the proposed nuclear power plant will be low enough that they are not expected to cause or contribute to a significant change in local or regional air quality levels, nor will they contribute to a degradation of ozone levels. Therefore, air quality impacts would be SMALL.
Terrestrial Ecology	Terrestrial ecology impacts are discussed in Sections 4.3, 5.3, 5.6, and 9.3. The predominant land cover at the NMP3NPP site is woodlands. Federal- and state-designated wetlands, including shrub wetlands, bogs, emergent marshes, forested wetlands, and inactive agricultural lands, also occur on the site. Flora and fauna found on or near the site are typical of disturbed areas in the coastal communities of the region. The area is part of the Atlantic Flyway, so bird numbers and species vary seasonally as birds migrate through or return to breed.	Section 9.3 provides a discussion on the terrestrial ecology impacts at the Ginna site. 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. No federally listed threatened or endangered terrestrial species are known to occur at the site.	The Blenheim-Gilboa site is surrounded to the east by deciduous and evergreen forests. Section 9.3 contains a list of federally and state-listed protected terrestrial species in the State of New York.	The AES Somerset site is situated in a flat agricultural area. Section 9.3 contains a list of federally and state-listed protected terrestrial species in the State of New York.

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Category	Proposed Site NMP3NPP Site	Option 1 Ginna Site	Option 2 Blenheim-Gilboa Site	Option 3 AES Somerset Site
Terrestrial Ecology (continued)	Potential impacts to terrestrial species would be minimized by searching for sensitive species before beginning construction activities and complying with permit and mitigation requirements. 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 NMP3PP is expected to be SMALL. Terrestrial impacts from construction and operation would be SMALL.	Potential impacts to terrestrial species would be minimized by searching for sensitive species before beginning construction activities and complying with permit and mitigation requirements. Terrestrial ecology impacts from construction would be MODERATE, while impacts from operations would be SMALL.	Potential impacts to terrestrial species would be minimized by searching for sensitive species before beginning construction activities and complying with permit and mitigation requirements. Terrestrial ecology impacts from construction would be MODERATE, while impacts from operations would be SMALL.	Potential impacts to terrestrial species would be minimized by searching for sensitive species before beginning construction activities and complying with permit and mitigation requirements. Terrestrial ecology impacts from construction would be MODERATE, while impacts from operations would be SMALL.
Aquatic Ecology	Aquatic ecology impacts are discussed in Sections 4.3, 5.3, 5.6, and 9.3. There are no federally listed threatened or endangered aquatic species in the vicinity of the NMP3NPP site. No state-listed endangered aquatic species have been collected in the extensive lake sampling and impingement monitoring efforts at the NMP3NPP site.	Section 9.3 provides a discussion on the aquatic ecology impacts at the Ginna site. There are no aquatic species federally or state listed as threatened or endangered in the vicinity of the Ginna site.	Section 9.3 provides a discussion of the aquatic ecology impacts at the Blenheim-Gilboa site. No federally or state-listed protected aquatic species occur at the site. There are emergent wetlands associated with Schoharie Creek, which borders the site to the west. Federal Emergency Management Agency (FEMA) floodplain maps show no flood zones within the area.	Section 9.3 provides a discussion of the aquatic ecology impacts at the AES Somerset site. No federally or state-listed protected aquatic species occur at the site. There are small areas of forested and scrub/shrub wetlands surrounding the site. FEMA floodplain maps indicate there is a small floodplain associated with Lake Ontario to the north of the site area.

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Category	Proposed Site NMP3NPP Site	Option 1 Ginna Site	Option 2 Blenheim-Gilboa Site	Option 3 AES Somerset Site
Aquatic Ecology (continued)	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.	Aquatic ecology impacts from construction would be SMALL to MODERATE based on loss of wetlands, temporary loss of habitat, and short-term degradation of water quality in isolated areas due to in-water and shoreline construction. Impacts to aquatic ecology from operations would be SMALL. Impacts to aquatic ecology would be minimized through implementation of BMPs and good engineering practices.	Aquatic ecology impacts from construction would be SMALL to MODERATE based on loss of wetlands, temporary loss of habitat, and short-term degradation of water quality in isolated areas due to in-water and shoreline construction. Impacts to aquatic ecology from operations would be SMALL. Impacts to aquatic ecology would be minimized through implementation of BMPs and good engineering practices.	Aquatic ecology impacts from construction would be SMALL to MODERATE based on loss of wetlands, temporary loss of habitat, and short-term degradation of water quality in isolated areas due to in-water and shoreline construction. Impacts to aquatic ecology from operations would be SMALL. Impacts to aquatic ecology would be minimized through implementation of BMPs and good engineering practices.
Socioeconomic	Socioeconomic impacts associated with the construction and operation of NMP3NPP are discussed in Sections 4.4 and 5.8. Oswego County's 2000 population was 122,377, with a median household income of $36,598. The overall impact of NMP3NPP on the population and demographics of Oswego County is expected to be SMALL. The overall environmental justice impacts would be SMALL. The 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 plant at this location.	Section 9.3 provides a discussion on the socioeconomic impacts associated with the construction and operation of a new nuclear power plant at the Ginna site. Wayne County's 2000 population was 93,765, with a median income of $44,157. The overall impacts on the population and demographics of Wayne County from construction and operation are anticipated to be SMALL. The overall environmental justice impacts are anticipated to be SMALL. The construction- and operation-related impacts to historical, cultural, and archeological resources are anticipated to be SMALL, but investigations of the site would be needed before siting a new nuclear power plant at this location.	Socioeconomic impacts associated with the construction and operation of a nuclear power plant at the Blenheim-Gilboa site are discussed in Section 9.3. Schoharie County's 2000 population was 31,582, with a median income of $36,585. The overall impacts on the population and demographics of Schoharie County are anticipated to be SMALL. The overall environmental justice impacts are anticipated to be SMALL to MODERATE. The construction- and operation-related impacts to historical, cultural, and archeological resources are anticipated to be SMALL, but investigations of the site would be needed before siting a new nuclear power plant at this location.	Section 9.3 provides a discussion on the socioeconomic impacts associated with the construction and operation of a new nuclear power plant at the AES Somerset site. Niagara County's 2000 population was 219,846, with a median income of $38,136. The overall impacts on the population and demographics of Niagara County are anticipated to be SMALL. The overall environmental justice impacts are anticipated to be SMALL. The construction- and operation-related impacts to historical, cultural, and archeological resources are anticipated to be SMALL, but investigations of the site would be needed before siting a new nuclear power plant at this location.

Table 10.4-1—{(Benefits and Costs of the Proposed Project Summarized)}

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Category	Proposed Site NMP3NPP Site	Option 1 Ginna Site	Option 2 Blenheim-Gilboa Site	Option 3 AES Somerset Site
Housing	Socioeconomic impacts (housing) associated with the construction and operation of NMP3NPP are discussed in Sections 4.4 and 5.8. As stated in Sections 4.4.2.4 and 5.8.2.2, the region of influence and each county in it have enough housing units to meet the needs of the temporary and permanent workforce. Impacts on housing from construction and operation would be SMALL.	As discussed in Section 9.3, it is anticipated that there will be adequate housing units available to meet the needs of the temporary and permanent workforce. Impacts on housing from construction and operation would be SMALL.	As discussed in Section 9.3, it is anticipated that there will be adequate housing units available to meet the needs of the temporary and permanent workforce. Impacts on housing from construction and operation would be SMALL.	As discussed in Section 9.3, it is anticipated that there will be adequate housing units available to meet the needs of the temporary and permanent workforce. Impacts on housing from construction and operation would be SMALL.
Local Infrastructure	Local infrastructure surrounding the NMP3NPP site is discussed in Sections 2.1, 2.2, 4.4, and 5.8. Increased traffic at the beginnings and ends of shifts may increase traffic on highways to and from the site. The proposed plant will be collocated with an existing nuclear power plant. Due to increased traffic, particularly during shift change, impacts to transportation from construction will be MODERATE, while impacts from operations will be SMALL. Overall impacts on local infrastructure would be SMALL.	Increased traffic at the beginnings and ends of shifts may increase traffic on highways to and from the site. The proposed plant will be collocated with an existing nuclear power plant. Impacts to transportation are anticipated to be SMALL to MODERATE from construction activities and SMALL from operation activities. Overall impacts on local infrastructure would be SMALL to MODERATE.	Increased traffic at the beginnings and ends of shifts may increase traffic on highways to and from the site. The proposed plant will be collocated with an existing power plant. Impacts to transportation are anticipated to be similar to those for NMP3NPP. Overall impacts on local infrastructure would be SMALL to MODERATE.	Increased traffic at the beginnings and ends of shifts may increase traffic on highways to and from the site. The proposed plant will be collocated with an existing power plant. Impacts to transportation are anticipated to be similar to those for NMP3NPP. Overall impacts on local infrastructure would be SMALL to MODERATE.

Table 10.4-1—{(Benefits and Costs of the Proposed Project Summarized)}

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Category	Proposed Site NMP3NPP Site	Option 1 Ginna Site	Option 2 Blenheim-Gilboa Site	Option 3 AES Somerset Site
Radiological Health	Radiological exposure is discussed in Sections 4.5 and 5.4. Radiological exposure from a new nuclear power plant is anticipated to be below limits to workers and the public. Radiological exposure from construction and operations is anticipated to be SMALL.	It is anticipated that radiological exposure from a new nuclear power plant will bNMP3NPPe similar to that anticipated for NMP3NPP.	It is anticipated that radiological exposure from a new nuclear power plant will be similar to that anticipated for NMP3NPP.	It is anticipated that radiological exposure from a new nuclear power plant will be similar to that anticipated for NMP3NPP.
Loss of Resources	Loss of resources is discussed in Sections 10.1, 10.2, and 10.3. It is expected that mitigation will be used to minimize the adverse impact of the loss.	Loss of resources are anticipated to be similar to those anticipated for NMP3NPP.	Loss of resources are anticipated to be similar to those anticipated for NMP3NPP.	Loss of resources are anticipated to be similar to those anticipated for NMP3NPP.
Measures and Controls to Reduce Environmental Impact	Measures and controls to reduce environmental impacts are discussed in Sections 4.6 and 5.10. As stated in Section 4.6, based on existing site conditions, in-place NMP Unit 1 and Unit 2 programs and procedures, 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, which is expected to be MODERATE, but manageable with mitigation, and wetlands and surface water, which are expected to be LARGE, but manageable with mitigation. The existing nuclear power plant's mitigation and environmental monitoring programs may be expanded to account for NMP3NPP, thereby potentially reducing mitigation costs.	Costs associated with mitigation would be SMALL because the proposed nuclear power plant would be collocated with an existing nuclear power plant. The existing nuclear power plant's mitigation and environmental monitoring programs may be expanded to account for the proposed nuclear power plant, thereby potentially reducing mitigation costs.	Costs associated with mitigation would be SMALL because the proposed nuclear power plant would be collocated with an established hydroelectric site. Mitigation and environmental monitoring programs would need to be implemented to account for the proposed nuclear power plant.	Costs associated with mitigation would be SMALL because the proposed nuclear power plant would be collocated with an established coal-fired electric generating site. Mitigation and environmental monitoring programs would need to be implemented to account for the proposed nuclear power plant.

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10.5 CUMULATIVE IMPACTS

{Sections 10.1 through 10.3 summarize the adverse environmental impacts from construction and operation of NMP3NPP that are potentially unavoidable, irreversible or irretrievable. Measures to mitigate these impacts are also discussed. Section 10.4 compares the environmental and economic costs and benefits of the facility. This section summarizes the potential cumulative adverse environmental impacts to the NMPNS region. Cumulative impacts include those that are incremental to past and ongoing activities on the site, along with those that are reasonably foreseeable in the future.

This evaluation of cumulative impacts is based on a comparison between the existing environmental conditions presented in Chapter 2 and the potential adverse environmental impacts of construction and operation detailed in Chapter 4 and Chapter 5, respectively. The evaluation also considers continued operation and license renewal of NMP Unit 1 and Unit 2.

The NMP3NPP site consists of approximately 500 acres (202 hectares) and is located in Oswego County. NMP3NPP will be co-located near the existing nuclear power plant site currently occupied by NMP Unit 1 and Unit 2. The total project area encompasses approximately 900 acres (364 hectares). The NMP3NPP power block will occupy approximately 48.1 acres (19.5 hectares), while NMP3NPP construction is expected to utilize approximately 40 acres (16 hectares). Construction and operations will utilize approximately 302 acres (122 hectares).

The NMP3NPP site includes more than 1 mi (1.6 km) of the southeastern shoreline of Lake Ontario in Scriba Township, New York (NY). The site is approximately 6 mi (10 km) northeast of the City of Oswego. The major facilities and/or employers located nearby include the SUNY College, NMP Unit 1 and Unit 2, the James A. Fitzpatrick Nuclear Power Plant (NPPJAF Unit 1), and Novelis (formerly Alcan Aluminum Corporation). The 50 mi (80 km) radius surrounding the site includes parts of 10 New York counties and part of the Canadian Province of Ontario.

Land use in Oswego County in the vicinity of the site is predominantly agricultural, forest and residential. The NMP3NPP site consists mostly of mixed deciduous forest and cleared agricultural and recreational lands. NMP3NPP will occupy areas that currently include forest and wetland, yet structures and construction activities will be located to minimize impacts on the remaining forest. While the site is relatively flat, the regional topography is gently rolling terrain that gradually rises from the shoreline until it meets the Tug Hill Plateau to the east of the site and the Onondaga Hills to the south of the site. Grade elevations at the site range from 260 ft (79 m) to approximately 280 ft (85 m) above mean sea level.

The north and west boundary of the NMP3NPP site is Lake Ontario. The Lake has an area of 7,340 mi^2 (18,960 km^2), a volume of 393 mi^3 (1,638 km^3), and is bordered by the State of NY to the south and the Canadian Province of Ontario to the north. Approximately 80% of the water flowing into the Lake comes from Lake Erie with the other 20% coming from precipitation and tributaries. Most of Lake Ontario's water flows in to the St; Lawrence River, which feeds into the Atlantic Ocean.}

10.5.1 CUMULATIVE IMPACTS FROM CONSTRUCTION

{Construction impacts associated with NMP3NPP include grading and clearing, allocation of land to material lay-down and parking, use of ground and surface waters, equipment noise and emissions, increased traffic and use of public resources. These activities are consistent with those conducted during the construction of NMP Unit 1 and Unit 2. Many of the impacts will be temporary and most can be mitigated through the use of best management construction

practices and stormwater pollution prevention planning required under State and Federal regulation.

The principal sources of water for construction include local municipal water, Lake Ontario water and off-site water that will be trucked in. It is estimated that water use on work days will average approximately 250 gpm (950 lpm) or 360,000 gpd (1,363,000 lpd). Peak demand is estimated to reach 1,200 gpm (4,500 lpm). Municipal water provided by the Town of Scriba, which receives water from the City of Oswego will satisfy domestic needs. The City of Oswego draws and treats water from Lake Ontario. NMP Unit 1 and Unit 2 do not utilize groundwater for domestic needs; however, NMP Unit 2 does require the use of a permanent dewatering system.

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

While much of the site has historically experienced alterations to support agriculture and electric power generation, protection of important or otherwise unique terrestrial habitats were considered in developing the construction plan for NMP3NPP. Surveys of the site were undertaken to identify sensitive locations and protected species and efforts made to limit encroachment on these areas. Examples include locations with federally or state designated threatened or endangered species, wetland buffers and contiguous forest areas. While certain state or federal designated faunal species may occur on the site and in the vicinity, their presence was not found to be unique to areas potentially affected by construction. No rare, threatened or endangered plants were found on site.

Impacts to aquatic organisms found in freshwater streams on site and within Lake Ontario may be realized to the extent on-site surface waters are removed, dredging is performed and water quality is affected. The condition of the aquatic habitat and the species potentially found on site and in Lake Ontario is summarized in Section 2.4.2. The US Fish and Wildlife Service (FWS) does not identify the vicinity of NMPNS as critical habitat in Lake Ontario and aquatic species listed under the Federal Endangered Species Act would not likely be found there, except as transients. Further, the NY State Department of Environmental Conservation (NYDEC) stated that no aquatic species listed as endangered, threatened, or a species of concern were known to be located in the area and that no critical habitats were listed.

The aquatic communities found within Lake Ontario in the vicinity of NMPNS are typical of the Great Lakes. Although water quality is improving, Lake Ontario has experienced historical impacts resulting in eutrophication and introduction of invasive species, both impacting community assemblages. Section 2.4.2.2 provides an historical summary of habitat and food web changes. Five fish species found in Lake Ontario are listed either by the US FWS and/or the NYDEC. These include the deepwater sculpin, round whitefish, lake sturgeon, lake chubsucker, and the redfin shiner. None of these protected species has been captured in recent gill net and impingement sampling at the NMPNS site.

Despite the changes in habitat quality and relative dominance of key species, Lake Ontario is a valuable natural resource in that it sustains active recreational and charter boat fisheries for several fish species including Chinook and Coho salmon. Other important recreational fishes include, but not limited to, brown bullhead, yellow perch, and walleye, among others. The Lake, in the vicinity of NMP3NPP, provides no unique or protected habitat. Potential impacts to Lake Ontario would be associated with construction of the cooling water intake and discharge structures.

The Circulating Water Supply System (CWS) and the Essential Service Water System (ESWS) will utilize a common intake structure located just to the west of the existing NMPNS training building. The intake structure will be divided based on safety and non-safety related components. Cooling water will be withdrawn through two 15 ft (4.6 m) diameter intake tunnels, labeled tunnels A and B. Tunnel B will extend, 1,275 ft (389 m) out into the lake and Tunnel A will extend out a distance of 1,167 ft (356 m). Tunnel A also contains the discharge diffuser pipe that extends an additional 416 ft (127 m) into the Lake. Construction of the intake and discharge piping will be constructed by tunneling from shore thereby minimizing disturbance of sediments. The intake tunnels will be equipped with a cribhouse to limit entry of debris. The discharge structure will contain two risers with 1.5 ft (0.46 m) diameter ports. Construction activities in navigable waters will conform to applicable State of New York and U.S. Army Corps of Engineers regulations.

Impacts to lake benthic infauna will be negligible given the methods being used to install the intake and discharge piping. Further, there are no endangered or threatened aquatic species that have been found in the NMP3NPP site area of the Lake that are likely to affected by sedimentation or sediment removal. As a result, cumulative construction impacts to Lake Ontario are not expected.

The construction of NMP3NPP will impact on-site surface and groundwater resources. However, the preventive measures and corrective actions identified above and the short-term nature of construction activities should limit long-term cumulative impacts. As a result, the cumulative impact on surface and groundwater from NMP3NPP construction in conjunction with the continued operation of NMP Unit 1 and Unit 2 should be moderate. Additionally, the use of the existing off-site transmission right-of-way will limit the amount of land and related natural resources potentially impacted by construction.

The potential for archaeological finds on the NMPNS site was evaluated during the NMP Unit 1 and Unit 2 license renewal. Both the NRC and New York State Historic Preservation Office had confirmed that no archaeological and historic architectural sites had previously been recorded for the site. Subsequent field investigations indicated the presence of archaeological remains associated with several mapped historic locations. Additional archaeological investigations are ongoing and will include further consultation with the New York State Historic Preservation Office (SHPO) to aid in the identification of archeological sites and to determine their eligibility for listing on the National Register of Historic Places. Construction activities will be managed to minimize encroachment on any sites potentially found. Appropriate disposition of historical sites that cannot be avoided will be determined in conjunction the New York state SHPO. Impacts on archaeological sites and historic properties are further discussed in Section 2.5.3 and 4.1.3.

Potential adverse cumulative impacts to public health and well being stem from construction related noise, increased vehicular traffic, aesthetics and emissions. Noise levels will increase during construction with operation of heavy equipment and vehicles. While there are no local or state criteria for noise for the NMP3NPP, the EPA, the Department of Housing and Urban

Development (HUD) and the New York State Department of Environmental Conservation (NYSDEC) have established criteria for acceptable outdoor noise. Excess noise levels that may occur during construction will be minimized at the site boundary as a result of distance, topography and surrounding forest. The nearest residence is approximately 0.2 mi (0.32 km) from the NMP3NPP site. For on-site workers, it will be necessary to meet Occupational Safety and Health Administration (OSHA) exposure limits through training and use of personal protective equipment. Cumulative impacts are not expected as construction related noise will cease upon completion of the construction activities.

Traffic will increase during construction as workers commute from within and outside Oswego County. The main highway, New York State Route 104, will experience additional traffic during shift change over. It is estimated that the peak construction workforce will exceed 3,900 full time equivalents. The total workforce potentially on site or traveling to the site during NMP3NPP construction, including the NMP Unit 1 and Unit 2 and James A. Fitzpatrick NPP operations personnel, would approach approximately almost 5,700 individuals. During an outage at one of the operating units, the total workforce on-site during construction would approach 6,700 people.

Construction workers are expected to use Lake Road, Lake View Road, County Road 1, and New York Route 104 to access the NMP3NPP site. A new access road will be constructed onsite to accommodate the excess traffic resulting from NMP3NPP construction. The access road will remain the primary entrance for NMP3NPP during operation when the number of workers is dramatically reduced. Traffic to NMP Units 1 and 2 will be redirected to a new access road specific to those units. Heavy equipment, plant components and construction materials will be hauled in by barge through the Port of Oswego and by rail, thus avoiding temporary blockage of local highways. Construction of the access road, use of rail for heavy equipment, and the decrease in workers following construction will limit the cumulative impacts of traffic. A traffic study of potential impacts identified mitigation alternatives for implementation during the construction period. These include appropriately placed traffic signals at nearby intersections and additional access lanes at the NMP3NPP access road intersection.

Dust, engine exhaust and other facility operations will result in construction related emissions. Protective actions will be required to ensure that applicable ambient air quality and hazardous pollutant regulations are met. Applicable permits will be obtained and construction practices, such as dust control, will be implemented so that cumulative impacts on-site from emissions are limited and are discontinued following construction.

Surrounding forest canopy will limit visibility of construction activities from the landward side of the new unit. However, as construction proceeds, structures such as the CWS cooling tower and containment structure will be visible from certain vantage points, particularly to the north of NMP3NPP site, mostly from the surface of Lake Ontario. The lower profile design for the single mechanical tower proposed for the CWS, will reduce its visibility. Activities related to construction of the intake structure and the intake and discharge piping will be visible from the Lake but these activities will terminate during operation.

Socioeconomic benefits accrue from capital expenditures as well as the increased number of jobs created during construction and from the additional spending which results. It is estimated that during NMP3NPP construction, a total of between 750 and 1,312 households would move into the Region of Influence (ROI); 77% of these would relocate to Oswego County and 23% to Onondaga County. An increase in the indirect workforce of between 1,080 and 1,890 individuals is also expected to occur in the ROI during peak construction. For each dollar spent, indirect revenue would be generated within the ROI. This influx may impact various

public service institutions such as fire, EMS, education and recreational facilities. However, as a percentage, the increase in population is small and the financial benefit to local governments large, providing opportunities to address capacity.

No disproportionate impact on minority populations is anticipated due to the relatively low percent occurrence of minority groups in Oswego and the distance between the site and the minority groups located in Onondaga County, in and around Syracuse. The year 2000 U.S. census data show that only 3.5% of the population within Oswego County was minority and 16.4% within Onondaga County. New York State's population contained approximately 33.6% minorities. Of the 68 census block groups within Oswego County, none were defined as being a racial minority. Onondaga County had 73 aggregate minority census block groups out of 406. The percentage of low income families within Oswego County was 18.5%, somewhat higher than the State's average (14.2%). The percentage of low income families in Onondaga was 14.0%. The median income in both counties was less than the state. To the extent additional higher paying jobs are provided by NMP3NPP, there will be a beneficial impact within the ROI.

Construction workers on-site will receive some radiation dose from the continued operation of NMP Unit 1 and Unit 2 and James A. Fitzpatrick NPP (JAF) Unit 1. Doses were calculated based on exposure to direct radiation, gaseous effluents and liquid effluents. The annual maximum dose was estimated to be less than the public dose criteria of100 mrem/yr (1000 µSv/yr). Total collective dose during the construction period from all on-site sources is discussed in Section 4.5.5.

In summary, the construction of NMP3NPP will not result in long-term cumulative impacts that are inconsistent with existing land use. Activities that occur during construction will be managed using best management practices and compliance with applicable regulations to limit both short-term and long-term adverse impacts. Where necessary, actions to mitigate construction impacts will be evaluated and discussed with applicable regulatory agencies. Furthermore, impacts will cease following completion of NMP3NPP and efforts made to reclaim those areas not required for operations.}

10.5.2 CUMULATIVE IMPACTS OF OPERATIONS

{Potential cumulative adverse impacts from operations include the withdrawal of water from the Lake Ontario, discharge of cooling tower blowdown, radiological dose consequences, waste generation, noise from the mechanical cooling tower and socioeconomic changes. Each of these potential impacts is discussed below.

NMP3NPP will utilize closed-cycle cooling, and therefore the amount of cooling water withdrawn from Lake Ontario will be significantly reduced below that required for once-through cooling. The single CWS cooling tower is approximately 177 ft (54 m) high and will occupy an area of approximately 5.4 acres (2.17 hectares). It is estimated that the NMP3NPP CWS and ESWS will withdraw a maximum of approximately 29,459 gpm (111,514 lpm) to replace evaporative loss, drift, and blowdown. Blowdown to the retention basins of the CWS and Essential Service System (ESWS), and ultimately to Lake Ontario, will total approximately 9,713 gpm (34,724 lpm). Maximum CWS and ESWS cooling water discharge will be approximately 9,891 gpm (37,442 lpm).

The ESWS will utilize closed-cycle cooling, and will have 4 wet mechanical forced draft cooling towers above 4 rectangular pools. The ESWS cooling towers will typically be supplied with fresh water from the RWSS. Makeup flow to the ESWS cooling towers during normal operations will be approximately 1,713 gpm (6,480 lpm). Blowdown from the ESWS cooling towers will be routed to the retention basin, and ultimately Lake Ontario, and will be approximately 569 gpm

(2,150 lpm). Maximum ESWS cooling water makeup demand is approximately 3,426 gpm (13,000 lpm). Evaporative loss from the CWS tower will be approximately 16,864 pgm (63,837 lpm), while evaporative loss and from the four ESWS towers will total 1,142 gpm (4,320 lpm).

Physical impacts of cooling system water withdrawal could include alteration of site hydrology in the immediate vicinity of the intake structure. However, the NMP3NPP makeup water withdrawal rate is less than 0.03% of the total inflow into Lake Ontario. Since the amount of cooling water to be used for NMP3NPP and NMP Unit 1 and Unit 2 is a small fraction of available Lake volume, there should be no incremental cumulative adverse impact to the hydrology of Lake Ontario.

Aquatic impacts attributable to operation of the NMP3NPP intake structure and cooling water systems include impingement of organisms on the traveling screens and entrainment of fish eggs and larvae within the cooling system. Use of closed-cycle cooling systems at NMP3NPP will significantly reduce these impacts compared to power plants that operate open-cycle (once-through). In addition, NMP3NPP will incorporate design criteria to limit intake approach velocities to less than 0.5 ft/sec (0.15 m/sec).

Although a small amount of entrainment will occur, studies indicate that the NMP3NPP site area is not a spawning area for key species of recreational value, and that entrainment at NMP Unit 1 and Unit 2 has not resulted in detectable changes in population levels. Further, the dominant species that occur in the NMP3NPP site area of the Lake Ontario have not been identified as requiring habitat protection.

Blowdown from the cooling towers is returned to the Lake via the cooling tower Waste Water Retention Basin and the multiport diffuser. The diffuser will be located in 39 ft (12 m) of water. The temperature of the discharge will be approximately 15˚F (8˚C) above ambient in summer and 30˚F (16˚C) in winter, creating a small thermal plume. Modeling of this plume shows that its size and distribution will meet all State water quality criteria and will be sufficiently small that it is unlikely to cause impacts to the Lake's benthic community or motile organisms in the area.

Included in the blowdown discharge are chemicals used in biocide treatment and in plant process control. The concentrations discharged will be in conformance with State Pollutant Discharge Elimination System (SPDES) permit conditions and applicable water quality criteria. Additionally, the amount of water being discharged from the closed-cycle system will be small compared to Lake volume, such that concentrations of chemicals discharged will rapidly disperse. Solids will be allowed time for settlement and chemical treatment in the on-site retention basins, if required.

Because the use of closed-cycle cooling will limit cooling water requirements, the incremental impact from the operation of NMP3NPP along with Units 1 and 2 and James A. Fitzpatrick Unit 1 should not result in cumulative adverse ecological impacts attributed to cooling water withdrawal.

Excess heat within the CWS will be dissipated to the environment using a single low profile mechanical cooling tower. A visible plume is created when a portion of the cooling water evaporates as it leaves the tower, undergoing partial condensation. Typical impacts from the resulting plume include fogging, icing, and water and solids deposition. The extent of these impacts was simulated using predictive models. The plume length varies with season. The average plume length for the NMP3NPP CWS cooling towers is predicted to range between a low of 2.5 mi (4.0 km) during fall and a high of 3.7 mi (3.0 km) during spring. The annual

average predicted plume length would be 2.3 mi (3.7 km). Average plume height would range from 2,017 ft (611 m) in fall to 2,983 ft (903 m) in spring. Fogging and icing from the natural draft towers is not predicted to occur. Since heat load from the four ESWS trains is only a small fraction (6.3%) of the CWS towers, impacts would be considerably less and any cumulative effect is expected to be small.

Some deposition of solids from operation of the CWS cooling towers is predicted to occur (Section 5.3.3.1). Model predictions indicate that the maximum deposition from the condenser cooling water towers is expected to be below NUREG-1555 (NRC, 1999) significance levels for possible vegetation damage.

While the new cooling tower to be installed and operated as part of the NMP3NPP closed-cycle cooling water system will create a visible plume, the cumulative impact off-site is expected to vary by season and primarily be a function of viewpoint.

Elevated temperatures within cooling tower systems are known to promote the growth of thermophilic bacteria such as Legionella sp., amoeba such as Naegleria sp., and fungi. Thermophilic organisms are typically associated with freshwater and the Nuclear Regulatory Commission (NRC) has linked health issues to power plants that use cooling ponds, lakes and canals, and that discharge to small rivers. Given Lake Ontario flow, the growth and dispersion of thermophilic organisms is not expected to present a human exposure health threat. Biocide treatment of the CWS will limit the propagation and dispersal of thermophilic organisms. Furthermore, there is no evidence that the operation of the NMP Unit 1 and Unit 2 and James A. Fitzpatrick NPP Unit 1 towers has caused any related health or aquatic impacts.

Cumulative impacts on land use and the terrestrial environment are expected to be minimal given that the final footprint of the NMP3NPP structure will be permanently established following construction and no new transmission corridors off-site will be required. Terrestrial vegetative and faunal species that are critical to structure and function have been identified and impacts are predicted to stabilize following construction. Implementation of a Stormwater Pollution Prevention Plan will also serve to limit future impacts of erosion and inadvertent releases from industrial activities on-site.

Bird mortality from collision is a concern particularly at sites where tall structures such as natural draft cooling towers extend well beyond the tree canopy. However, collisions with towers historically have shown to have only minor impacts on bird populations. Furthermore, the low profile design of the CWS tower will further limit the potential for bird mortalities.

The sources of noise from operations include the switchyard, transformers, cooling towers and traffic. A baseline noise survey of existing conditions showed that there was no observed offsite audible noise from the operation of NMP Unit 1 and Unit 2 and James A. Fitzpatrick NPP Unit 1. Predicted noise from the new NMP3NPP cooling tower suggests that day and nighttime noise levels beyond the site boundary will be below maximum allowable levels due to sound attenuation with distance. Traffic noise will be limited to normal work day business hours during shift changes. Noise from the new onsite switchyard and transformers will be similar to that currently associated with NMP Units 1 and 2 and James A. Fitzpatrick NPP Unit 1. Taken together, the additional noise associated with NMP3NPP is not expected to affect noise levels off-site and will not represent an adverse cumulative impact.

Air emissions are limited by U.S. EPA standards and state permits as well as by OSHA worker health based standards. The primary sources of operational related emissions are the four emergency diesel generators and two station blackout diesel generators. Periodic testing of

the diesels is required to ensure their operability. The diesel generator engines are designed and operated to meet the increasingly stringent emission standards.

Additional emissions reductions from the diesel generators will be achieved through the purchase of low sulfur fuels. Carbon dioxide production will be limited to that small amount attributed to testing of the diesel generators. By contrast, a typical coal plant produces greater than 1,000 gCO2eg/kWh as compared to a typical nuclear power plant that produces on average approximately 5 gCO2eq/kWh. Natural gas plants have a corresponding carbon footprint of approximately 500 gCO2eq/kWh.

Exposure of the general public to radiation from the operation of NMP3NPP is a function of meteorology, relative location, population density, land use practices, harvest and consumption of food sources, and allowable radiological release limits. Dose consequences result from liquid and gaseous releases and from direct radiation. Each of these potential pathways has been analyzed to ensure that applicable public health exposure limits are met.

In addition, the potential dose from the operation of NMP3NPP has been combined with that predicted for NMP Unit 1 and Unit 2 and James A. Fitzpatrick NPP Unit 1. Results show that applicable NRC exposure limits are met, and that while there will be dose consequences resulting from operation of NMP3NPP, exposure will remain within applicable limits and will not represent an adverse cumulative impact.

Conservative estimates of radiological dose to biota also demonstrate that exposure to key selected species should result in no observable effects. An existing long-term radiological monitoring program will continue to verify that dose consequences to the general public are as low as reasonably achievable (ALARA).

The uranium fuel cycle will contribute to cumulative impacts from fuel production, transportation, storage and disposal. Related environmental impacts are attributed to land and water use, electrical consumption, chemical effluents, radioactive effluents and waste generation. The cumulative impacts from each of these sources has been reviewed based on an NRC mandated comparative assessment detailed in 10 CFR 51.51(a) (CFR, 2007).

Non-radioactive and mixed-wastes will be produced during NMP3NPP operations. Typically these consist of recyclables, solid waste debris, and sewage. Cumulative impacts will be managed through implementation of waste minimization practices including the procurement process, allocation of material for work, storage and recycling. Wastes that can not be recycled will be stored and disposed in accordance with applicable state and federal hazardous and non-hazardous waste regulations, and at licensed liquid and solid waste disposal locations. Properly sized and designed on-site facilities for storage will be provided and procedures put in place to deal with potential spills and emergency response.

Socioeconomic impacts (benefits) from long-term NMP3NPP3 operation result from the increased operational work force, facility taxes, and generation of competitively priced electricity. Approximately 363 additional employees will be required to support NMP3NPP operations. Most of these employees are expected to reside primarily within Oswego and Onondaga Counties. The NMP3NPP operational workforce will result in increased indirect employment of approximately 586 individuals.

An overall increase in population is expected as families relocate, acquire housing and utilize public services. It is estimated that the additional workforce will increase population within Oswego and Onondaga Counties by approximately 1,420 people compared to the existing

580,713 people (2006 Census) or an increase of approximately 0.2%. An analysis of available housing suggests that adequate supply is currently available to support the influx of operational employees.

NMP3NPP operational direct and indirect workforce would add about 374 new households to Oswego County. The number of students in these households would represent an increase of less than 0.4% of the existing public and [rivate student enrollment. Furthermore, existing police, fire, EMS, and school districts appear to have adequate capacity, and the additional tax revenue that Oswego County would realize will provide for increased resources if needed.

The median income of residents within Oswego and Onondaga Counties is slightly below that of the state and U.S. As a result, there may be an overall socioeconomic benefit from the operation of NMP3NPP to the extent workers are able to seek employment at NMP3NPP. The cumulative benefit, however, as a percentage, appears to be small. The relative proportion of racial minorities in Oswego County is small, only 3.5%, and there were no census blocks defined as being a racial minority. There is a larger percentage of racial minorities (16.4%) in Onondaga County but most of these are located in the Syracuse area, over 30 miles from the proposed NMP3NPP site. In each of the counties within the ROI, the percentage of minorities was less than that of NY State (33.6%). The cumulative impact therefore should be small and no minority class should be disproportionately impacted.

There are currently two known projects within the ROI that may contribute to cumulative environmental impacts and that may compete for resources or increase demands on public services. These include a new coal gasification plant in Scriba and the Nine Mile Point Unit 2 plant uprate. The coal gasification plant to be located just east of the City of Oswego will manufacture synthetic gas for transport via existing natural gas pipelines to a proposed cogeneration facility in Brooklyn New York. The NMP Unit 2 power uprate involves activities similar to those already conducted at the facility. Of the two projects, coal gasification is most likely to contribute to cumulative impacts. However, the relative impacts will be assessed by the appropriate regulatory agencies.}

10.5.3 CUMULATIVE IMPACTS SUMMARY

{The potential adverse short-term and long-term impacts from the construction and operation of NMP3NPP3 have been identified and actions to mitigate those impacts proposed. Activities to be undertaken during construction and operation of NMP3NPP are consistent with those currently in place for NMP Unit 1 and Unit 2. Except for the construction footprint, available land use and the terrestrial environmental will remain unchanged.

Operation of the new unit will require the use of certain natural resources including water withdrawal from Lake Ontario for cooling and will result in the release of gaseous, liquid and solid wastes, all in conformance with applicable Local, State, and Federal permit requirements and standards. Economic benefits accrue from capital expenditures, additional tax revenue and the jobs created during construction and operation. The environmental assessment demonstrates that cumulative adverse impacts to the vicinity and to the region will be small.}

10.5.4 REFERENCES

{**CFR, 2007.** Title 10, Code of Federal Regulations, Part 51, Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions, 2007.

FERC, 2006. Final EIS Dominion Cove Point LNG Project Expansion, Docket Nos. CP05-310-000 et al., U.S. Federal Energy Regulatory Commission, April 28, 2006, Website: www.ferc.gov/industries/lng/enviro/eis/04-28-06-eis-cove.asp, Date accessed: May 26, 2006

NRC, 1999. Standard Review Plans for Environmental Reviews for Nuclear Power Plants, NUREG-1555, Nuclear Regulatory Commission, 1999.}